



Monitoring report form (Version 03.1)

Monitoring report

| | |
|--|---|
| Title of the project activity | Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project |
| Reference number of the project activity | 1413 |
| Version number of the monitoring report | 3.0 |
| Completion date of the monitoring report | 14/08/2013 |
| Registration date of the project activity | 14/03/2008 |
| Monitoring period number and duration of this monitoring period | Monitoring period No. 2 (01/01/2009 – 31/12/2012) |
| Project participant(s) | - Jaroensompong Co., Ltd. - Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. |
| Host Party(ies) | Thailand |
| Sectoral scope(s) and applied methodology(ies) | 13: Waste handling and Disposal ACM0001 (version 05): Consolidated baseline and monitoring methodology for landfill gas project activities |
| Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD | 239,704 tCO ₂ |
| Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period | 126,264tCO ₂ |

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project (the Project) has received Thai DNA approval on 30/08/2007 and officially registered with CDM Executive Board on 14/03/2008 with registration reference number 1413.

Developer of the Project Jaroensompong Co., Ltd. (JS) has installed a landfill gas (LFG) collection system and a 1.1 MW electricity generator at the Rachathewa landfill site, which is located 30km east of the Bangkok Metropolitan Area (BMA), Thailand. The LFG collection system for the Project is based on horizontal line s and wells, which include a system for drainage and collection of leachate at the outer edges of the landfill. LFG collection system is constructed using PVC and HDPE piping to allow for settlement. Recovered LFG is being utilized as fuel for the electricity generator. The generated electricity is being sold to the Metropolitan Electricity Authority (MEA) under a power purchase agreement. The Project has also installed an open flare system to combust excess LFG not used in power generation to avoid release of collected LFG into atmosphere. The project does not involve direct utilization of LFG for thermal use. The project does not consume any fossil fuel during this monitoring period.

The project is the first in Thailand to utilize LFG for electricity generation on a commercial scale and contributes to sustainable development of the country by mitigating uncontrolled GHG emission from the landfill site in environmentally sound manner such as; preventing on-site fire hazard, controlling the release of volatile organic compounds, reducing undesirable odors, providing greater control of leachate drainage, and physically stabilizing the landfill site.

The Project started on 01/08/2004, which is the date on which JS entered into a contractual agreement with a local Engineering Company for the project construction, and is the earliest date at which real action of the project activity began. The construction of the LFG collection system and installation of biogas electricity generator were completed in June 2005, whereas the commissioning of the project plant was completed on 11/08/2005. The continued operation of the project (i.e. LFG collection, electricity generation, and electricity sales to the grid) started on 03/03/2006.

The total Emission Reductions claimed for the 2nd Monitoring Period from 01/01/2009 to 31/12/2012 is 126,264 tCO₂e.

A.2. Location of project activity

Host Party: The Kingdom of Thailand

Region/State/Province: Samuthprakarn

City/Town/Community: Rachathewa, Bangplee

Physical/Geographical location:

The geographical coordinate of the Project is 13°41'17.10"N and 100°43'42.75"E.

The Project is located at the Rachathewa landfill area, about 30 km east of BMA. The area in the vicinity of the landfill is primarily industrial, with numerous heavy industrial compounds and some agricultural and residential establishments. The Rachathewa landfill site occupies some 40 hectares and includes ancillary facilities necessary to support its operations. It also includes a buffer zone around the disposal area. The landfill site has been separated into two sites. Among the two sites of the landfill area, the Project is implemented at Site 1. Details of the two sites are described below:

| | |
|---------|--|
| Site 1: | Operations commenced in December 1999. The site was capped and closed in November 2001. The area contains approximately 2.5 million tons of newly disposed solid waste and 2.2 million tons of old solid waste relocated from the On-Nuch landfill site. |
| Site 2: | Operation commenced in December 2001 and was closed in December 2006. It is estimated that this disposal site will contain approximately 6 million tons of solid waste by the end of 2006. |

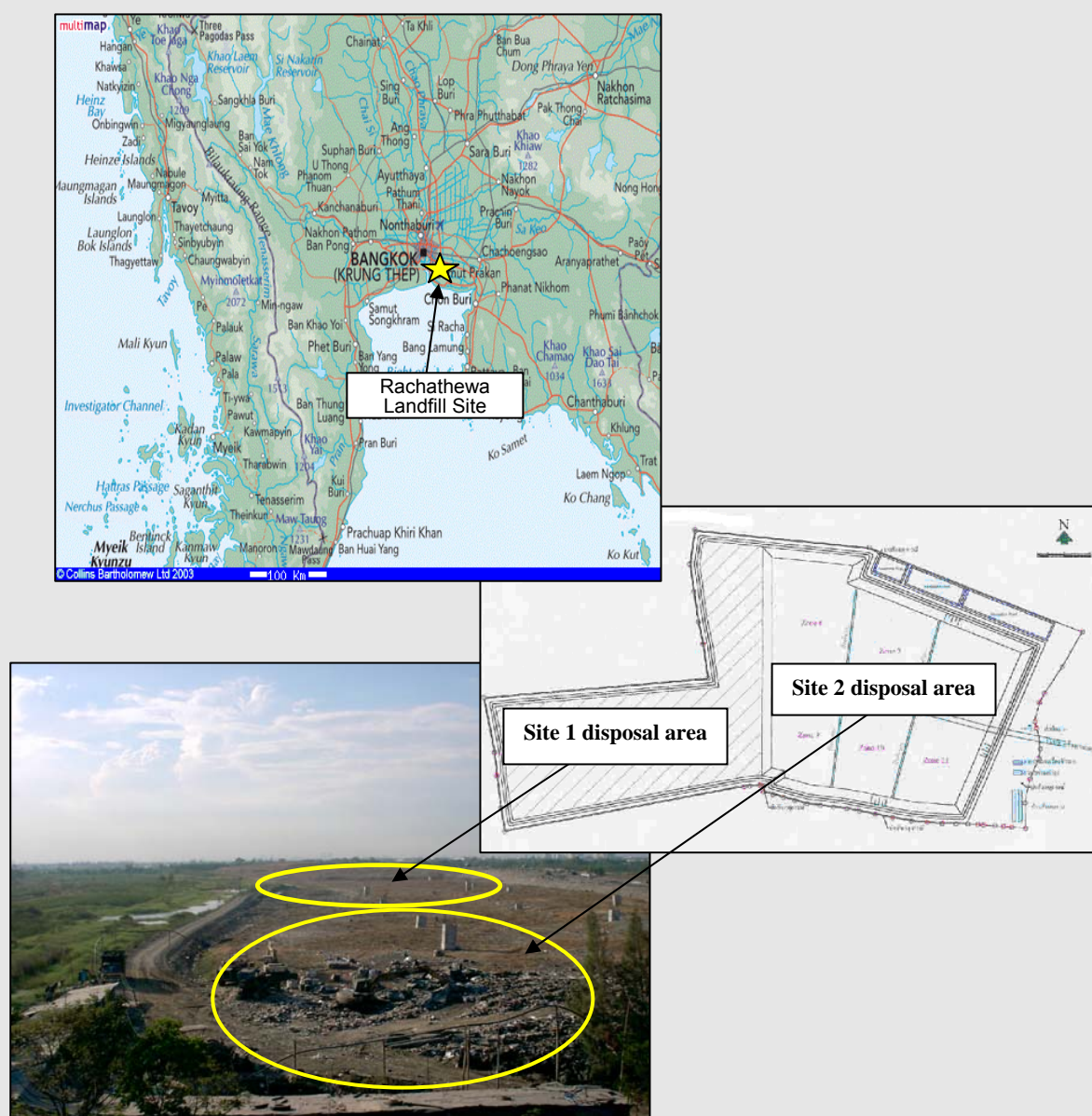


Figure 1. Location and overview of the Rachathewa landfill sites

A.3. Parties and project participant(s)

| Party involved (host) indicates a host Party) | Private and/or public entity(ies) project participants (as applicable) | Indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Thailand (host) | Jaroensompong Co., Ltd. (Private entity) | No |
| Japan | Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. (Private entity) | No |

A.4. Reference of applied methodology

ACM0001 version 05 “Consolidated baseline and monitoring methodology for landfill gas project activities”

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_V66J3B48JSA77ID045VYMSLQX2BGFI

AMS I.D version 11 “Grid connected renewable electricity generation”

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_UYF1PQNDY5FZ4VH4HZ28FYAP13SI9W

“Tool for the demonstration and assessment of additionality (version 03)”

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v3.pdf>

“Methodological Tool to determine project emissions from flaring gases containing methane”

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf>

A.5. Crediting period of project activity

Type of crediting period: fixed crediting period

Starting date of the crediting period: 14/03/2008

End date of the crediting period: 13/03/2018

Length of the crediting period: Ten (10) years

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

This 2nd monitoring report for the project “Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project” (UNFCCC Ref No.1413) covers the period from 01/01/2009 to 31/12/2012.

The CDM project developed by Jaroensompong Co., Ltd. reduces GHG emissions by utilizing LFG which was released into the atmosphere in the absence of the project activity for electricity generation. The installation of the project activity includes the LFG collection system of PVC and HDPE piping with blower, the LFG utilization system including a gas engine generator with rated power output of 1100kW (Manufacturer: Caterpillar, Model: 3516), and an open flaring system to burn excess LFG.

The CDM project does not involve phased implementation, consisting only one site.

The project started its continued operation on 03/03/2006. By the time of CDM registration on 14/03/2008, monitoring system was installed and the project has been monitored for CDM purpose since then.

During the 2nd monitoring period, most landfill gas was sent to the biogas engine and utilized for electricity generation. As the result, the open flare system was rarely in operation.

During the 2nd monitoring period, the project was continuously in operation, except when the project experienced equipments/system malfunctioning or when overhaul maintenance is scheduled. Table 1 summarizes the major shutdowns and events of which the project experienced during this monitoring period.

