

MONITORING REPORT FORM (F-CDM-MR)
VERSION 02.0

MONITORING REPORT

Title of the project activity	Bangkok Kamphaeng Saen East : Landfill Gas to Electricity Project
Reference number of the project activity	3462
Version number of the monitoring report	2
Completion date of the monitoring report	15/04/2012
Registration date of the project activity	21/01/2011
Monitoring period number and duration of this monitoring period	Monitoring period 3 Duration – 01/11/2011 – 31/03/2012 inclusive
Project participant(s)	Bangkok Greenpower Co., Ltd. Xentolar Holdings Limited Sindicatum Carbon Capital Ltd.
Host Party(ies)	The Kingdom of Thailand
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1 - Energy industries (renewable - / non-renewable sources) Sectoral Scope 13 - Waste Handling and Disposal Baseline and monitoring methodology ACM0001 (Version 11) - “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	134,005 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	132,230 tCO ₂ e

*as contained within the document entitled “Guidelines for completing the monitoring report form(CDM-MR)” (EB66 meeting report, annex 20)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project (hereinafter is referred as “The Project”) extracts, captures and utilizes landfill gas (LFG) to generate electricity. The LFG is extracted and captured using Sindicatum Carbon Capital (ordered by Xentolar Holdings Limited, a project participant) proprietary LFG collection system and the electricity generated is exported to the Thailand electrical grid (Thai Grid).

Under the project activity, a fully integrated LFG collection system is installed and operated. When the yield of gas is insufficient to supply to the generators, or surplus LFG is available, due to engine maintenance or other site factors, LFG is sent to an enclosed ground flare where it is flared; thus minimising methane emissions and maximising carbon abatement. The annual emission reductions of the project activity indicated in the PDD are approximately 273,086 tCO₂e yearly over the first 7-year crediting period.

The construction of landfill gas extraction pipe system commenced in August 2009. Landfill gas has been extracted and combusted by flare since February 2010. The physical installation of the first four engines and construction of the grid connection was completed by the end of March 2010. Following commissioning the project exported electricity to the Thai Grid from April 2010. An additional 2 engines were installed during April 2011 and commissioned during May 2011. A further 2 engines were installed during December 2011 and commissioned during January 2012.

Total emission reductions achieved in this monitoring period are 132,230 tCO₂e .

A.2. Location of project activity

The Project is located in the Kingdom of Thailand, at T. Sasimhum, A. Kamphaeng Saen, Nakhon Pathom, 73140. The geographic coordinates of the project are: longitude 14°3'50.62"N and latitude 99°56'50.96"E.

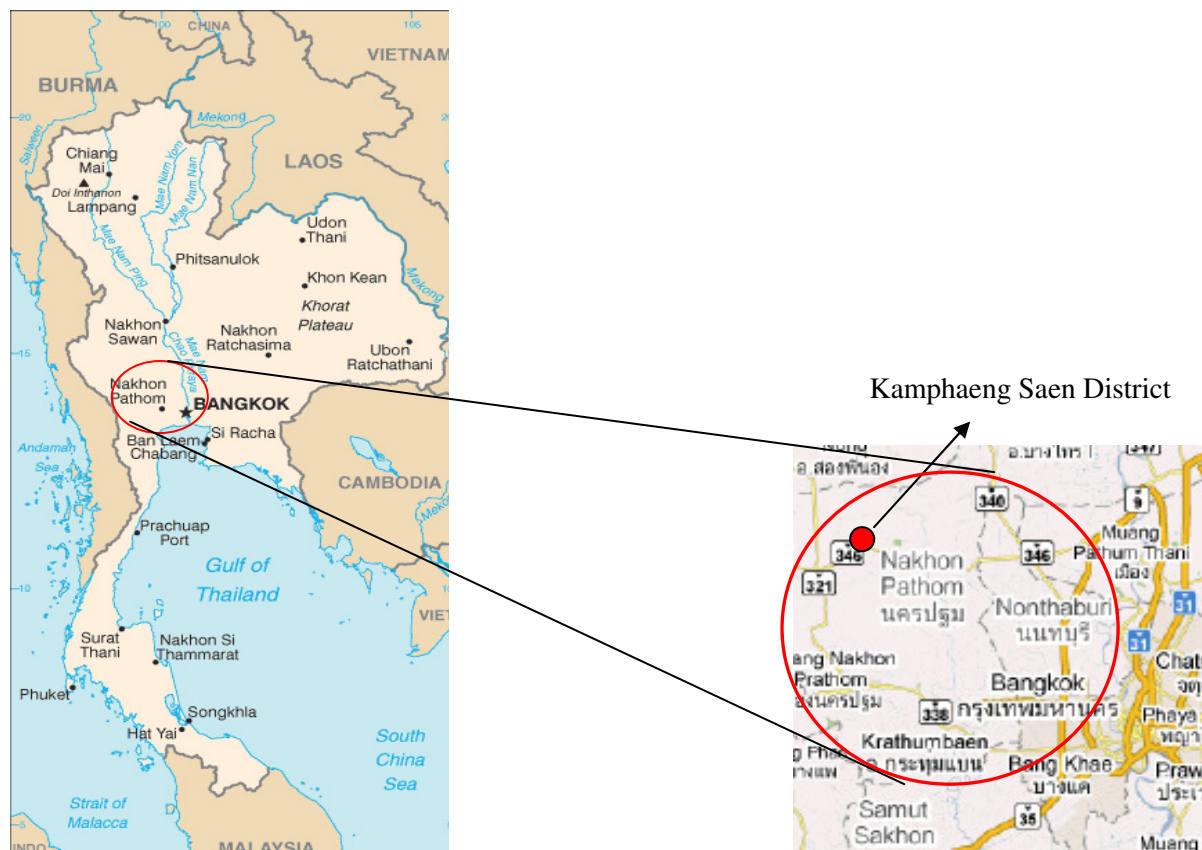




Figure A.2.1 Location of the project activity.

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)
The Kingdom of Thailand (host)	Bangkok Greenpower Co., Ltd.	No
UK (Annex I)	Xentolar Holdings Limited	No
UK (Annex I)	Sindicatum Carbon Capital Ltd.	No

A.4. Reference of applied methodology

- Baseline and monitoring methodology ACM0001 (Version 11) - “Consolidated baseline and monitoring methodology for landfill gas project activities”;
- “Tool for the demonstration and assessment of additionality” - Version 05.2
- “Tool to determine project emissions from flaring gases containing methane”
- “Tool to calculate the emission factor for an electricity system” - Version 02
- “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” - Version 04
- “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” - Version 1.

A.5. Crediting period of project activity

A renewable 7 years crediting period was chosen for the project activity. The start date of the crediting period was 21/01/2011.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project is extracting, capturing and utilizing landfill gas (LFG) from Kamphaeng Saen East Landfill to generate electricity. The electricity generated is exported to the Thai Grid. Whenever there is surplus LFG, due to engine maintenance or other site factors, LFG is sent to an enclosed ground flare where it is flared thus minimising methane emissions and maximising carbon abatement.

Landfill gas collection system:

High-density polyethylene (HDPE) horizontal collection pipes have been installed in the waste as an integral part of the tipping operation. These collection wells are augmented by additional horizontal and vertical collection wells. The collection pipes are connected via main carrier pipes to the LFG extraction plant and a negative pressure applied. The LFG, comprising approximately 50% methane and 50% carbon dioxide is used for power generation with any surplus gas flared. The SCC proprietary LFG system has been designed to optimise LFG recovery and utilisation and optimise carbon abatement, and is designed to overcome inherent problems associated with LFG projects in similar conditions.