Table 1 Major shutdowns and events of the project plant during the 2nd monitoring period

| Year | Date | Main reason for shutdowns |
|-------------|--------------|---|
| 2009 | Feb 1 | Engine gas system (EGS) malfunction |
| | Aug 2-13 | Engine ignition system malfunction |
| | Oct 8-11 | Overhaul (In frame) |
| | Nov 3-5 | Engine ignition system malfunction |
| 2010 | Apr 21-26 | Changed engine cylinder head |
| | Jun 10-11 | EGS malfunction |
| 2011 | Feb 4 | Changed engine cylinder head |
| | Mar 26 | Changed engine cylinder head |
| | Mar 30-May 6 | Major overhaul maintenance |
| | Jun 21-23 | Malfunction of Programmatic Logic Controller (PLC) program in Generator Control Panel (GCP) |
| | Jun 29-30 | Malfunction of PLC program in GCP |
| | Aug 8 | MEA fault (unable to export electricity) |
| | Oct 1-4 | Tec jet Valve malfunction |
| 2012 | Aug 5 | EGS malfunction |

Request for post-registration changes were submitted during the verification process of the first monitoring period and approved by the CDM-EB on 02/04/2013 (PRC-1413-001). However, there are no post registration changes for this monitoring period as indicated in Section B.2.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

No temporary deviations have been applied during this monitoring period.

B.2.2. Corrections

No corrections to project information or parameters fixed at validation have been applied during this monitoring period.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

No permanent changes from the registered monitoring plan or applied methodologies have been applied during this monitoring period.

B.2.4. Changes to project design of registered project activity

No changes to the project design for the project activity have been applied during this monitoring period.

B.2.5. Changes to start date of crediting period

No changes to the start date of the crediting period have been applied during this monitoring period.

B.2.6. Types of changes specific to afforestation or reforestation project activity

Not applicable to the project activity.

SECTION C. Description of monitoring system

The process flow diagram of the project plant with monitoring parameters and points is shown in Figure 2.

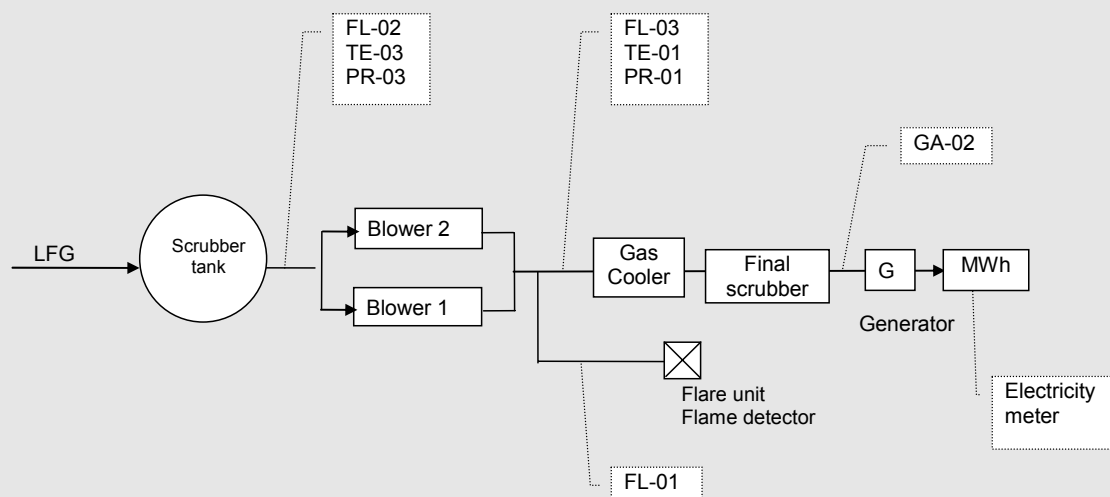


Figure 2. Process flow diagram of the project plant with monitoring parameters and points

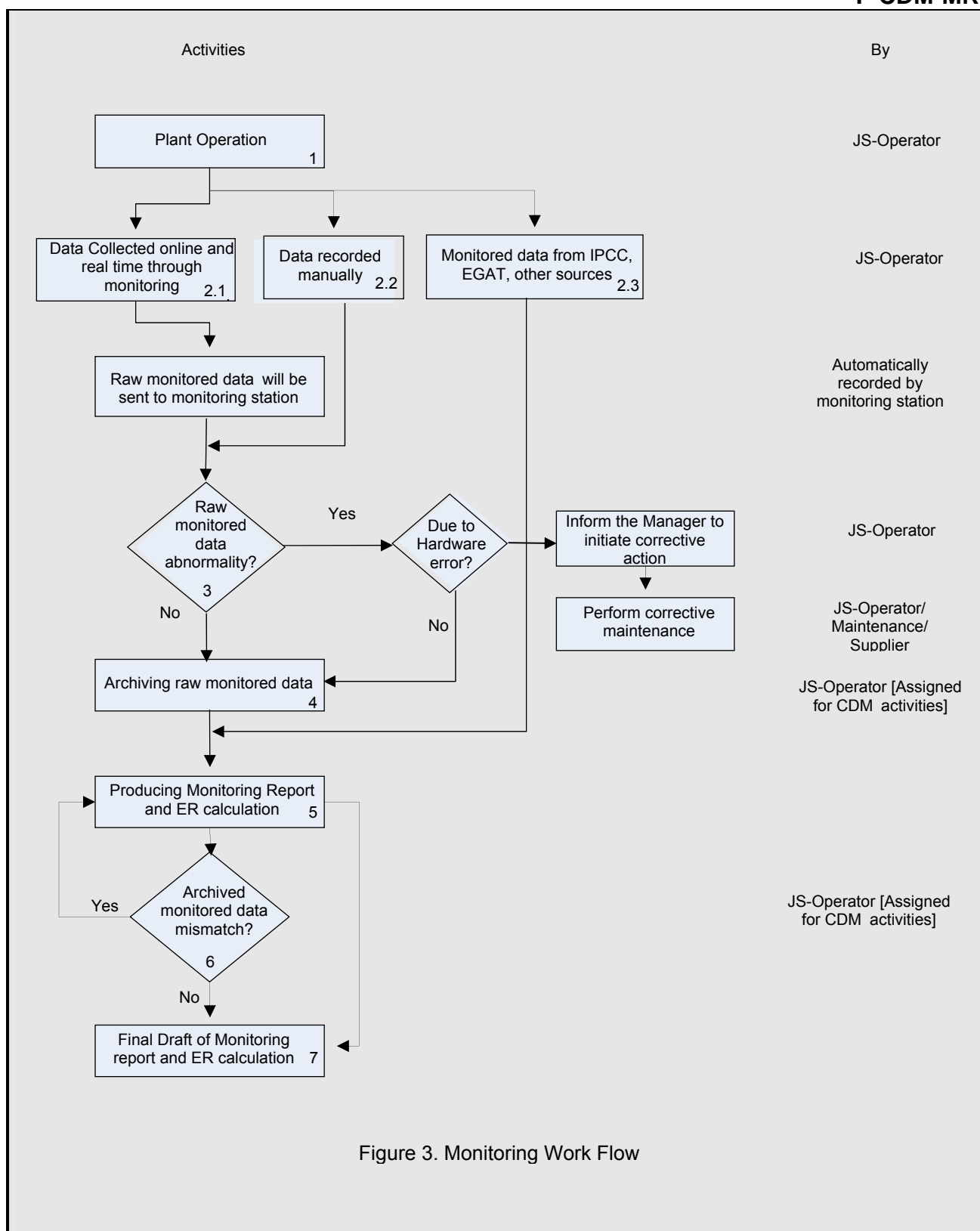
In order to meet the requirement of monitoring plan stated in the revised registered PDD, JS has created the CDM monitoring team.

CDM Monitoring structure

Members of the monitoring organization consist of JS Operator, Operation Manager, and JS Director. Collected raw data from monitoring devices have been read and recorded periodically by JS Operator. Other operational data ($EL_{EX,LFG}$, EL_{IMP} , ET_v , operation of the energy plant) have been read and recorded on monthly basis by JS Operator apart from data from monitoring station. Operation Manager manages overall operation of the plant and CDM activities, and provides necessary training to the operators. Monitoring data have been forwarded to and reviewed by Operation Manager on a monthly basis in order to ensure that the Project follows the requirements of the monitoring plan. JS Director supervises overall operation and maintenance to Operation Manager.

For recording of the LFG related parameters (i.e. flow rate, temperature, pressure, and methane concentration), monitoring equipments are connected to data logger where recorded data is stored. Recorded data is then downloaded periodically to Excel file by JS Operator. MEA meter measurement is continuous and the recording is done monthly by the MEA personnel when they visit to read the meter.

In case of monitoring equipment malfunctioning and shutdowns, the project does not plan to claim CERs for such event.



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

| | |
|-------------------|--|
| Data / Parameter: | GWP_{CH_4} |
| Unit: | tCO ₂ e/tCH ₄ |
| Description: | Global warming potential for CH ₄ |

| | |
|---------------------|--|
| Source of data: | IPCC |
| Value(s) applied): | 21 |
| Purpose of data: | Calculation of baseline and project emissions |
| Additional comment: | 21 for the first commitment period. It shall be updated according to any future COP/MOP decisions. |

| | |
|--------------------------|--|
| Data / Parameter: | AF |
| Unit: | % |
| Description: | Adjustment factor |
| Source of data: | Registered PDD |
| Value(s) applied): | 0 % |
| Purpose of data: | Calculation of baseline emissions |
| Additional comment: | There are no enforced regulatory or contractual requirements for LFG collection/utilization in Thailand at the time of project registration. |

| | |
|--------------------------|---|
| Data / Parameter: | EF_{grid} |
| Unit: | tCO ₂ /MWh |
| Description: | CO ₂ emission factor of the grid |
| Source of data: | Registered PDD |
| Value(s) applied): | 0.51 tCO ₂ /MWh |
| Purpose of data: | Calculation of baseline and project emissions |
| Additional comment: | Fixed ex-ante as in the registered PDD. Data choice and calculation method as per AMS I.D. version 11. Calculated based on the data sourced from EGAT and EPPO, for the year 2001, 2002 and 2003 which were the most recent data available at the time of the validation. |

| | |
|--------------------------|--|
| Data / Parameter: | EF_{OM} |
| Unit: | tCO ₂ /MWh |
| Description: | CO ₂ Operating Margin emission factor of the grid |
| Source of data: | Registered PDD |
| Value(s) applied): | 0.60 tCO ₂ /MWh |
| Purpose of data: | Calculation of baseline and project emissions |
| Additional comment: | Fixed ex-ante as in the registered PDD. Data choice and calculation method as per AMS I.D. version 11. |

| | |
|--------------------------|--|
| Data / Parameter: | EF_{BM} |
| Unit: | tCO ₂ /MWh |
| Description: | CO ₂ Build Margin emission factor of the grid |
| Source of data: | Registered PDD |
| Value(s) applied): | 0.42 tCO ₂ /MWh |
| Purpose of data: | Calculation of baseline and project emissions |

| | |
|---------------------|--|
| Additional comment: | Fixed ex-ante as in the registered PDD. Data choice and calculation method as per AMS I.D. version 11. |
|---------------------|--|

| | |
|--------------------------|--|
| Data / Parameter: | D_{CH4} |
| Unit: | tCH ₄ /m ³ CH ₄ |
| Description: | Density of methane |
| Source of data: | ACM0001 ver.05 |
| Value(s) applied: | 0.0007168 |
| Purpose of data: | Calculation of baseline and project emissions |
| Additional comment: | Density at standard temperature and pressure (0 degree Celsius and 1.013 bar) as stipulated in the applied CDM methodology ACM0001/version 05. |

D.2. Data and parameters monitored

| | | | | | |
|--|---------------------------------------|------------|-----------|-----------|-----------|
| Data / Parameter: | LFG _{total,y} | | | | |
| Unit: | m ³ at STP (0°C, 1 bar) | | | | |
| Description: | Total amount of landfill gas captured | | | | |
| Measured/ Calculated / Default: | Measured | | | | |
| Source of data: | On-site measurements | | | | |
| Value(s) of monitored parameter: | | | | | |
| | <div>Year Month</div> | 2009 | 2010 | 2011 | 2012 |
| | January | 397,158 | 413,308 | 417,691 | 397,374 |
| | February | 354,581 | 365,486 | 359,843 | 426,052 |
| | March | 424,370 | 401,129 | 354,084 | 453,134 |
| | April | 405,370 | 291,826 | 0 | 435,308 |
| | May | 401,365 | 326,023 | 392,673 | 430,099 |
| | June | 405,444 | 294,205 | 352,566 | 411,850 |
| | July | 388,983 | 366,340 | 462,842 | 454,943 |
| | August | 241,158 | 366,367 | 436,876 | 405,038 |
| | September | 401,637 | 262,186 | 446,844 | 423,669 |
| | October | 324,309 | 354,474 | 390,248 | 433,270 |
| | November | 303,306 | 372,929 | 448,215 | 389,931 |
| | December | 409,594 | 373,969 | 433,569 | 396,063 |
| | Year Total | 4,457,275 | 4,188,242 | 4,495,451 | 5,056,731 |
| | Total | 18,197,699 | | | |

| Monitoring equipment: | Device ID: FL-02 Device Name: Gas Flow Meter Instrument Type: Differential pressure transmitter Serial No.: N1U0139599904 Manufacturer: SIEMENS Model: 7MF4433-1BA22-1AC6-Z Measuring Range: 0 to 1,200 m ³ /hr Accuracy Class: 0.075% Calibration frequency: Once a year Date of calibration: <table border="1"> <thead> <tr> <th>Year</th> <th>Calibration date</th> <th>Validity</th> </tr> </thead> <tbody> <tr> <td>2008</td> <td>02/08/2008</td> <td>01/08/2009</td> </tr> <tr> <td>2009</td> <td>26/07/2009</td> <td>25/07/2010</td> </tr> <tr> <td>2010</td> <td>18/07/2010</td> <td>17/07/2011</td> </tr> <tr> <td>2011</td> <td>16/07/2011</td> <td>15/07/2012</td> </tr> <tr> <td>2012</td> <td>26/06/2012</td> <td>25/06/2013</td> </tr> </tbody> </table> | | Year | Calibration date | Validity | 2008 | 02/08/2008 | 01/08/2009 | 2009 | 26/07/2009 | 25/07/2010 | 2010 | 18/07/2010 | 17/07/2011 | 2011 | 16/07/2011 | 15/07/2012 | 2012 | 26/06/2012 | 25/06/2013 |
|--|--|------------|------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | |
| 2008 | 02/08/2008 | 01/08/2009 | | | | | | | | | | | | | | | | | | |
| 2009 | 26/07/2009 | 25/07/2010 | | | | | | | | | | | | | | | | | | |
| 2010 | 18/07/2010 | 17/07/2011 | | | | | | | | | | | | | | | | | | |
| 2011 | 16/07/2011 | 15/07/2012 | | | | | | | | | | | | | | | | | | |
| 2012 | 26/06/2012 | 25/06/2013 | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using a flow meter. Data to be recorded hourly and aggregated monthly and yearly | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. | | | | | | | | | | | | | | | | | | | |
| Purpose of data: | Comparison with the total consumption of the LFG in flaring and power plant | | | | | | | | | | | | | | | | | | | |
| Additional comment: | N/A | | | | | | | | | | | | | | | | | | | |

| | |
|---------------------------------|------------------------------------|
| Data / Parameter: | LFG_{flare,y} |
| Unit: | m ³ at STP (0°C, 1 bar) |
| Description: | Amount of landfill gas flared |
| Measured/ Calculated / Default: | Measured |
| Source of data: | On-site measurements |

| Value(s) of monitored parameter: | <table><tr><th>Year Month</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr><tr><td>January</td><td>2,004</td><td>1,263</td><td>1,222</td><td>15</td></tr><tr><td>February</td><td>1,737</td><td>805</td><td>1,260</td><td>0</td></tr><tr><td>March</td><td>1,649</td><td>2,060</td><td>1,687</td><td>1</td></tr><tr><td>April</td><td>1,736</td><td>1,197</td><td>0</td><td>7</td></tr><tr><td>May</td><td>1,121</td><td>1,108</td><td>0</td><td>7</td></tr><tr><td>June</td><td>793</td><td>2,172</td><td>1</td><td>7</td></tr><tr><td>July</td><td>818</td><td>1,986</td><td>1</td><td>4</td></tr><tr><td>August</td><td>901</td><td>401</td><td>0</td><td>0</td></tr><tr><td>September</td><td>970</td><td>1,445</td><td>0</td><td>0</td></tr><tr><td>October</td><td>980</td><td>1,453</td><td>59</td><td>0</td></tr><tr><td>November</td><td>2,038</td><td>2,695</td><td>0</td><td>0</td></tr><tr><td>December</td><td>2,047</td><td>2,346</td><td>0</td><td>0</td></tr><tr><td>Year Total</td><td>16,794</td><td>18,931</td><td>4,230</td><td>41</td></tr><tr><td>Total</td><td colspan="4">39,996</td></tr></table> | | | | Year Month | 2009 | 2010 | 2011 | 2012 | January | 2,004 | 1,263 | 1,222 | 15 | February | 1,737 | 805 | 1,260 | 0 | March | 1,649 | 2,060 | 1,687 | 1 | April | 1,736 | 1,197 | 0 | 7 | May | 1,121 | 1,108 | 0 | 7 | June | 793 | 2,172 | 1 | 7 | July | 818 | 1,986 | 1 | 4 | August | 901 | 401 | 0 | 0 | September | 970 | 1,445 | 0 | 0 | October | 980 | 1,453 | 59 | 0 | November | 2,038 | 2,695 | 0 | 0 | December | 2,047 | 2,346 | 0 | 0 | Year Total | 16,794 | 18,931 | 4,230 | 41 | Total | 39,996 | | | |
|---|--|------------|--------|-------|---------------|------------------|----------|------|------------|------------|-------|------------|------------|------|------------|------------|------|------------|------------|-------|------------|------------|-------|---|-------|-------|-------|---|---|-----|-------|-------|---|---|------|-----|-------|---|---|------|-----|-------|---|---|--------|-----|-----|---|---|-----------|-----|-------|---|---|---------|-----|-------|----|---|----------|-------|-------|---|---|----------|-------|-------|---|---|------------|--------|--------|-------|----|-------|--------|--|--|--|
| | Year Month | 2009 | 2010 | 2011 | 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | January | 2,004 | 1,263 | 1,222 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | February | 1,737 | 805 | 1,260 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | March | 1,649 | 2,060 | 1,687 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | April | 1,736 | 1,197 | 0 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | May | 1,121 | 1,108 | 0 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | June | 793 | 2,172 | 1 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | July | 818 | 1,986 | 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | August | 901 | 401 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | September | 970 | 1,445 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | October | 980 | 1,453 | 59 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | November | 2,038 | 2,695 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | December | 2,047 | 2,346 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Year Total | 16,794 | 18,931 | 4,230 | 41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total | 39,996 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring equipment: Device ID: FL-01 Device Name: Gas Flow Meter Instrument Type: Differential pressure transmitter Serial No.: N1T1109491336 Manufacturer: SIEMENS Model: 7MF4433-1BA22-1AC6-Z Measuring Range: 0 to 1,200 m ³ /hr Accuracy Class: 0.075% Calibration frequency: Once a year Date of calibration: <table><tr><td>Year</td><td>Calibration date</td><td>Validity</td></tr><tr><td>2008</td><td>18/09/2008</td><td>17/09/2009</td></tr><tr><td>2009</td><td>13/09/2009</td><td>12/09/2010</td></tr><tr><td>2010</td><td>11/09/2010</td><td>10/09/2011</td></tr><tr><td>2011</td><td>04/09/2011</td><td>03/09/2012</td></tr><tr><td>2012</td><td>02/09/2012</td><td>01/09/2013</td></tr></table> | | | | | Year | Calibration date | Validity | 2008 | 18/09/2008 | 17/09/2009 | 2009 | 13/09/2009 | 12/09/2010 | 2010 | 11/09/2010 | 10/09/2011 | 2011 | 04/09/2011 | 03/09/2012 | 2012 | 02/09/2012 | 01/09/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 18/09/2008 | 17/09/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 13/09/2009 | 12/09/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 11/09/2010 | 10/09/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 04/09/2011 | 03/09/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 02/09/2012 | 01/09/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: Measured continuously using a flow meter. Data to be recorded hourly and aggregated monthly and yearly. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Purpose of data: Calculation of baseline emissions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional comment: N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | |
|---------------------------------------|---|
| Data / Parameter: | LFG _{electricity,y} |
| Unit: | m ³ at STP (0°C, 1 bar) |
| Description: | Amount of landfill gas combusted in power plant |
| Measured/ Calculated / Default: | Measured |
| Source of data: | On-site measurements |