The recovered LFG passes through the pre-treatment plant where moisture and particulates are removed prior to the power generating engines. The pre treatment plant is designed to ensure that the gas quality reaching the engines is in line with the manufacturer's requirements. A schematic layout of the pre treatment and utilisation plant is shown in Figure B.1-1 below. Power generation units have been installed in line with electrical infrastructure capacity and also to match the LFG recovery profile. Sufficient flare capacity has been installed to ensure that any surplus LFG is flared if engine capacity is insufficient or during periods of maintenance or breakdown. The interface control and system management has been designed to allow real time adjustment of system performance thus optimising gas utilisation and carbon abatement.

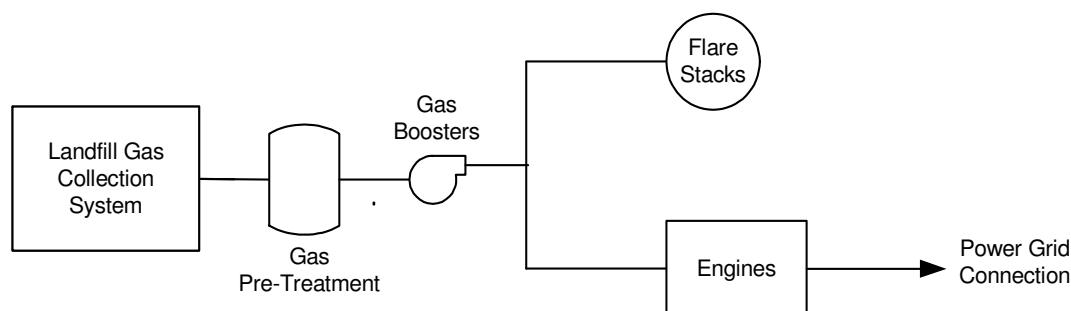


Figure B.1-1 Technical diagram of the project activity

LFG generator sets:

After the LFG has passed through the pre treatment plant the gas is sent to spark ignition power generation units. The electricity produced is distributed to the Thailand Electric Grid. Currently the project activity consists of 8 generator sets manufactured by GE Jenbacher. The specification for the generator sets are shown below:

Parameters	Generator Sets
Quantity	8
Style	4 strokes
Rated rotating speed	1000r/minute
Rated power	1063kW
Rated voltage	400V
Rated frequency	50Hz

The generator sets used by this project are designed for power generation by utilizing landfill gas.

Flare system:

The surplus gas is destroyed by a flare system. The combination of power generation and flare optimizes the destruction of landfill gas.

The flare installation used by this project meets all of the necessary conditions that are required by “Tool to determine project emissions from flaring gases containing methane” option a) for a default value of 90% for flare efficiency with continuous monitoring of compliance with the flare manufacture specifications. The flare system is equipped with a monitoring system to measure flow, pressure, methane concentration and the temperature in order to comply with the tool.

Below is a summary of the technical specification of the flare:

Parameters	Flare
Type	Enclosed Flare
Quantity	3
Capacity	2,000 Nm ³ /h
Flare Temperature (°C)	500-1200
Methane Combustion Efficiency	>98%
Manufacturer	Nanjing Carbon Recycle Biomass Technology Co., Ltd

Specification of the installed monitoring equipment is detailed in the tables included in section D.

Landfill gas has been extracted and combusted by flare since February 2010. The physical installation of the first 4*1063kW engines and construction of the grid connection was completed by late March 2010. Following commissioning of the grid connection the project started to export power to the Thai Grid on 8th April 2010. An additional 2*1063kW engines (No. 5 & 6) were installed during April and commissioned during May 2011. An additional 2*1063kW engines (No. 7 & 8) were install during December 2011 and commissioned during January 2012 The dates of commissioning completion for the engines were as follows:

Engine	Commissioning Handover Date	Engine	Commissioning Handover Date
1	18/05/2010	5	20/04/2011
2	17/06/2010	6	20/05/2011
3	18/05/2010	7	27/01/2012
4	18/05/2010	8	27/01/2012

The project activity started to export power on 08/04/2010 at a capacity of 0.8MW, which was subsequently increased to 3MW on 03/06/2010, 4MW on 06/10/2010, 6MW on 26/05/2010 and 6.3MW on 12/07/2011; as each phase of the power generation plant has been granted approval by the Provincial Electricity Authority (PEA). A further two engines were commissioned during this monitoring period taking the potential export generation capacity to 8MW; however the PEA has yet to grant approval for the increase from 6.3MW to 8MW export.

Meanwhile, excessive landfill gas was also combusted by the flares in conjunction with power generation. At this stage, the combination of power generation and flaring optimizes the destruction of landfill gas. As waste tipping continues and additional LFG is generated, further generator sets will be installed.

Therefore, emission reductions of methane destroyed by both flare and power generation occurred within this monitoring period and emission reductions calculated for both types of LFG destruction are included in this monitoring report.

This is the third monitoring report. The monitoring period covered by this monitoring report is: **01/11/2011 – 31/03/2012(inclusive)**.

The individual engine operational time for this monitoring period is provided in section D.2 – operation of energy plant. Information regarding replacement schedule of monitoring equipment is referred to in Annex E.

Special events (overhaul times, downtimes of equipment, exchange,..) of the project activity during this monitoring period are detailed in Annex F.

No events or situations may which impact the applicability of the methodology occurred during this monitoring period.

B.2. Post registration changes

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

No temporary deviations from registered monitoring plan or applied methodology were applied during this monitoring period.

B.2.2. Corrections

Not applicable.

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

There have been no permanent changes from registered monitoring plan or applied methodology submitted or approved during this monitoring period with this monitoring report.

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

There have been no changes to the project design of the project activity submitted or approved during this monitoring period with this monitoring report.

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B.2.5. Changes to start date of crediting period

There have been no changes to the start date of crediting period submitted or approved during this monitoring period with this monitoring report.

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

Not Applicable

SECTION C. Description of monitoring system

In order to guarantee the quality of the data and data collection system, a detailed monitoring manual has been developed and implemented. This detailed monitoring manual (available for verification by the DOE) is based upon requirements set out in the PDD and monitoring plan.

Management structure for the implementation of monitoring plan

The project owner has established a specific CDM department and a CDM manager has been appointed to oversee that activities are carried out according to the monitoring plan. The organizational structure for the CDM department is shown below.

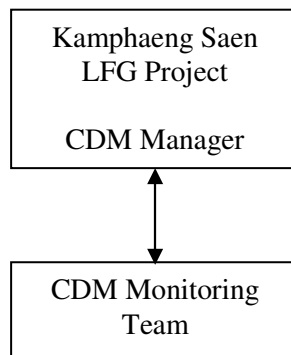


Figure C.1 Organisation Structure of the CDM Team

Responsibility and CDM management:

A CDM Manager is appointed with responsibility for monitoring all Project related activities and organizing training. The CDM Manager is responsible for overseeing the implementation of this procedure. Competency requirements for the position of CDM Manager are defined and applied to ensure that the CDM Manager is able to implement this procedure.

All calculations are checked and signed off by the CDM Manager who is also be responsible for preparing and checking the documents required for verification.

A CDM Monitoring Team, that reports directly to the CDM Manager, has day to day responsibilities for checking instrumentation, record keeping, data handling and data processing, filing, reporting, organizing repair and maintenance of monitoring equipment and ensuring the monitoring plan is adhered to as indicated in the approved PDD. The monitoring staffs have received technical training and refresher training as well as safety training to minimize exposure to workplace hazards.

A management level link has been established to ensure effective co-operation between landfill staff and CDM monitoring staff.

All relevant information, notes of meetings, data files, maintenance records, defect reports, hard copy and computerized records of monitoring are kept at a designated location and arranged in an orderly and transparent manner to facilitate auditing as and when required.

Responsibilities, procedures, methods, equipment types and specifications are described in detail in a site-specific CDM monitoring manual.

The parameters monitored and the monitoring procedure applied for determination of the emission reductions is described in detail in section B.7.1 of the Project Design Document Version 8, dated 13/08/2010, and available upon the UNFCCC website:

<http://cdm.unfccc.int/Projects/DB/SGS-UKL1267631662.24/view>

An overview of the parameters monitored is provided in **Section D**.

The location of measurement devices is presented in Figure C.2 below:

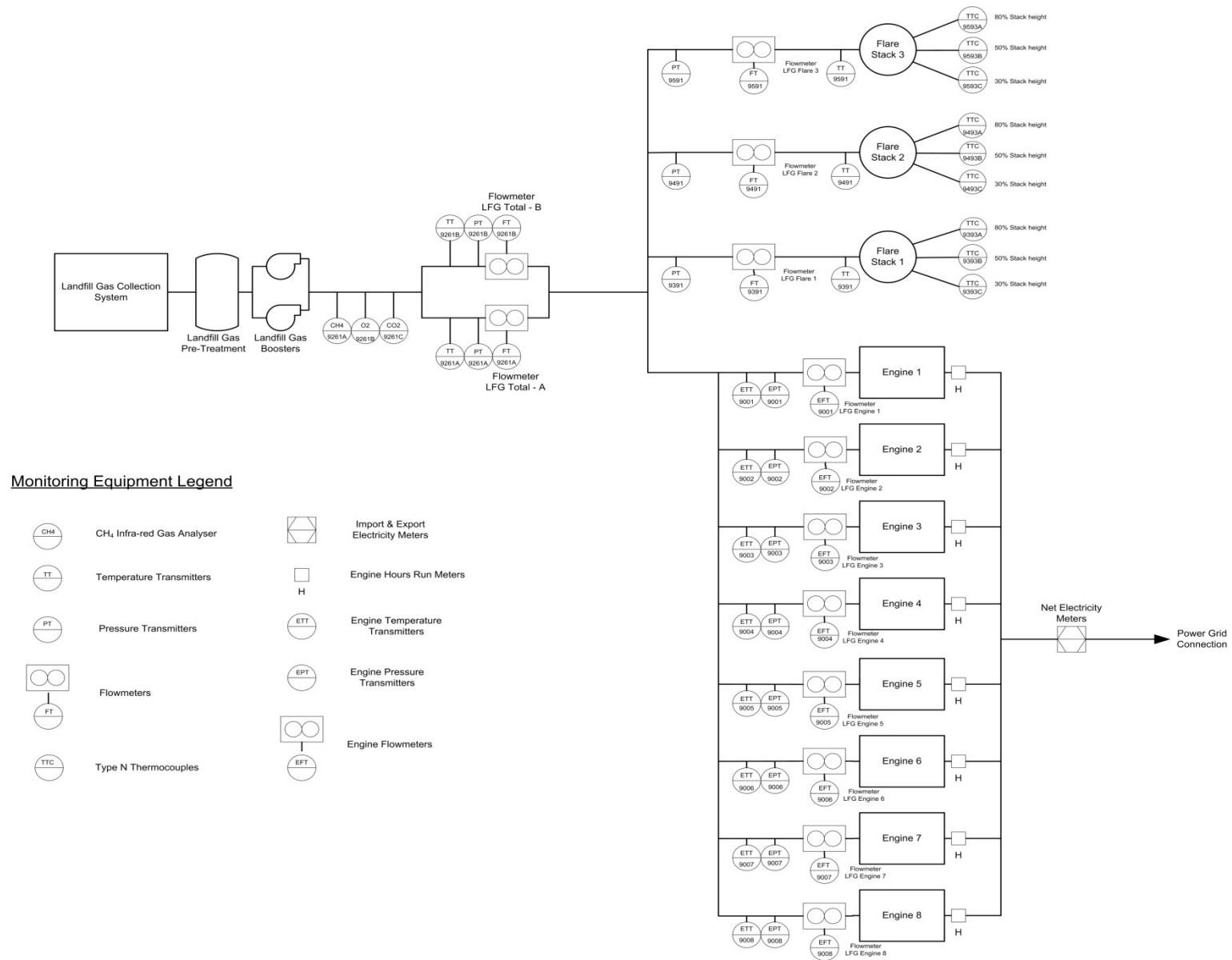


Figure C.2 - Location of the measurement devices

Data collection and management

- On-line monitoring

With the exception of the electricity meters, monitoring equipment required to determine GHG emissions and emission reductions are monitored on-line from a central control point which records meter readings at one minute intervals.

- Manual data recording system

A manual data recording system to act as a back-up for the on-line monitoring system is in place. This involves completion of a log sheet that records flow meter readings. Spot readings of other values (methane concentration, temperature and pressure) are also recorded periodically and at the times when flow meter readings are taken.

- Regulatory requirements related to landfill gas projects

Although the methodology only requires recording at the renewal of the crediting period, the information related to all relevant policies and circumstances are collected and recorded annually. Information will be kept during crediting period and two years after.

- Data archiving

The on-line monitoring system automatically and periodically archives data in a safe manner. Electronic documents are saved for backup, with written documents and back-ups safely kept. Calibration data is saved electronically. All information related to monitoring such as meeting minutes, data documents, maintenance records, accident reports, hard copies as well as computer records, are kept at designated locations to ensure that the examination process is transparent and effective. These data will be stored until 2 years after the end of the crediting period.

Maintenance and calibration of meters

All meters are maintained as specified in the CDM monitoring manual and according to manufacturer specifications. All key meters are subject to a quality control regime that includes regular maintenance and calibration. Calibrations are carried out by the manufacturer or a suitably qualified external company. A record is maintained showing the location and unique identification number of each meter, the calibration status of that meter (when last calibrated, when next due for calibration) and who performs the calibration service. Calibration certificates will be retained for all meters until two years after the end of the crediting period.

Mass flow of methane supplied to the engines is corroborated by comparison with the sum of the gross engine power outputs, the relationship being a function of engine efficiency which can be considered a constant under the proposed maintenance regime.

Treatment of missing or corrupted data

When data in the on-line system are corrupted or missing whilst the generators are operating (as shown, for example, by electricity output) the missing data can be estimated by taking the lower value of the parameter one hour before the error or one hour after the system restart. If there is evidence that neither of these values is representative, use the average value of the parameter from the previous 24 hours.

Any error is recorded in the log sheet and the occurrence of the error is investigated and rectified as soon as possible. If the on-line system is compromised for more than 24 hours, data is manually recorded. Manually recorded data is backup data for methane destruction amount and other key parameters. Any deficiencies in methane flow monitoring data are rectified by calculation from power generation data.

Any treatment of missing or corrupt data is detailed in the special events schedule in Appendix F.

Non-essential data

The on-line monitoring system also records “non-essential” data. Such data is termed non-essential because it is not directly listed in the CDM Monitoring Methodology, but it will constitute a means of corroborating the on-line system. Non-essential data may include measurements of net and gross output from individual

generators, certificated conversion efficiency, waste deposition and any other data considered relevant to the project activity.

Document Control

The CDM Manager has implemented a document control system that ensures that the current versions of necessary documents are available at the point of use.

Audit function and management review

The CDM Manager arranges for an independent internal audit of the management system periodically and at least once per year. The auditor is not be involved in the daily operation of the project and if necessary, may be sourced from a third party. The auditor assesses the implementation of the monitoring procedure and the preparation of the monitoring report. Audit findings and steps taken to address findings are recorded and reviewed in a Management Review meeting (convened at least annually) at which time the effectiveness of these procedures will be reviewed and necessary changes implemented. The audit reports and annual review meeting notes are available to the verifying DOE.

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 of CH ₄
Source of data	Decisions under UNFCCC and the Kyoto Protocol
Value(s) applied	21
Purpose of data	This data is used for baseline and project emission reduction calculations.
Additional comment	Shall be updated according to any future COP/MOP decisions

Data / Parameter	D_{CH_4}
Unit	tCH ₄ / m ³ CH ₄
Description	Methane density
Source of data	ACM0001 version 11
Value(s) applied	0.0007168 (at standard temperature and pressure: 0 degree Celsius and 1.013 bar)
Purpose of data	This data is used for baseline emission calculations.
Additional comment	N.A.