| | | | | | | | |
|----------------------------------|---------------|--|--|------------|-----------|-----------|-----------|
| Value(s) of monitored parameter: | Year Month | | | 2009 | 2010 | 2011 | 2012 |
| | January | | | 384,514 | 399,520 | 419,176 | 352,436 |
| | February | | | 340,745 | 354,148 | 359,330 | 378,096 |
| | March | | | 398,313 | 394,647 | 349,201 | 391,095 |
| | April | | | 396,634 | 285,476 | 0 | 368,316 |
| | May | | | 401,248 | 314,387 | 368,166 | 360,496 |
| | June | | | 401,680 | 287,858 | 330,891 | 343,330 |
| | July | | | 374,945 | 365,808 | 430,657 | 381,463 |
| | August | | | 234,645 | 363,645 | 406,290 | 332,666 |
| | September | | | 389,196 | 253,560 | 416,554 | 353,262 |
| | October | | | 314,005 | 352,449 | 361,028 | 354,950 |
| | November | | | 288,667 | 374,152 | 411,565 | 315,030 |
| | December | | | 397,908 | 375,830 | 397,368 | 320,613 |
| | Year Total | | | 4,322,500 | 4,121,480 | 4,250,226 | 4,251,753 |
| | Total | | | 16,945,959 | | | |

| | | | | | | | | | | | | | | | | | | | |
|-----------------------|---|------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Monitoring equipment: | <div>Device ID: FL-03</div> <div>Device Name: Gas Flow Meter</div> <div>Instrument Type: Differential pressure transmitter</div> <div>Serial No.: N1U0139599905</div> <div>Manufacturer: SIEMENS</div> <div>Model: 7MF4433-1BA22-1AC6-Z</div> <div>Measuring Range: 0 to 1,200 m³/hr</div> <div>Accuracy Class: 0.075%</div> <div>Calibration frequency: Once a year</div> <div>Date of calibration:</div> <table><tr><td>Year</td><td>Calibration date</td><td>Validity</td></tr><tr><td>2008</td><td>18/09/2008</td><td>17/09/2009</td></tr><tr><td>2009</td><td>13/09/2009</td><td>12/09/2010</td></tr><tr><td>2010</td><td>11/09/2010</td><td>10/09/2011</td></tr><tr><td>2011</td><td>04/09/2011</td><td>03/09/2012</td></tr><tr><td>2012</td><td>02/09/2012</td><td>01/09/2013</td></tr></table> | Year | Calibration date | Validity | 2008 | 18/09/2008 | 17/09/2009 | 2009 | 13/09/2009 | 12/09/2010 | 2010 | 11/09/2010 | 10/09/2011 | 2011 | 04/09/2011 | 03/09/2012 | 2012 | 02/09/2012 | 01/09/2013 |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | |
| 2008 | 18/09/2008 | 17/09/2009 | | | | | | | | | | | | | | | | | |
| 2009 | 13/09/2009 | 12/09/2010 | | | | | | | | | | | | | | | | | |
| 2010 | 11/09/2010 | 10/09/2011 | | | | | | | | | | | | | | | | | |
| 2011 | 04/09/2011 | 03/09/2012 | | | | | | | | | | | | | | | | | |
| 2012 | 02/09/2012 | 01/09/2013 | | | | | | | | | | | | | | | | | |

| | |
|---|---|
| Measuring/ Reading/ Recording frequency: | Measured continuously using a flow meter. Data to be recorded hourly and aggregated monthly and yearly. |
| Calculation method (if applicable): | N/A |
| QA/QC procedures: | Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. |
| Purpose of data: | Calculation of baseline emissions |
| Additional comment: | N/A |

| | |
|---------------------------------------|---|
| Data / Parameter: | PE _{flare,y} |
| Unit: | tCO ₂ e |
| Description: | Project emissions from flaring of the residual gas stream in year y |
| Measured/ Calculated / Default: | Calculated |

| Source of data: | Calculated as per the “tool to determine project emissions from flaring gases containing methane”, based on LFG_{flare} , $fv_{CH4,h}$, and the density of methane | | | | | | | | | | | | | |
|--|--|--|------|--------------|------|-------|------|-------|------|------|------|-----|-------|-------|
| Value(s) of monitored parameter: | <table><tr><th>Year</th><th>Annual Total</th></tr><tr><td>2009</td><td>123.0</td></tr><tr><td>2010</td><td>122.0</td></tr><tr><td>2011</td><td>30.0</td></tr><tr><td>2012</td><td>0.2</td></tr><tr><td>Total</td><td>275.2</td></tr></table> | | Year | Annual Total | 2009 | 123.0 | 2010 | 122.0 | 2011 | 30.0 | 2012 | 0.2 | Total | 275.2 |
| Year | Annual Total | | | | | | | | | | | | | |
| 2009 | 123.0 | | | | | | | | | | | | | |
| 2010 | 122.0 | | | | | | | | | | | | | |
| 2011 | 30.0 | | | | | | | | | | | | | |
| 2012 | 0.2 | | | | | | | | | | | | | |
| Total | 275.2 | | | | | | | | | | | | | |
| Monitoring equipment: | N/A | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | N/A | | | | | | | | | | | | | |
| Calculation method (if applicable): | Calculation is in accordance with the Methodological “Tool to determine project emissions from flaring gases containing methane”. | | | | | | | | | | | | | |
| QA/QC procedures: | N/A | | | | | | | | | | | | | |
| Purpose of data: | Calculation of project emissions | | | | | | | | | | | | | |
| Additional comment: | The parameters used for determining the project emissions from flaring of the residual gas stream in year y ($PE_{flare,y}$) will be monitored as per the “Tool to determine project emissions from flaring gases containing Methane” | | | | | | | | | | | | | |

| Data / Parameter: | $fv_{CH4,h}$ | | | | | | | | | | | | |
|----------------------------------|---|------|----------------|------|-------|------|-------|------|-------|------|-------|---------|-------|
| Unit: | - | | | | | | | | | | | | |
| Description: | Volumetric fraction of CH_4 in the residual gas in the hour h | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured | | | | | | | | | | | | |
| Source of data: | On-site measurements | | | | | | | | | | | | |
| Value(s) of monitored parameter: | <table><tr><th>Year</th><th>Annual Average</th></tr><tr><td>2009</td><td>0.485</td></tr><tr><td>2010</td><td>0.438</td></tr><tr><td>2011</td><td>0.417</td></tr><tr><td>2012</td><td>0.481</td></tr><tr><td>Average</td><td>0.455</td></tr></table> | Year | Annual Average | 2009 | 0.485 | 2010 | 0.438 | 2011 | 0.417 | 2012 | 0.481 | Average | 0.455 |
| Year | Annual Average | | | | | | | | | | | | |
| 2009 | 0.485 | | | | | | | | | | | | |
| 2010 | 0.438 | | | | | | | | | | | | |
| 2011 | 0.417 | | | | | | | | | | | | |
| 2012 | 0.481 | | | | | | | | | | | | |
| Average | 0.455 | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|--|---|------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Monitoring equipment: | Device ID: GA-02 Device Name: Fixed Type Gas Analyzer Instrument Type: Gas Analyser Serial No.: I-02253 Manufacturer: HITECH INSTRUMENTS Model: HITOX IR-600 Measuring Range: 0-100% Accuracy Class: ±2% Calibration frequency: Once a year Date of calibration: <table><tr><td>Year</td><td>Calibration date</td><td>Validity</td></tr><tr><td>2008</td><td>04/12/2008</td><td>03/12/2009</td></tr><tr><td>2009</td><td>29/11/2009</td><td>28/11/2010</td></tr><tr><td>2010</td><td>07/11/2010</td><td>06/11/2011</td></tr><tr><td>2011</td><td>05/10/2011</td><td>04/10/2012</td></tr><tr><td>2012</td><td>09/09/2012</td><td>08/09/2013</td></tr></table> | Year | Calibration date | Validity | 2008 | 04/12/2008 | 03/12/2009 | 2009 | 29/11/2009 | 28/11/2010 | 2010 | 07/11/2010 | 06/11/2011 | 2011 | 05/10/2011 | 04/10/2012 | 2012 | 09/09/2012 | 08/09/2013 |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | |
| 2008 | 04/12/2008 | 03/12/2009 | | | | | | | | | | | | | | | | | |
| 2009 | 29/11/2009 | 28/11/2010 | | | | | | | | | | | | | | | | | |
| 2010 | 07/11/2010 | 06/11/2011 | | | | | | | | | | | | | | | | | |
| 2011 | 05/10/2011 | 04/10/2012 | | | | | | | | | | | | | | | | | |
| 2012 | 09/09/2012 | 08/09/2013 | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using a continuous gas analyser. Values to be recorded hourly. The same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas (fv _{i,h}) when the residual gas temperature exceed 60°C. The residual gas temperataure does not exceed 60 °C during this monitoring period. | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Analysers will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas. | | | | | | | | | | | | | | | | | | |
| Purpose of data: | Calculation of project emissions | | | | | | | | | | | | | | | | | | |
| Additional comment: | N/A | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|----------------------------------|--|------|----------------|------|------|------|------|------|------|------|------|---------|------|
| Data / Parameter: | FV _{RG,h} | | | | | | | | | | | | |
| Unit: | m ³ /h | | | | | | | | | | | | |
| Description: | Volumetric flow rate of the residual gas in dry basis at normal condition in the hour h | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured | | | | | | | | | | | | |
| Source of data: | On-site measurement | | | | | | | | | | | | |
| Value(s) of monitored parameter: | <table><tr><td>Year</td><td>Annual Average</td></tr><tr><td>2009</td><td>2.56</td></tr><tr><td>2010</td><td>2.96</td></tr><tr><td>2011</td><td>2.41</td></tr><tr><td>2012</td><td>2.73</td></tr><tr><td>Average</td><td>2.67</td></tr></table> | Year | Annual Average | 2009 | 2.56 | 2010 | 2.96 | 2011 | 2.41 | 2012 | 2.73 | Average | 2.67 |
| Year | Annual Average | | | | | | | | | | | | |
| 2009 | 2.56 | | | | | | | | | | | | |
| 2010 | 2.96 | | | | | | | | | | | | |
| 2011 | 2.41 | | | | | | | | | | | | |
| 2012 | 2.73 | | | | | | | | | | | | |
| Average | 2.67 | | | | | | | | | | | | |