Data / Parameter	$CEF_{elec,BL,y}$ (the same parameter as $EF_{EL,y}$)
Unit	tCO ₂ /MWh
Description	Grid emission factor of electricity
Source of data	Thai grid emission factpr calculation
Value(s) applied	0.57420
Purpose of data	This data is used for baseline emission and project emission calculations.
Additional comment	N.A.

D.2. Data and parameters monitored

Data / Parameter	$LFG_{total,y}$
Unit	m ³
Description	Total amount of landfill gas captured at Normal Temperature and Pressure
Measured /Calculated /Default	Measured
Source of data	Flow meter readings
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet

Monitoring equipment	- V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter. - See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/recorded every minute Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	Data is backed up and archived, where it is stored for two years longer than the crediting period or two years after the last issuance of CERs. For internal cross checking purposes the consistency of flow measurements is checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{\text{flare,h}} + LFG_{\text{electricity,h}}) = LFG_{\text{total,h}}$ Flow meter is calibrated according to the manufacturer's specifications. Calibrations are carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained. Installation, calibration dates and validity periods are provided in Annex E. On site staff have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

Data / Parameter	$LFG_{\text{flare,y}}$ (The same as $FV_{\text{RG,h}}$, different nomenclature for ACM0001 (version 11) and “Tool to determine project emissions from flaring gases containing methane”.)
Unit	m^3
Description	Amount of landfill gas flared at Normal Temperature and Pressure
Measured /Calculated /Default	Measured
Source of data	Flow meter on the inlet to each flare.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter. - See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute. Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	Data is backed up and archived, where it is stored for two years longer than the crediting period or two years after the last issuance of CERs. For internal cross checking purposes the consistency of flow measurements is checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{\text{flare,h}} + LFG_{\text{electricity,h}}) = LFG_{\text{total,h}}$ Flow meter is calibrated according to the manufacturer's specifications. Calibrations are carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained. Installation, calibration dates and validity periods are provided in Annex E. On site staff have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data	For baseline emission and project emission calculation
Additional comment	N.A.

Data / Parameter	$LFG_{\text{electricity,y}}$
Unit	m^3

Description	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure
Measured /Calculated /Default	Measured
Source of data	Flow meter on the inlet to each generator.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter. See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute. Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	Data is backed up and archived, where it is stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. For internal cross checking purposes the consistency of flow measurements is be checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{flare,h} + LFG_{electricity,h}) = LFG_{total,h}$ Flow meter is calibrated according to the manufacturer's specifications. Calibrations are carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained. Installation, calibration dates and validity periods are provided in Annex E. On site staff have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data	For baseline emission calculation
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
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	N.A.
Measuring/ Reading/ Recording frequency	N.A.
Calculation method (if applicable)	The parameter is calculated as per “Tool to determine project emissions from flaring gases containing Methane”.
QA/QC procedures	Regular maintenance should ensure optimal operation of flares. The enclosed flares are operated and maintained as per the specifications prescribed by the manufacturer.
Purpose of data	For project emission calculation
Additional comment	N.A.

Data / Parameter	$\omega_{CH_4,y}$ (The same parameter as $fv_{CH_4, RG,h}$ different nomenclature for ACM001(version 11) and “Tool to determine project emissions from flaring gases containing methane”.)
Unit	m ³ CH ₄ /m ³ LFG
Description	Methane fraction in the landfill gas
Measured /Calculated /Default	Measured
Source of data	Gas quality analyzer reading

Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	• Infra-Red Gas Monitor. See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	Routine checks are performed by the CDM Monitoring Team to ensure proper functioning of the equipment. Any faults are reported to the CDM Manager for action. Monthly zero checks using atmospheric air or a certified nitrogen reference gas. Monthly site gas span undertaken using certified calibration gas. Gas analyser maintained and calibrated as per manufacturers recommendations. Installation, calibration dates and validity periods are provided in Annex E. Data is backed up and archived where it is stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

Data / Parameter	T
Unit	°C
Description	Temperature of the landfill gas
Measured /Calculated /Default	Measured
Source of data	Temperature probe in LFG pipe work between the gas treatment package and the generator sets / flares.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	• Temperature Transmitter. • See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute
Calculation method (if applicable)	N.A.
QA/QC procedures	Routine checks are performed by CDM Monitoring Team to ensure proper functioning of the equipment. Any faults are reported to the CDM Manager for action. Temperature probe maintained and calibrated as per manufacturers recommendations. Installation, calibration dates and validity periods are provided in Annex E. Data is backed up and archived where it is stored for the longer of two years longer than the crediting period or two years after the last issuance of CER's.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

Data / Parameter	P
Unit	Pa
Description	Pressure of the landfill gas
Measured /Calculated /Default	Measured
Source of data	Pressure transmitter mounted in the LFG pipe work between the gas treatment package and the generator sets / flares.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	• Absolute Pressure Transmitter See specification details in Annex D.

Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	Routine checks are performed by CDM Monitoring Team to ensure proper functioning of the equipment. Any faults are reported to the CDM Manager for action. Pressure Transmitter maintained and calibrated as per manufacturers recommendations. Installation, calibration dates and validity periods are provided in Annex E. Data is backed up and archived where it is stored for the longer of two years longer than the crediting period or two years after the last issuance of CER's.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

Data / Parameter	EL_{LFG}
Unit	MWh
Description	Net quantity of electricity produced / exported using LFG
Measured /Calculated /Default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- Electricity Meter - See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuously measured. Data is aggregated monthly and yearly.
Calculation method (if applicable)	N.A.
QA/QC procedures	The electricity meters are maintained and calibrated according to manufacturer's instructions or the relevant regulations. Data will be archived for 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the export of power to the grid.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

Data / Parameter	EL_{import} (The same parameter as $EC_{PJ,j,y}$)
Unit	MWh
Description	Net amount of electricity imported from the grid for auxiliary use
Measured /Calculated /Default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- Electricity Meter - See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuously measured. Data is aggregated monthly and yearly
Calculation method (if applicable)	N.A.
QA/QC procedures	The electricity meters are maintained and calibrated according to manufacturer's instructions or the relevant regulations. Data will be archived for 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the import of power from the grid
Purpose of data	For project emission calculation

Additional comment	N.A.
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Data / Parameter	Operation of the energy plant
Unit	Hours
Description	Operation of the energy plant
Measured /Calculated /Default	Measured
Source of data	Measured with individual, software based, run meters on each generator set, readings taken from SCADA system
Value(s) of monitored parameter	Engine #1 : 14,228 hours run Engine #2 : 13,977 hours run Engine #3 : 14,557 hours run Engine #4 : 14,000 hours run Engine #5 : 7,279 hours run Engine #6 : 6,921 hours run Engine #7 : 1,342 hours run Engine #8 : 1,549 hours run
Monitoring equipment	N.A.
Measuring/ Reading/ Recording frequency	Continuously Measured
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	For emission reductions calculation
Additional comment	N.A.

Data / Parameter	T_{flare}
Unit	°C
Description	Temperature of the exhaust gas of the flare
Measured /Calculated /Default	Measured
Source of data	Type N Temperature thermocouple mounted in flare stack
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- Type N Thermocouple - See specification details in Annex D.
Measuring/ Reading/ Recording frequency	Continuous measuring/reading every minute
Calculation method (if applicable)	N.A.
QA/QC procedures	Routine checks are performed by Site Engineers to ensure proper functioning of the equipment. Any faults are reported to the CDM Manager for action. Thermocouple maintained and calibrated as per manufacturer's recommendations. Installation, calibration dates and validity periods are provided in Annex E. Data is backed up and archived where it is stored for the longer of two years longer than the crediting period or two years after the last issuance of CER's.
Purpose of data	For project emission calculation
Additional comment	N.A.

Data / Parameter	$TDL_{j,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to Source j
Measured /Calculated /Default	Calculated

Source of data	Thailand Energy Statistics 2011 by DEDE Department Ministry of Energy, Thailand. Most recent, accurate and reliable published data available within the host country is applied.
Value(s) of monitored parameter	8.55%
Monitoring equipment	N.A.
Measuring/ Reading/ Recording frequency	Annually
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	For project emission calculation
Additional comment	N.A.

Data / Parameter	Regulatory requirements relating to landfill gas projects
Unit	-
Description	Regulatory requirements relating to landfill gas projects may effect the value of AF or MD _{reg,y}
Measured /Calculated /Default	Measurements by project participants
Source of data	See details in Annex C.
Value(s) of monitored parameter	N.A.
Monitoring equipment	N.A.
Measuring/ Reading/ Recording frequency	Annually
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	For baseline emission calculation
Additional comment	N.A.

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

The formulae used for determination of the baseline emissions are described in section B.6.1 of the registered PDD for the project activity.

$$BE_y = (MD_{project,y} - MD_{BL,y}) * GWP_{CH4} + EL_{LFG,y} * CEF_{elec,BL,y} + ET_{LFG,y} * CEF_{ther,BL,y} \quad (I)$$

Where:

- BE_y = Baseline emission in year y (tCO₂e)
- $MD_{project,y}$ = The amount of methane that would have been destroyed/combusted during year y (tCH₄) in project scenario
- $MD_{BL,y}$ = The amount of methane that would have been destroyed/combusted during year y in the absence of the project due to regulatory and/or contractual requirement (tCH₄) this is zero for this project
- GWP_{CH4} = Global Warming Potential value for methane for the first commitment period is

$$\begin{aligned}
& 21(\text{tCO}_2\text{e/tCH}_4) \\
EL_{LFG,y} &= \text{Net quantity of electricity produced using LFG, which in the absence of this project activity would have been produced by power plants connected to the Thai Grid during year } y(\text{MWh}) \\
CEF_{elec,BL,y} &= \text{CO}_2 \text{ emission factor of the Thai Grid (tCO}_2\text{e/MWh)} \\
ET_{LFG,y} &= \text{The quantity of thermal energy produced utilizing the landfill gas, which in the absence of project activity would have been produced from onsite/offsite fossil fuel fired boiler, during the year } y \text{ (TJ)} \\
CEF_{ther,BL,y} &= \text{CO}_2 \text{ emission intensity of the fuel used by boiler to generate thermal energy which is displaced by LFG based thermal energy generation (t CO}_2\text{/TJ)}
\end{aligned}$$

$MD_{project,y}$ is determined via the measured quantities of methane captured and destroyed by the project, either by flaring or as fuel to the gas engines, as detailed in equation 2 below.

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} \quad (2)$$

Where:

$$\begin{aligned}
MD_{flared,y} &= \text{measured quantity of methane destruction in flares during the year } y ; \\
MD_{electricity,y} &= \text{measured quantity of methane destruction in power plant during the year } y ;
\end{aligned}$$

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH_4,y} * D_{CH_4} \quad (3)$$

Where:

$$\begin{aligned}
LFG_{electricity,y} &= \text{quantity of LFG destroyed by the generators in m}^3 \\
w_{CH_4,y} &= \text{average concentration of methane in LFG (m}^3\text{CH}_4\text{/m}^3\text{LFG)} \\
D_{CH_4} &= \text{density of methane (tCH}_4\text{/m}^3\text{)}
\end{aligned}$$

Including it in this equation takes account of the fact that $LFG_{electricity,y}$ is measured at the inlet to the generator.

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH_4,y} * D_{CH_4}) - (PE_{flare,y} / GWP_{CH_4}) \quad (4)$$

Where:

$$\begin{aligned}
LFG_{flared,y} &= \text{quantity of landfill gas fed to the flare during the year measured in cubic meters (m}^3\text{),} \\
w_{CH_4,y} &= \text{the average methane fraction of the landfill gas as measured during the year and expressed as a fraction (m}^3\text{CH}_4\text{/m}^3\text{LFG);} \\
D_{CH_4} &= \text{methane density, (tCH}_4\text{/m}^3\text{ CH}_4\text{)} \\
PE_{flare,y} &= \text{the project emissions from flaring of the residual gas stream in year } y \text{ (tCO}_2\text{e)}
\end{aligned}$$

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} X (1 - \eta_{flare,h}) X GWP_{CH_4} / 1000 \quad (5)$$

Where:

$PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year y (tCO₂e);
 $TM_{RG,h}$ = Mass flow rate of methane in the residual gas in the hour h(kgCH₄/h);

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH_4, RG,h} \times \rho_{CH_4,n} \quad (6)$$

Where:

$\eta_{flare,h}$ = Flare efficiency in hour h(%), IPCC default value 90% is taken;
 GWP_{CH_4} = Global warming potential of methane valid for the first commitment period (21tCO₂e/tCH₄).

In the above formula, $LFG_{flare,y}$, $LFG_{flared,h}$, $\omega_{CH_4,y}$, $\omega_{CH_4,h}$ and $\eta_{flare,h}$ has been confirmed ex-post during project implementation.

The value of D_{CH_4} under standard temperature and air pressure (1.013bar and 0°C) is 0.0007168 tCH₄/m³CH₄.

In this project there is no thermal energy utilization from LFG: $ET_{LFG,y} = 0$. Similarly $MD_{BL,y} = 0$ as there is no methane destruction due to regulatory and/or contractual requirements in the absence of this project.

The baselines emissions are calculated in the attached ER calculation excel spreadsheets, and a summary of the calculation results is provided in Tables 1 to 5 below.

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

$$PE_y = PE_{EC,y} + PE_{FC,j,y} \quad (7)$$

Where:

$PE_{EC,y}$ = Emission from consumption of electricity in project case
 $PE_{FC,j,y}$ = Emission from consumption of heat in the project case

$PE_{FC,j,y}$ does not need to be accounted for as there is no thermal generation by the proposed project activity.

Project emissions arise from consumption of grid electricity ($PE_{EC,y}$) during periods when there is no on-site generation. $PE_{EC,y}$ is determined using the procedure described in Methodological “Tool to calculate baseline, project and/or leakage emissions from energy consumption” Version 1.

$$PE_{EC,y} = EC_{P,y} \times EF_{EL,y} \times (1 + TDL_{j,y}) \quad (8)$$

Where:

$EC_{P,y}$ (also = Electricity imported from the grid and used in the project in year y (MWh/yr)
 EL_{import}
 $CEF_{EL,y}$ (also = CO₂ emission factor of the Thai Grid in year y (tCO₂e/MWh)
 $EF_{EL,y}$
 $TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to the project in year y (fraction)

E.3. Calculation of leakage

No leakage effects need to be accounted under ACM0001 version 11.

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

The projects emissions are calculated in the attached ER calculation excel spreadsheets, and a summary of the calculation results is provided in Table 6.

Emission reductions are calculated using ACM 0001 version 11, as follows:

$$ER_y = BE_y - PE_y \quad (9)$$

Where:

- ER_y = Emission reductions in year y(tCO₂e/yr)
- BE_y = Baseline emissions in year y(tCO₂e/yr)
- PE_y = Project emissions in year y(tCO₂e/yr)

The emission reductions are calculated in the attached ER calculation excel spreadsheets, and a summary of the calculation results is provided in Table 7.

See registered PDD for detailed information.

<http://cdm.unfccc.int/UserManagement/FileStorage/R28ZCYKV731O6DHP9GSQ0LTUW.JXF5N>

Calculation sheets are provided below.