| Monitoring equipment: | Device ID: FL-01 Device Name: Gas Flow Meter Instrument Type: Differential pressure transmitter Serial No.: N1T1109491336 Manufacturer: SIEMENS Model: 7MF4433-1BA22-1AC6-Z Measuring Range: 0 to 1,200 m ³ /hr Accuracy Class: 0.075% Calibration frequency: Once a year Date of calibration: <table border="1"> <thead> <tr> <th>Year</th> <th>Calibration date</th> <th>Validity</th> </tr> </thead> <tbody> <tr> <td>2008</td> <td>18/09/2008</td> <td>17/09/2009</td> </tr> <tr> <td>2009</td> <td>13/09/2009</td> <td>12/09/2010</td> </tr> <tr> <td>2010</td> <td>11/09/2010</td> <td>10/09/2011</td> </tr> <tr> <td>2011</td> <td>04/09/2011</td> <td>03/09/2012</td> </tr> <tr> <td>2012</td> <td>02/09/2012</td> <td>01/09/2013</td> </tr> </tbody> </table> | | Year | Calibration date | Validity | 2008 | 18/09/2008 | 17/09/2009 | 2009 | 13/09/2009 | 12/09/2010 | 2010 | 11/09/2010 | 10/09/2011 | 2011 | 04/09/2011 | 03/09/2012 | 2012 | 02/09/2012 | 01/09/2013 |
|--|--|------------|------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | |
| 2008 | 18/09/2008 | 17/09/2009 | | | | | | | | | | | | | | | | | | |
| 2009 | 13/09/2009 | 12/09/2010 | | | | | | | | | | | | | | | | | | |
| 2010 | 11/09/2010 | 10/09/2011 | | | | | | | | | | | | | | | | | | |
| 2011 | 04/09/2011 | 03/09/2012 | | | | | | | | | | | | | | | | | | |
| 2012 | 02/09/2012 | 01/09/2013 | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using a flow meter. Values to be recorded hourly. The same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas ($f_{v,i,h}$) when the residual gas temperature exceed 60°C. The residual gas temperature does not exceed 60 °C during this monitoring period. | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Flow meters will be periodically calibrated according to the manufacturer's recommendation. | | | | | | | | | | | | | | | | | | | |
| Purpose of data: | calculation of project emissions | | | | | | | | | | | | | | | | | | | |
| Additional comment: | N/A | | | | | | | | | | | | | | | | | | | |

| | |
|--|---|
| Data / Parameter: | Flare operation parameter |
| Unit: | min/h |
| Description: | Minutes that flare is detected during the hour h |
| Measured/ Calculated / Default: | Measured |
| Source of data: | On-site measurement |
| Value(s) of monitored parameter: | 0 |
| Monitoring equipment: | Device Name: Flame Detector Instrument Type: Flame Detector Serial No.: 945011V Manufacturer: USHIO INC. Model: SF-102B Measuring Range: Detect ON/OFF signal Accuracy Class: n/a |
| Measuring/ Reading/ Recording frequency: | Flame detector continuously detects the flame at the flaring system and sends the signal to the monitoring station. |

| | | |
|-------------------------------------|--|--|
| Calculation method (if applicable): | N/A | |
| QA/QC procedures: | N/A | |
| Purpose of data: | Calculation of project emissions | |
| Additional comment: | Operation/Reading Procedure: The detector will detect the flame and then the controller will send the digital signal to data logger automatically. | |

| Data / Parameter: | $W_{CH_4,y}$ | | | | | | | | | | | | | | | | | | | |
|---|---|------------|------|-------------------|----------|-------|------------|------------|------|------------|------------|-------|------------|------------|------|------------|------------|------|------------|------------|
| Unit: | m^3CH_4/m^3LFG | | | | | | | | | | | | | | | | | | | |
| Description: | Methane fraction in the landfill gas | | | | | | | | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured | | | | | | | | | | | | | | | | | | | |
| Source of data: | On-site measurement | | | | | | | | | | | | | | | | | | | |
| Value(s) of monitored parameter: | <table border="1"> <thead> <tr> <th>Year</th> <th>Annual Average</th> </tr> </thead> <tbody> <tr> <td>2009</td> <td>0.485</td> </tr> <tr> <td>2010</td> <td>0.438</td> </tr> <tr> <td>2011</td> <td>0.417</td> </tr> <tr> <td>2012</td> <td>0.481</td> </tr> <tr> <td>Average</td> <td>0.455</td> </tr> </tbody> </table> | | Year | Annual Average | 2009 | 0.485 | 2010 | 0.438 | 2011 | 0.417 | 2012 | 0.481 | Average | 0.455 | | | | | | |
| Year | Annual Average | | | | | | | | | | | | | | | | | | | |
| 2009 | 0.485 | | | | | | | | | | | | | | | | | | | |
| 2010 | 0.438 | | | | | | | | | | | | | | | | | | | |
| 2011 | 0.417 | | | | | | | | | | | | | | | | | | | |
| 2012 | 0.481 | | | | | | | | | | | | | | | | | | | |
| Average | 0.455 | | | | | | | | | | | | | | | | | | | |
| Monitoring equipment: | Device ID: GA-02 Device Name: Fixed Type Gas Analyzer Instrument Type: Gas Analyser Serial No.: I-02253 Manufacturer: HITECH INSTRUMENTS Model: HITOX IR-600 Measuring Range: 0-100% Accuracy Class: $\pm 2\%$ Calibration frequency: Once a year Date of calibration: <table border="1"> <thead> <tr> <th>Year</th> <th>Calibration date</th> <th>Validity</th> </tr> </thead> <tbody> <tr> <td>2008</td> <td>04/12/2008</td> <td>03/12/2009</td> </tr> <tr> <td>2009</td> <td>29/11/2009</td> <td>28/11/2010</td> </tr> <tr> <td>2010</td> <td>07/11/2010</td> <td>06/11/2011</td> </tr> <tr> <td>2011</td> <td>05/10/2011</td> <td>04/10/2012</td> </tr> <tr> <td>2012</td> <td>09/09/2012</td> <td>08/09/2013</td> </tr> </tbody> </table> | | Year | Calibration date | Validity | 2008 | 04/12/2008 | 03/12/2009 | 2009 | 29/11/2009 | 28/11/2010 | 2010 | 07/11/2010 | 06/11/2011 | 2011 | 05/10/2011 | 04/10/2012 | 2012 | 09/09/2012 | 08/09/2013 |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | |
| 2008 | 04/12/2008 | 03/12/2009 | | | | | | | | | | | | | | | | | | |
| 2009 | 29/11/2009 | 28/11/2010 | | | | | | | | | | | | | | | | | | |
| 2010 | 07/11/2010 | 06/11/2011 | | | | | | | | | | | | | | | | | | |
| 2011 | 05/10/2011 | 04/10/2012 | | | | | | | | | | | | | | | | | | |
| 2012 | 09/09/2012 | 08/09/2013 | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using a continuous gas analyser. (Methane fraction of the LFG is to be measured on wet basis.) Values to be averaged and recorded hourly. | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | |

QA/QC procedures:

Analysers will be periodically calibrated according to the manufacturer’s recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas.