Notes on ER Calculations:

1. The flow of LFG_{total,y}, LFG_{flare,y} and LFG_{electricity,y} are measured using V-Cone pressure differential flow meters at each location as detailed in section D.2 above. At each V-cone flow measuring location an independent temperature transmitter and pressure transmitter is also installed to measure the LFG at this location. These working conditions are then used to convert the flow of LFG to NTP. The CH₄ volume flow is then converted to mass flow using the NTP methane density, a constant provided in the ACM0001 methodology.



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The following table shows monthly total LFG collected by project and amount of LFG fed to each individual flare stack and each engine.

Table 1. Monthly net methane destruction attribute to the project activity

Date (inclusive)	Quantity of total Landfill gas captured measured in Nm ³	Quantity of Landfill gas fed to flare measured in Nm ³	Quantity of landfill gas fed to the power generators measured in Nm ³	Average value of concentration of methane in landfill gas m ³ CH ₄ /m ³ LFG	Quantity of Methane Gas fed to the flare measured in Nm ³	Quantity of Methane Gas fed to the power generators measured in Nm ³
	LFG total, month	LFG flare, month	LFG Electricity, month	ω CH _{4,y}	CH ₄ Flare, month	CH ₄ Electricity, month
01/11/2011 30/11/2011	3,525,892	709,369	2,789,653	48	344,680	1,349,248
01/12/2011 31/12/2011	3,363,902	371,415	2,961,012	48	175,717	1,405,258
01/01/2012 31/01/2012	3,291,130	392,552	2,751,625	49	191,086	1,338,806
01/02/2012 29/02/2012	3,095,201	452,193	2,559,167	53	240,114	1,347,365
01/03/2012 31/03/2012	3,691,737	751,450	2,863,155	51	378,912	1,447,883

Table 2. Methane destruction attributes to power generation

Date (inclusive)	Quantity of Methane Gas fed to the power generators measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane destroyed by generator (tCH ₄)*	Global warming potential of methane	Quantity of equivalent Carbon dioxide destroyed by power generation(tCO ₂)
	CH ₄ Electricity, month	D CH ₄	MD electricity, month	GWP CH ₄	tCO ₂ e, month
01/11/2011 30/11/2011	1,349,248	0.0007168	967	21	20,310
01/12/2011 31/12/2011	1,405,258	0.0007168	1007	21	21,153
01/01/2012 31/01/2012	1,338,806	0.0007168	960	21	20,153
01/02/2012 29/02/2012	1,347,365	0.0007168	966	21	20,282
01/03/2012 31/03/2012	1,447,883	0.0007168	1038	21	21,795

Table 3. Methane destruction attributes to LFG flaring

Flare 1

Date (inclusive)	Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)*	Project emissions from flaring of the residual gas stream (tCH ₄)*	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)*	Quantity of methane destroyed by flaring (tCH ₄)*
	CH ₄ total, month	D CH ₄		PE flare CH ₄ , month	GWP CH ₄	PE flare CO ₂ , month	MD flare, month
01/11/2011 30/11/2011	45,944	0.0007168	32.93	3.51	21	73.61	29.43
01/12/2011 31/12/2011	60,213	0.0007168	43.16	4.89	21	102.77	38.27
01/01/2012 31/01/2012	0	0.0007168	0.00	0.00	21	0.00	0.00
01/02/2012 29/02/2012	0	0.0007168	0.00	0.00	21	0.00	0.00
01/03/2012 31/03/2012	0	0.0007168	0.00	0.00	21	0.00	0.00

Flare 2

Date (inclusive)	Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)*	Project emissions from flaring of the residual gas stream (tCH ₄)*	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)*	Quantity of methane destroyed by flaring (tCH ₄)*
	CH ₄ total, month	D CH ₄		PE flare CH ₄ , month	GWP CH ₄	PE flare CO ₂ , month	MD flare, month
01/11/2011 30/11/2011	157,295	0.0007168	112.75	12.70	21	266.63	100.05
01/12/2011 31/12/2011	55,936	0.0007168	40.09	4.68	21	98.20	35.42
01/01/2012 31/01/2012	15,476	0.0007168	11.09	1.47	21	30.94	9.62
01/02/2012 29/02/2012	141,879	0.0007168	101.70	10.94	21	229.77	90.76
01/03/2012 31/03/2012	186,223	0.0007168	133.48	13.62	21	286.11	119.86

Flare 3

Date (inclusive)	Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)*	Project emissions from flaring of the residual gas stream (tCH ₄)*	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)*	Quantity of methane destroyed by flaring (tCH ₄)*
	CH ₄ total, month	D CH ₄		PE flare CH ₄ , month	GWP CH ₄	PE flare CO ₂ , month	MD flare, month
01/11/2011 30/11/2011	141,441	0.0007168	101.38	11.62	21	243.94	89.77
01/12/2011 31/12/2011	59,569	0.0007168	42.70	4.68	21	98.19	38.02
01/01/2012 31/01/2012	175,610	0.0007168	125.88	13.64	21	286.54	112.23
01/02/2012 29/02/2012	98,234	0.0007168	70.41	7.93	21	166.55	62.48
01/03/2012 31/03/2012	192,689	0.0007168	138.12	15.10	21	317.16	123.02

Remarks: Flare efficiency determination is referred to scenario a) of “Tool to determine project emissions from flaring gases containing methane”.

The following table shows monthly net methane destruction attributed to the project activity and total emission reductions completed associated with project activity in this monitoring period.

Table 4. Monthly net methane destruction attributed to the project activity

Date (inclusive)	The amount of methane that has been destroyed in the project scenario (tCH ₄)	The amount of methane that would have been destroyed in the absence of the project (tCH ₄)	Net methane destruction attributable to the project activity (tCH ₄)	Net methane destruction attributable to the project activity (tCO ₂)
	MD _{project, month}	MD _{BL, month}	MD _{project, month} - MD _{BL, month}	=(MD _{project, month} - MD _{BL, month})*GWP _{CH₄}
01/11/2011 – 30/11/2011	1,186.39	0.00	1,186.39	24,914.17
01/12/2011 – 31/12/2011	1,119.00	0.00	1,119.00	23,498.93
01/01/2012 – 31/01/2012	1,081.51	0.00	1,081.51	22,711.67
01/02/2012 – 29/02/2012	1,119.03	0.00	1,119.03	23,499.69
01/03/2012 – 31/03/2012	1,280.72	0.00	1,280.72	26,895.10
Total 01/11/2011 – 31/03/2012 (inclusive)				121,520

Remarks: Data in this table is aggregated from the hourly results; calculation formulas are used in hourly and daily data level.

The sum of the LFG quantities fed to the flare and the power plant was compared hourly with the LFG_{total}. The lowest value is be used for calculation of MD_{Project,y} in the next data processing step, according to QA/QC.



Table 5. The net amount of electricity exported to the grid

Date (inclusive)		Total amount of electricity exported (MWh)	CO ₂ emissions intensity of the baseline source of electricity displaced (tCO ₂ e/MWh)	CO ₂ emissions (exported electricity) (tCO ₂ e)
		EL _{LFG, month}	CEF _{elec, BL, month}	
01/11/2011	31/03/2012	20,950.80	0.5113	10,712

Table 6. The net amount of electricity imported for the project purpose (project emissions)

Date (inclusive)		Total amount of electricity imported (MWh)	CO ₂ emissions intensity of the baseline source of electricity displaced (tCO ₂ e/MWh)	Average technical transmission and distribution losses for providing electricity	CO ₂ emissions (imported electricity) (tCO ₂ e)
		EL _{IM, month}	CEF _{elec, BL, month}	TDL _{grid, month}	
01/11/2011	31/03/2012	3.36	0.5113	8.55%	1.86

Table 7. Total Emission reductions of the monitoring period

Reporting Period	Net methane destruction attributable to the project activity (tCO ₂)	CO ₂ emissions intensity (imported electricity) (tCO ₂ e)	CO ₂ emissions intensity (exported electricity) (tCO ₂ e)	Total emission reductions (tCO ₂ e)
Total 01/11/2011 – 31/03/2012 (inclusive)	121,520	2	10,712	132,230

Table 8. Summary of GHG Emission reductions for the monitoring period

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
Total 01/11/2011 – 31/03/2012 (inclusive)	134,432	2,202	0	132,230

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 (tCO₂e)	2011year = $315,502 \times 61/365 = 52,728$ 2012 year = $326,895 \times 91/366 = 81,277$ Total MP = $52,728 + 81,277 = 134,005$	132,230

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

The ex-ante emission reduction calculation included in the PDD estimates a total of 134,005 tCO₂e for the current monitoring period (calculation as per table section E.5). However only **132,230** tCO₂e have actually been generated during the current monitoring period, and the slightly lower amount is due to the lower number of engines (8 instead of 9) installed to date compared to that envisaged at this stage in the PDD.

Annex A. Emission Reductions Calculation Sheets

Separate emission reductions calculation spreadsheets have been provided for the purpose of verification.

Annex B. Flare Efficiency

The determination of project emissions from flaring gases containing methane is described in the registered PDD page 25 onwards.

Determination of the hourly flare efficiency:

In case of enclosed flares and use of the default value for the flare efficiency, the flare efficiency in the hour h ($h_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during the hour h .
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h .
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h .

The assessment of the hourly flare efficiency using the above described criteria for the dataset covering the monitoring period is be verified by the DOE at the time of the site visit. The excel spreadsheet indicating flare efficiency for the reported period is submitted to the DOE.

Annex C. Monitored Laws and Regulations

Regulation	Impact	Date of application
Public Health Act 1992	Stated in PDD. Governs the operation of the landfill and provides a mechanism for regulation by local administrative body via the issuance of the license to the landfill. Sasimhum Sub-district Administrative Organisation has not currently set out and specific regulations relating to the license. No impact on parameters monitored during the current crediting period.	1992
Act of Cleanliness and Tidiness of the Nation 1992	Has no requirement for LFG control, extraction or utilisation. No impact on parameters monitored during the current crediting period.	1992

Annex D. Specification of CDM Monitoring Equipment

Parameter	Instrument Type	Manufacturer	Instrument Model	Instrument Range	Accuracy	Calibration Requirements
LFG _{total}	V-Cone Flow Meter	Kingways	KVS14IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	750-7500 m. ³ /hr.	±0.5%	2 yearly
LFG _{flare}	V-Cone Flow Meter	Kingways	KVS08IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	250-2500 m. ³ /hr.	±0.5%	2 yearly
		KVS Lamway	RVM-VS08IJJF63N2 with Rosemount 3051 CD Differential Pressure Transmitter			
LFG _{electricity} ,	V-Cone Flow Meter	Kingways	KVS06IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	200-2000 m. ³ /hr.	±0.5%	2 yearly
		Kingways	KVS06IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	100-1000 m. ³ /hr.		
		KVS Lamway	RVM-VS06IJJF63N2 with Rosemount 3051 CD Differential Pressure Transmitter			
		Shanghai Kent	KVCFF150CD1N/6 with Rosemount 3051 CD Differential Pressure Transmitter			
ω _{CH4}	Infra Red Gas Analyser	Edinburgh Instruments Limited	Guardian Plus Infra-Red Gas Monitor	0-100%	± 2.0% Full Scale Deflection	Annually
T	Temperature Transmitter	Honeywell	STT830-171	-58 to 500°C	(0.3+0.0051t)°C	Annually
P	Absolute Pressure Transmitter	Rosemount	Model 3051TA	0 – 207 kPa	± 0.075 % of span	Annually
EL _{LFG}	Electric Meter	EDMI	EDMI-Mk6(Genius)	-	Class 0.5S	Annually
EL _{import}	Electric Meter	EDMI	EDMI-Mk6(Genius)	-	Class 0.5S	Annually
T _{flare}	Type N Thermocouple	Honeywell	STT830-173	0 to 1200°C	Accuracy Class II (allowable deviation ±(0.00751t))	Annually
		TC Ltd.	32-N-LTS-176-6.0-2I-TXLIN/EXI	0 to 1300°C	Accuracy Class II (allowable deviation ±(0.00751t))	Annually

Annex E. CDM Monitoring Equipment Installation & Calibration Dates

Name	Tag No.	Serial No.	Equipment Start Date	Equipment End Date	Calibration Certification Validity Period	Certificate Reference
LFG _{Total}	FT 9261 A ^B	9061213 ^E	20120127	20120331	20111201-20131130	D11-1128-JG
	FT 9261 B	9061212	20111101	20120331	20110729-20130728	D11-733-JG-01
LFG _{Flare}	FT 9391	9061210	20111101	20120331	20110914-20130913	LC1109-046
	FT 9491	9062916	20111101	20120331	20110621-20130620	LC1106-080
	FT 9591	9061205	20111101	20120331	20110618-20130617	LC1106-075
LFG _{Engine}	EFT 9001	9062903	20111101	20120331	20110613-20130612	LC1106-025
	EFT 9002	10071503	20111101	20120331	20100823-20120822	D10-783-JG-04
	EFT 9003	9062907	20111101	20120331	20110613-20130612	LC1106-026
	EFT 9004	9062913	20111101	20120331	20110613-20130612	LC1106-027
	EFT 9005	1104-0160	20111101	20120331	20110714-20130713	LC1106-082
	EFT 9006	1104-0159	20111101	20120331	20110720-20130719	LC1106-081
	EFT 9007	9062901 ^E	20111226	20120331	20110613-20130612	LC1106-024
	EFT 9008	9062914 ^E	20111226	20120331	20110913-20130912	LC1109-045
ω _{CH4}	CH4 9261 A	31426	20111101	20120331	20110603-20120602	L1106-104
T	TT 9261 A	080625355	20111101	20120331	20110808-20120807	11/1867
	TT 9261 B	080625360	20111101	20120331	20110809-20120808	11/1870
	TT 9391	100208523	20111101	20120331	20110808-20120807	11/1875
	TT 9491	080625400	20111101	20120331	20110808-20120807	11/1868
	TT 9591	090536657	20111101	20120331	20110808-20120807	11/1876
	ETT 9001 ^A	090536658	20111101	20120301	20110317-20120316	11/0541
		100208540 ^E	20120301	20120331	20110809-20120808	11/1871
	ETT 9002 ^A	090543121	20111101	20120301	20110317-20120316	11/0542
		100208515 ^E	20120301	20120331	20110809-20120808	12/0401
	ETT 9003 ^A	090536683	20111101	20120301	20110317-20120316	11/0544
		090536658 ^E	20120301	20120331	20120301-20130228	12/0333
	ETT 9004 ^A	090543120	20111101	20120301	20110317-20120316	11/0543
		090543121 ^E	20120301	20120331	20120301-20130228	12/0334
	ETT 9005 ^A	100211940	20111101	20120301	20110329-20120328	11/0656
		090536683 ^E	20120301	20120331	20120301-20130228	12/0332
	ETT 9006 ^A	100098212	20111101	20120301	20110329-20120328	11/0657
		090543120 ^E	20120301	20120331	20120301-20130228	12/0335
	ETT 9007	100208541	20111226	20120331	20110809-20120808	11/1872
	ETT 9008	100208537	20111226	20120331	20110809-20120808	11/1873
P	PT 9261 A	5466080	20111101	20120331	20110614-20120613	L1106-158
	PT 9261 B	5466089	20111101	20120331	20110614-20120613	L1106-159
	PT 9391	5466010	20111101	20120331	20110614-20120613	L1106-155
	PT 9491	5466007	20111101	20120331	20110614-20120613	L1106-156
	PT 9591	5466015	20111101	20120331	20110614-20120613	L1106-157
	EPT 9001 ^A	02166915	20111101	20111110	20101116-20111115	C1011-354
		02443480 ^E	20111110	20120331	20110614-20120613	L1106-160
	EPT 9002 ^A	02300672	20111101	20111110	20101116-20111115	C1011-355
		02443481 ^E	20111110	20120331	20110614-20120613	L1106-161
	EPT 9003 ^A	02300673	20111101	20111110	20101116-20111115	C1011-356
		02166915 ^E	20111110	20120331	20111110-20121109	C1111-014
	EPT 9004 ^A	02300674	20111101	20111110	20101116-20111115	C1011-357
		02300672 ^E	20111110	20120331	20111110-20121109	C1111-015
	EPT 9005 ^A	02150753	20111101	20111110	20101220-20111219	P02760
		02150751 ^E	20111110	20120331	20111110-20121109	C1111-011
	EPT 9006 ^A	02150750	20111101	20111110	20101220-20111219	P02758
		02300674 ^E	20111110	20120331	20111110-20121109	C1111-017
	EPT 9007	02150753 ^E	20111226	20120331	20111110-20121109	C1111-010
	EPT 9008	02300673 ^E	20111226	20120331	20111110-20121109	C1111-016