Purpose of data:

Calculation of baseline emissions

Additional comment:

N/A

Data / Parameter:

T

Unit:

°C

Description:

Temperature of the landfill gas

Measured/
Calculated /
Default:

Measured

Source of data:

On-site measurements

Value(s) of monitored parameter:

| Year | TE-01 | TE-03 |
|---------|-------|-------|
| 2009 | 58.8 | 30.0 |
| 2010 | 58.4 | 29.7 |
| 2011 | 56.8 | 28.7 |
| 2012 | 70.8 | 29.0 |
| Average | 61.2 | 29.4 |

| Monitoring equipment: | <p>Device ID: TE-01 Device Name: Temperature Controller with PT100 Instrument Type: Thermocouple and RTD with temperature Controller Serial No.: T07216/PT07081 Manufacturer: SHIMAX with FW System Model: Pt100N MAC3D-MCF-NN-NTN with FWP-7A-4.8x30 (S4) Measuring Range: - 50 to 400 °C Accuracy Class: ±0.3% Calibration frequency: Once a year Date of calibration:</p> <table border="1"> <thead> <tr> <th>Year</th><th>Calibration date</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>2008</td><td>30/12/2008</td><td>29/12/2009</td></tr> <tr> <td>2009</td><td>20/12/2009</td><td>19/12/2010</td></tr> <tr> <td>2010</td><td>18/12/2010</td><td>17/12/2011</td></tr> <tr> <td>2011</td><td>17/12/2011</td><td>16/12/2012</td></tr> <tr> <td>2012</td><td>16/12/2012</td><td>15/12/2013</td></tr> </tbody> </table> <p>Device ID: TE-03 Device Name: Temperature Controller with PT100 Instrument Type: Thermocouple and RTD with temperature Controller Serial No.: T08151/PT08133 Manufacturer: SHIMAX with FW System Model: Pt100N MAC3D-MCF-NN-NTN with FWP-7A-4.8x30 (S4) Measuring Range: -50 to 400 °C Accuracy Class: ±0.3% Calibration frequency: Once a year Date of calibration:</p> <table border="1"> <thead> <tr> <th>Year</th><th>Calibration date</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>2008</td><td>22/07/2008</td><td>21/07/2009</td></tr> <tr> <td>2009</td><td>19/07/2009</td><td>18/07/2010</td></tr> <tr> <td>2010</td><td>18/07/2010</td><td>17/07/2011</td></tr> <tr> <td>2011</td><td>09/07/2011</td><td>08/07/2012</td></tr> <tr> <td>2012</td><td>08/07/2012</td><td>07/07/2013</td></tr> </tbody> </table> | Year | Calibration date | Validity | 2008 | 30/12/2008 | 29/12/2009 | 2009 | 20/12/2009 | 19/12/2010 | 2010 | 18/12/2010 | 17/12/2011 | 2011 | 17/12/2011 | 16/12/2012 | 2012 | 16/12/2012 | 15/12/2013 | Year | Calibration date | Validity | 2008 | 22/07/2008 | 21/07/2009 | 2009 | 19/07/2009 | 18/07/2010 | 2010 | 18/07/2010 | 17/07/2011 | 2011 | 09/07/2011 | 08/07/2012 | 2012 | 08/07/2012 | 07/07/2013 |
|--|--|------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 30/12/2008 | 29/12/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 20/12/2009 | 19/12/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 18/12/2010 | 17/12/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 17/12/2011 | 16/12/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 16/12/2012 | 15/12/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 22/07/2008 | 21/07/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 19/07/2009 | 18/07/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 18/07/2010 | 17/07/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 09/07/2011 | 08/07/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 08/07/2012 | 07/07/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously to determine the density of methane (D _{CH4}) using a thermocouple, and averaged and recorded hourly. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Thermocouple is calibrated annually. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Purpose of data: | Calculation of baseline and project emissions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional comment: | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data / Parameter: | p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unit: | Pressure of the landfill gas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description: | Pa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured periodically to determine the density of methane (DC _{H4}) using a pressure transmitter. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source of data: | On-site measurements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Value(s) of monitored parameter: | <table><tr><th>Year</th><th>PR-01</th><th>PR-03</th></tr><tr><td>2009</td><td>40,682</td><td>-8,062</td></tr><tr><td>2010</td><td>51,311</td><td>-4,915</td></tr><tr><td>2011</td><td>36,687</td><td>-5,434</td></tr><tr><td>2012</td><td>15,300</td><td>-3,429</td></tr><tr><td>Average</td><td>35,995</td><td>-5,460</td></tr></table> | Year | PR-01 | PR-03 | 2009 | 40,682 | -8,062 | 2010 | 51,311 | -4,915 | 2011 | 36,687 | -5,434 | 2012 | 15,300 | -3,429 | Average | 35,995 | -5,460 | | | | | | | | | | | | | | | | | | |
|--|--|------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|---------|------------|------------|------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|
| Year | PR-01 | PR-03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 40,682 | -8,062 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 51,311 | -4,915 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 36,687 | -5,434 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 15,300 | -3,429 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Average | 35,995 | -5,460 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring equipment: | <p>Device ID: PR-01 Device Name: Pressure Transmitter Instrument Type: Pressure Transmitter Serial No.: 1107030328 Manufacturer: NAGANO Model: ADZ-SML-10.0-1 Measuring Range: -1 to 1 bar Accuracy Class: ±0.5% Calibration frequency: Once a year Date of calibration:</p> <table><tr><th>Year</th><th>Calibration date</th><th>Validity</th></tr><tr><td>2008</td><td>30/12/2008</td><td>29/12/2009</td></tr><tr><td>2009</td><td>20/12/2009</td><td>19/12/2010</td></tr><tr><td>2010</td><td>18/12/2010</td><td>17/12/2011</td></tr><tr><td>2011</td><td>17/12/2011</td><td>16/12/2012</td></tr><tr><td>2012</td><td>16/12/2012</td><td>15/12/2013</td></tr></table> <p>Device ID: PR-03 Device Name: Pressure Transmitter Instrument Type: Pressure Transmitter Serial No.: 07202080001 Manufacturer: NAGANO Model: ADZ-SML-10.0-1 Measuring Range: -1 to 1 bar Accuracy Class: ±0.5% Calibration frequency: Once a year Date of calibration:</p> <table><tr><th>Year</th><th>Calibration date</th><th>Validity</th></tr><tr><td>2008</td><td>14/08/2008</td><td>13/08/2009</td></tr><tr><td>2009</td><td>01/08/2009</td><td>31/07/2010</td></tr><tr><td>2010</td><td>18/07/2010</td><td>17/07/2011</td></tr><tr><td>2011</td><td>09/07/2011</td><td>08/07/2012</td></tr><tr><td>2012</td><td>08/07/2012</td><td>07/07/2013</td></tr></table> | Year | Calibration date | Validity | 2008 | 30/12/2008 | 29/12/2009 | 2009 | 20/12/2009 | 19/12/2010 | 2010 | 18/12/2010 | 17/12/2011 | 2011 | 17/12/2011 | 16/12/2012 | 2012 | 16/12/2012 | 15/12/2013 | Year | Calibration date | Validity | 2008 | 14/08/2008 | 13/08/2009 | 2009 | 01/08/2009 | 31/07/2010 | 2010 | 18/07/2010 | 17/07/2011 | 2011 | 09/07/2011 | 08/07/2012 | 2012 | 08/07/2012 | 07/07/2013 |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 30/12/2008 | 29/12/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 20/12/2009 | 19/12/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 18/12/2010 | 17/12/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 17/12/2011 | 16/12/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 16/12/2012 | 15/12/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 14/08/2008 | 13/08/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 01/08/2009 | 31/07/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 18/07/2010 | 17/07/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 09/07/2011 | 08/07/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 08/07/2012 | 07/07/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously to determine the density of methane (D _{CH4}) using a thermocouple, and averaged and recorded hourly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Pressure transmitter is calibrated annually. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Purpose of data: | Calculation of baseline and project emissions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional comment: | For PR-03, pressure recorded in bar unit was converted to Pa unit using a conversion factor of 10 ⁵ Pa/bar. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Data / Parameter: | EL _{EX,LFG} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------------|-------|-------|--|---------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|-------|------------|------------|-----|-----|-------|-----|-----|---|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|--------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|---------|-----|-----|-----|-----|----------|-----|-----|-----|-----|----------|-----|-----|-----|-----|------------|-------|-------|-------|-------|-------|--------|--|--|--|
| Unit: | MWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description: | Total amount of electricity exported out of the project boundary | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source of data: | On-site measurements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Value(s) of monitored parameter: | <table><tr><th>Year Month</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr><tr><td>January</td><td>534</td><td>569</td><td>436</td><td>486</td></tr><tr><td>February</td><td>564</td><td>502</td><td>445</td><td>277</td></tr><tr><td>March</td><td>688</td><td>594</td><td>331</td><td>350</td></tr><tr><td>April</td><td>685</td><td>440</td><td>0</td><td>320</td></tr><tr><td>May</td><td>703</td><td>484</td><td>523</td><td>321</td></tr><tr><td>June</td><td>680</td><td>272</td><td>354</td><td>323</td></tr><tr><td>July</td><td>666</td><td>489</td><td>478</td><td>349</td></tr><tr><td>August</td><td>398</td><td>320</td><td>416</td><td>294</td></tr><tr><td>September</td><td>656</td><td>239</td><td>350</td><td>302</td></tr><tr><td>October</td><td>533</td><td>336</td><td>400</td><td>290</td></tr><tr><td>November</td><td>558</td><td>470</td><td>363</td><td>220</td></tr><tr><td>December</td><td>684</td><td>460</td><td>283</td><td>223</td></tr><tr><td>Year Total</td><td>7,349</td><td>5,175</td><td>4,379</td><td>3,755</td></tr><tr><td>Total</td><td colspan="4">20,658</td></tr></table> | | | | | Year Month | 2009 | 2010 | 2011 | 2012 | January | 534 | 569 | 436 | 486 | February | 564 | 502 | 445 | 277 | March | 688 | 594 | 331 | 350 | April | 685 | 440 | 0 | 320 | May | 703 | 484 | 523 | 321 | June | 680 | 272 | 354 | 323 | July | 666 | 489 | 478 | 349 | August | 398 | 320 | 416 | 294 | September | 656 | 239 | 350 | 302 | October | 533 | 336 | 400 | 290 | November | 558 | 470 | 363 | 220 | December | 684 | 460 | 283 | 223 | Year Total | 7,349 | 5,175 | 4,379 | 3,755 | Total | 20,658 | | | |
| Year Month | 2009 | 2010 | 2011 | 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| January | 534 | 569 | 436 | 486 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| February | 564 | 502 | 445 | 277 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| March | 688 | 594 | 331 | 350 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 685 | 440 | 0 | 320 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| May | 703 | 484 | 523 | 321 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 680 | 272 | 354 | 323 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| July | 666 | 489 | 478 | 349 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| August | 398 | 320 | 416 | 294 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| September | 656 | 239 | 350 | 302 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| October | 533 | 336 | 400 | 290 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| November | 558 | 470 | 363 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| December | 684 | 460 | 283 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year Total | 7,349 | 5,175 | 4,379 | 3,755 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 20,658 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring equipment: | <p>Device ID: Electricity Meter Type: Bi-directional electricity meter Serial No.: 2009-9010176, 2010-046477, 2011-9044011, 2012-9044562 (Location ID No.: PK-201103) Manufacturer: ELSTER Model: A1RL+ Accuracy Class: 0.2% Calibration frequency: annually Date of calibration:</p> <table><tr><td>Year</td><td>Calibration date</td><td>Validity</td></tr><tr><td>2008</td><td>12/06/2008</td><td>11/06/2009</td></tr><tr><td>2009</td><td>10/06/2009</td><td>09/06/2010</td></tr><tr><td>2010</td><td>28/04/2010</td><td>27/04/2011</td></tr><tr><td>2011</td><td>27/04/2011</td><td>26/04/2012</td></tr><tr><td>2012</td><td>25/04/2012</td><td>24/04/2013</td></tr></table> | | | | | Year | Calibration date | Validity | 2008 | 12/06/2008 | 11/06/2009 | 2009 | 10/06/2009 | 09/06/2010 | 2010 | 28/04/2010 | 27/04/2011 | 2011 | 27/04/2011 | 26/04/2012 | 2012 | 25/04/2012 | 24/04/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 12/06/2008 | 11/06/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 10/06/2009 | 09/06/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 28/04/2010 | 27/04/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 27/04/2011 | 26/04/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 25/04/2012 | 24/04/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using an electricity meter. Aggregated and recorded monthly. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | The electricity meter will be subject to a regular maintenance and testing regime to ensure accuracy. Amount of electricity exported is cross-checked with MEA statement and sales receipt monthly. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Purpose of data: | Calculation of baseline emissions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Additional comment: | MEA grid company replaces electricity meter every year with new one which is the same type and same accuracy. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|------------|------|------|---------------|------------------|----------|------|------------|------------|------|------------|------------|------|------------|------------|------|------------|------------|-------|------------|------------|---|---|-------|---|---|---|---|-----|---|---|---|---|------|---|---|---|---|------|---|---|---|---|--------|---|---|---|---|-----------|---|---|---|---|---------|---|---|---|---|----------|---|---|---|---|----------|---|---|---|---|------------|---|---|---|---|-------|---|--|--|--|
| Data / Parameter: | EL_{IMP} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unit: | MWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description: | Total amount of electricity imported to meet project requirement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured/ Calculated / Default: | Measured | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source of data: | On-site measurements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Value(s) of monitored parameter: | <table border="1"> <tr> <th>Year Month</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr> <tr><td>January</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>February</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>March</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>April</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>May</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>June</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>July</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>August</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>September</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>October</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>November</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>December</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Year Total</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>Total</td><td colspan="4">1</td></tr> </table> | | | | Year Month | 2009 | 2010 | 2011 | 2012 | January | 0 | 0 | 0 | 0 | February | 0 | 1 | 0 | 0 | March | 0 | 0 | 0 | 0 | April | 0 | 0 | 0 | 0 | May | 0 | 0 | 0 | 0 | June | 0 | 0 | 0 | 0 | July | 0 | 0 | 0 | 0 | August | 0 | 0 | 0 | 0 | September | 0 | 0 | 0 | 0 | October | 0 | 0 | 0 | 0 | November | 0 | 0 | 0 | 0 | December | 0 | 0 | 0 | 0 | Year Total | 0 | 1 | 0 | 0 | Total | 1 | | | |
| Year Month | 2009 | 2010 | 2011 | 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| January | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| February | 0 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| March | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| May | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| July | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| August | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| September | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| October | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| November | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| December | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year Total | 0 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring equipment: | Device ID: Electricity Meter Type: Bi-directional electricity meter Serial No.: 2009-9010176, 2010-046477, 2011-9044011, 2012-9044562 (Location ID No.: PK-201103) Manufacturer: ELSTER Model: A1RL+ Accuracy Class: 0.2% Calibration frequency: annually Date of calibration: <table border="1"> <tr> <th>Year</th><th>Calibration date</th><th>Validity</th></tr> <tr><td>2008</td><td>12/06/2008</td><td>11/06/2009</td></tr> <tr><td>2009</td><td>10/06/2009</td><td>09/06/2010</td></tr> <tr><td>2010</td><td>28/04/2010</td><td>27/04/2011</td></tr> <tr><td>2011</td><td>27/04/2011</td><td>26/04/2012</td></tr> <tr><td>2012</td><td>25/04/2012</td><td>24/04/2013</td></tr> </table> | | | | Year | Calibration date | Validity | 2008 | 12/06/2008 | 11/06/2009 | 2009 | 10/06/2009 | 09/06/2010 | 2010 | 28/04/2010 | 27/04/2011 | 2011 | 27/04/2011 | 26/04/2012 | 2012 | 25/04/2012 | 24/04/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | Calibration date | Validity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2008 | 12/06/2008 | 11/06/2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2009 | 10/06/2009 | 09/06/2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2010 | 28/04/2010 | 27/04/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011 | 27/04/2011 | 26/04/2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 25/04/2012 | 24/04/2013 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Measured continuously using an electricity meter. Aggregated and recorded monthly. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures: | Amount of electricity imported is cross-checked with the MEA's invoice. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | |
|---------------------|---|
| Purpose of data: | Calculation of project emissions |
| Additional comment: | MEA grid company replaces electricity meter every year with new one which is the same type and same accuracy. |

| | |
|---|--|
| Data / Parameter: | ET_y |
| Unit: | TJ |
| Description: | Thermal energy used in landfill during project |
| Measured/ Calculated / Default: | Measured |
| Source of data: | On-site measurements |
| Value(s) of monitored parameter: | 0 (No thermal use in the project plant) |
| Monitoring equipment: | N/A |
| Measuring/ Reading/ Recording frequency: | If fossil fuel is used, the quantity of fossil fuel used will be measured using weight or volume meters. |
| Calculation method (if applicable): | N/A |
| QA/QC procedures: | N/A |
| Purpose of data: | Calculation of project emissions |
| Additional comment: | No thermal energy was used for the Project activity during this monitoring period. |

| | |
|---|--|
| Data / Parameter: | CEF_{thermal,y} |
| Unit: | tCO ₂ /TJ |
| Description: | CO ₂ emission intensity of the thermal energy |
| Measured/ Calculated / Default: | Calculated |
| Source of data: | Local data and/or IPCC default values |
| Value(s) of monitored parameter: | N/A |
| Monitoring equipment: | N/A |
| Measuring/ Reading/ Recording frequency: | N/A |
| Calculation method (if applicable): | N/A |
| QA/QC procedures: | N/A |
| Purpose of data: | Calculation of project emissions |

| | |
|---------------------|--|
| Additional comment: | <p>If fossil fuel is used, CO2 emission intensity of the thermal energy will be calculated with local data of NCV and/or IPCC default values.</p> <p>No fossil fuel was used for the Project activity during this monitoring period.</p> |
|---------------------|--|

| | |
|---|--|
| Data / Parameter: | Regulatory requirements |
| Unit: | - |
| Description: | Regulatory requirements relating to landfill gas projects |
| Measured/ Calculated / Default: | NA |
| Source of data: | Local/national data |
| Value(s) of monitored parameter: | <p>There are no regulatory or contractual requirements for LFG collection/combustion in Thailand at the time of project registration.</p> <p>No change during this monitoring period</p> |
| Monitoring equipment: | N/A |
| Measuring/ Reading/ Recording frequency: | At the renewal of crediting period (as per ACM0001ver05) though information is recorded annually |
| Calculation method (if applicable): | N/A |
| QA/QC procedures: | N/A |
| Purpose of data: | Calculation of baseline emissions |
| Additional comment: | N/A |

| | |
|---------------------------------------|-------------------------------|
| Data / Parameter: | - |
| Unit: | Hours |
| Description: | Operation of the energy plant |
| Measured/ Calculated / Default: | Measured |
| Source of data: | On-site measurements |

| Value(s) of monitored parameter: | <table border="1"> <thead> <tr> <th>Year</th> <th>Operation Hour</th> </tr> </thead> <tbody> <tr> <td>2009</td> <td>7,933</td> </tr> <tr> <td>2010</td> <td>8,251</td> </tr> <tr> <td>2011</td> <td>7,329</td> </tr> <tr> <td>2012</td> <td>8,660</td> </tr> <tr> <td>Total</td> <td>32,173</td> </tr> </tbody> </table> | Year | Operation Hour | 2009 | 7,933 | 2010 | 8,251 | 2011 | 7,329 | 2012 | 8,660 | Total | 32,173 |
|--|--|------|----------------|------|-------|------|-------|------|-------|------|-------|-------|--------|
| Year | Operation Hour | | | | | | | | | | | | |
| 2009 | 7,933 | | | | | | | | | | | | |
| 2010 | 8,251 | | | | | | | | | | | | |
| 2011 | 7,329 | | | | | | | | | | | | |
| 2012 | 8,660 | | | | | | | | | | | | |
| Total | 32,173 | | | | | | | | | | | | |
| Monitoring equipment: | Count by analogue gauge | | | | | | | | | | | | |
| Measuring/ Reading/ Recording frequency: | Recorded annually | | | | | | | | | | | | |
| Calculation method (if applicable): | N/A | | | | | | | | | | | | |
| QA/QC procedures: | N/A | | | | | | | | | | | | |
| Purpose of data: | Calculation of baseline and project emissions | | | | | | | | | | | | |
| Additional comment: | This is monitored to ensure that methane destruction is claimed for methane used in electricity plant when it is operational. | | | | | | | | | | | | |

D.3. Implementation of sampling plan

Not applicable.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

In accordance with ACM0001 version 5 that was applied for the Project, the emission reductions achieved by the project activity during a year y is determined as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) \times GWP_{CH_4} + EL_y \times CEF_{electricity,y} - ET_y \times CEF_{thermal,y}$$

where:

| | |
|-----------------------|--|
| ER_y | Emission reductions in tonnes of CO ₂ equivalents (tCO ₂ e) |
| $MD_{project,y}$ | Amount of methane that would have been destroyed/combusted during the year in tonnes of methane (tCH ₄) |
| $MD_{reg,y}$ | Amount of methane that would have been destroyed/combusted during the year in the absence of the project in tonnes of methane (tCH ₄) |
| GWP_{CH_4} | Global Warming Potential value for methane for the first commitment period is 21 tCO ₂ e/tCH ₄ |
| EL_y | Net quantity of electricity exported during year y in megawatt hours (MWh) |
| $CEF_{electricity,y}$ | CO ₂ emissions intensity of the electricity displaced in tCO ₂ e/MWh |
| ET_y | Incremental quantity of fossil fuel defined as difference of fossil fuel used in the baseline and fossil fuel used during the project for energy requirement on site under project activity during the year in TJ. No fossil fuel was consumed by the project during this monitoring period. Therefore, this parameter is zero for this monitoring period. |
| $CEF_{thermal,y}$ | CO ₂ emissions intensity of the fuel used to generate thermal/mechanical energy in tCO ₂ e/TJ |

Net quantity of electricity exported during year y in megawatt hours (EL_y) is estimated as follows:

$$EL_y = EL_{EX,LFG} - EL_{IMP}$$

where:

| | |
|---------------|--|
| $EL_{EX,LFG}$ | Net quantity of electricity exported during year y produced using landfill gas in megawatt hours (MWh) |
| EL_{IMP} | Net incremental electricity imported, defined as difference of project imports less any imports of electricity in the baseline, to meet the project requirements in megawatt hours (MWh) |

In cases where the $MD_{reg,y}$ is given/defined as a quantity, that quantity will be used.

In cases where regulatory or contractual requirements do not specify $MD_{reg,y}$ and “Adjustment factor” (AF) shall be used and justified, taking into account the project context.

$$MD_{reg,y} = MD_{project,y} \times AF$$

Amount of methane that would have been destroyed/combusted during the year ($MD_{project,y}$) can be arrived at by applying the following equation:

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y}$$

where:

| | |
|-----------------------------|--|
| $MD_{\text{flared},y}$ | Quantity of methane destroyed by flaring during year y (tCH ₄ /year) |
| $MD_{\text{electricity},y}$ | Quantity of methane destroyed by generation of electricity during year y (tCH ₄ /year) |
| $MD_{\text{thermal},y}$ | Quantity of methane destroyed by generation of thermal energy during year y (tCH ₄ /year) |

As the project does not involve thermal utilization of the collected landfill gas (LFG), $MD_{\text{thermal},y} = 0$. Therefore, the above equation is further reduced to as follows:

$$MD_{\text{project},y} = MD_{\text{flared},y} + MD_{\text{electricity},y}$$

The remaining parameters, $MD_{\text{electricity},y}$ and $MD_{\text{flared},y}$ are determined as follows:

$$MD_{\text{electricity},y} = LFG_{\text{electricity},y} \times w_{\text{CH}_4,y} \times D_{\text{CH}_4}$$

where:

| | |
|------------------------------|--|
| $LFG_{\text{electricity},y}$ | Quantity of landfill gas into electricity generator during the year y (m ³ /year) |
|------------------------------|--|

$$MD_{\text{flared},y} = (LFG_{\text{flare},y} \times w_{\text{CH}_4,y} \times D_{\text{CH}_4}) - (PE_{\text{flare},y} \div GWP_{\text{CH}_4})$$

where:

| | |
|------------------------|---|
| $LFG_{\text{flare},y}$ | Quantity of landfill gas fed to the flare during the year measured in cubic meters (m ³ /year) |
| $w_{\text{CH}_4,y}$ | Average methane fraction of the landfill gas as measured during the year and expressed as a fraction (m ³ CH ₄ /m ³ LFG) |
| D_{CH_4} | Methane density expressed in tonnes of methane per cubic meter of methane (tCH ₄ /m ³ CH ₄) |
| $PE_{\text{flare},y}$ | Project emissions from flaring of the residual gas stream in year y (tCO ₂ /year), calculated as per the "Tool to determine project emissions from flaring gases containing methane" |

$$PE_{\text{flare},y} = \sum_{h=1}^{8760} TM_{\text{RG},h} \times (1 - \eta_{\text{flare},h}) \times \frac{GWP_{\text{CH}_4}}{1000}$$

where:

| | |
|-------------------------|--|
| $TM_{\text{RG},h}$ | Mass flow rate of methane in the residual gas in the hour h (kg/h) |
| $\eta_{\text{flare},h}$ | Flare efficiency in hour h |

$$TM_{\text{RG},h} = FV_{\text{RG},h} \times fv_{\text{CH}_4,\text{RG},h} \times \rho_{\text{CH}_4,n}$$

where:

| | |
|--------------------------------|--|
| $FV_{\text{RG},h}$ | Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m ³ /h) |
| $fv_{\text{CH}_4,\text{RG},h}$ | Volumetric fraction of methane in the residual gas on dry basis in hour h |
| $\rho_{\text{CH}_4,n}$ | Density of methane at normal conditions (0.716 kg/m ³) |

Emission reductions achieved by the project activity during this monitoring period are summarized in the below table.

CER calculation from year 2009 to year 2012

| Emission Reduction Calculation | | | | | | | |
|--------------------------------|---------------------------|--|----------------------|-------------------------------------|------------------------------|------------------------|--------------------------|
| | ER = | (MD _{project} - MD _{reg}) x | GWP _{CH4} + | ELy x | CEF _{electricity} - | ET x | CEF _{thermal,m} |
| Year 2009 | 35,247 | 1,500 | 0 | 21 | 7,349 | 0.51 | 0 |
| Year 2010 | 29,665 | 1,287 | 0 | 21 | 5,174 | 0.51 | 0 |
| Year 2011 | 28,630 | 1,257 | 0 | 21 | 4,379 | 0.51 | 0 |
| Year 2012 | 32,722 | 1,467 | 0 | 21 | 3,755 | 0.51 | 0 |
| 2009-2012 | 126,264 | | | | | | |
| | unit : tCO ₂ e | tCH ₄ | tCH ₄ | tCO ₂ e/tCH ₄ | MWh | tCO ₂ e/MWh | TJ |
| | | | | | | | |
| | ELy = | EL-EX, LGFG - | EL-IMP | | | | |
| Year 2009 | 7,349 | 7,349 | 0 | | | | |
| Year 2010 | 5,174 | 5,175 | 1 | | | | |
| Year 2011 | 4,379 | 4,379 | 0 | | | | |
| Year 2012 | 3,755 | 3,755 | 0 | | | | |
| | unit : MWh | MWh | MWh | | | | |

E.2. Calculation of project emissions or actual net GHG removals by sinks

As per the applied methodology ACM0001 version 05, separate procedures for calculation of project emissions are not provided in the methodology. Rather, project emissions during this monitoring period are accounted in the baseline emissions calculation described in Section E.1. It is also noted that, during this monitoring period, no fossil fuels are consumed for the Project. Therefore, no project emissions associated with fossil fuel consumption occurred during this monitoring period.

E.3. Calculation of leakage

No leakage effects need to be accounted under the applied methodology, ACM0001 version 5.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

| Item | Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e) | Project emissions or actual net GHG removals by sinks (t CO ₂ e) | Leakage (t CO ₂ e) | Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e) |
|-----------|--|---|-------------------------------|--|
| Year 2009 | 35,247 | 0 | 0 | 35,247 |
| Year 2010 | 29,665 | 0 | 0 | 29,665 |
| Year 2011 | 28,630 | 0 | 0 | 28,630 |
| Year 2012 | 32,722 | 0 | 0 | 32,722 |
| Total | 126,264 | 0 | 0 | 126,264 |

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

| Item | Values estimated in ex-ante calculation of registered PDD | Actual values achieved during this monitoring period |
|--|---|--|
| Emission reductions or GHG removals by sinks (t CO ₂ e) | 239,704 | 126,264 |

E.6. Remarks on difference from estimated value in registered PDD

The actual GHG emission reductions achieved during the 2nd monitoring period of 01/01/2009-31/12/2012 (4 years) is less than the GHG emission reductions estimated ex-ante in the registered PDD. No further explanation is provided as per the guideline for completing the monitoring report form.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

| Item | Actual values achieved up to 31 December 2012 | Actual values achieved from 1 January 2013 onwards |
|--|---|--|
| Emission reductions or GHG removals by sinks (t CO ₂ e) | 126,264 | - |

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Document information

| <i>Version</i> | <i>Date</i> | <i>Description</i> |
|---|-----------------|--|
| 03.1 | 2 January 2013 | Editorial revision to correct table in section E.5. |
| 03.0 | 3 December 2012 | Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11). |
| 02.0 | 13 March 2012 | Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20). |
| 01 | 28 May 2010 | EB 54, Annex 34. Initial adoption. |
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