Annex E. CDM Monitoring Equipment Installation & Calibration Dates (Cont.)

Name	Tag No.	Serial No.	Equipment Start Date	Equipment End Date	Calibration Certification Validity Period	Certificate Reference
EL _{export}	Primary	201005194 - PEA 15850695	20111101	20120331	20110712-20120711	-
	Back-up	201007272 - PEA 15852773	20111101	20120331	20110713-20120712	-
EL _{import}	Primary	201006718 - PEA 15852219	20111101	20120331	20110712-20120711	-
	Back-up	201005191 - PEA 15850692	20111101	20120331	20110713-20120712	-
T _{Flare}	TTC 9393 A ^{A,C}	22641C/2	20111101	20120105	20110105-20120104	18706-2A
		22641C/1 ^E	20120310	20120331	20120207-20130206	12/0203
	TTC 9393 B ^{A,C}	22641C/3	20111101	20120105	20110105-20120104	18706-3A
		22641C/3 ^E	20120310	20120331	20120207-20130206	12/0205
	TTC 9393 C	090329527	20111101	20120331	20110808-20120807	11/1861
	TTC 9493 A ^{A,D}	22641C/1	20111101	20120105	20110105-20120104	18706-1A
		080614379 ^E	20120105	20120331	20110907-20120906	11/2183
	TTC 9493 B	080614305	20111101	20120331	20110907-20120906	11/2185
	TTC 9493 C	080614306	20111101	20120331	20110907-20120906	11/2184
	TTC 9593 A	080614323	20111101	20120331	20110809-20120808	11/1896
	TTC 9593 B	080614321	20111101	20120331	20110809-20120808	11/2072
	TTC 9593 C	080614320	20111101	20120331	20110809-20120808	11/1897

Note: A: This instrument was installed during the monitoring period to replace an instrument that was due for calibration
B: This instrument did not operate from 20111101 until 20120127
C: This instrument did not operate from 20111221 until 20120319
D: This instrument did not operate from 20111218 until 20120704
E: This instrument is newly installed during this monitoring period.

Annex F. Special Events Table and Missing CDM Data

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
2/11/2011 2:16	2/11/2011 7:53	Engine 5 schedule maintenance 4,000 OPH and lube oil change	No methane destruction by the Engine 5
2/11/2011 22:02	2/11/2011 23:15	Engine 3 trip due to oil filter diff pressure high	No methane destruction by the Engine 3
3/11/2011 1:51	3/11/2011 3:58	Stopped for Engine 3 lube oil changing	No methane destruction by the Engine 3
4/11/2011 2:22	4/11/2011 4:50	Stopped for Engine 6 lube oil changing	No methane destruction by the Engine 6
5/11/2011 8:12	5/11/2011 8:26	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
5/11/2011 8:12	5/11/2011 11:05	Engine 5 trip due to mains failure and adjust zero pressure	No methane destruction by the Engine 5
6/11/2011 1:43	6/11/2011 3:44	Stopped for Engine 2 lube oil changing	No methane destruction by the Engine 2
6/11/2011 2:19	6/11/2011 3:22	Engine 5 trip due to leanox controller deviation high	No methane destruction by the Engine 5
6/11/2011 2:22	6/11/2011 2:52	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
7/11/2011 2:09	7/11/2011 2:14	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
8/11/2011 2:02	8/11/2011 2:13	Span check of CH ₄ gas analyzer	Replace CH ₄ reading value by previous hour average
10/11/2011 3:04	10/11/2011 3:11	Engine 1 change pressure transmitter	Replace value according QA/QC procedures
10/11/2011 3:14	10/11/2011 3:20	Engine 2 change pressure transmitter	Replace value according QA/QC procedures
10/11/2011 6:42	10/11/2011 6:47	Engine 3 change pressure transmitter	Replace value according QA/QC procedures
10/11/2011 6:50	10/11/2011 8:04	Engine 4 change pressure transmitter	Replace value according QA/QC procedures
10/11/2011 8:07	10/11/2011 8:31	Engine 5 change pressure transmitter	Replace value according QA/QC procedures
10/11/2011 8:16	10/11/2011 8:19	Engine 6 change pressure transmitter	Replace value according QA/QC procedures
11/11/2011 13:02	11/11/2011 14:03	Power Plant trip due to container#3 smoke detection	No methane destruction by the project (MD project = 0)
12/11/2011 2:02	12/11/2011 10:23	Power Plant Maintenance (Install switchgear)	No methane destruction by the project (MD project = 0)
13/11/2011 6:17	13/11/2011 8:17	Stopped for Engine 4 lube oil changing	No methane destruction by the Engine 4
13/11/2011 10:42	13/11/2011 11:12	Power Plant trip due to container#3 Smoke detection	No methane destruction by the project (MD project = 0)
16/11/2011 2:09	16/11/2011 3:55	Engine 6 schedule maintenance 4,000 OPH	No methane destruction by the Engine 6
18/11/2011 3:36	18/11/2011 7:42	Engine 1 trip due to leanox controller deviation high and check gas mixture	No methane destruction by the Engine 1
23/11/2011 23:41	24/11/2011 0:52	Engine 1 trip due to gas collection system	No methane destruction by the Engine 1
23/11/2011 23:41	24/11/2011 0:57	Engine 6 trip due to leanox controller deviation high	No methane destruction by the Engine 6
24/11/2011 8:05	24/11/2011 8:16	Span check of CH ₄ gas analyzer	Replace CH ₄ reading value by previous hour average
24/11/2011 10:21	24/11/2011 12:08	Engine 4 trip due to jaket water pressure low and refill water coolant	No methane destruction by the Engine 4
29/11/2011 2:12	29/11/2011 4:54	Engine 3 schedule maintenance 12,000 OPH	No methane destruction by the Engine 3

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
30/11/2011 2:02	30/11/2011 4:49	Engine 4 schedule maintenance 12,000 OPH	No methane destruction by the Engine 4
2/12/2011 2:10	2/12/2011 6:25	Engine 1 schedule maintenance 12,000 OPH and lube oil change	No methane destruction by the Engine 1
6/12/2011 9:23	6/12/2011 9:28	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
7/12/2011 0:25	7/12/2011 0:52	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
8/12/2011 3:22	8/12/2011 3:24	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
10/12/2011 3:15	10/12/2011 4:56	Stopped for Engine 3 lube oil changing and cleaning spark plug	No methane destruction by the Engine 3
10/12/2011 6:45	10/12/2011 8:39	Stopped for Engine 5 lube oil changing and cleaning spark plug	No methane destruction by the Engine 5
11/12/2011 6:31	11/12/2011 8:34	Stopped for Engine 6 lube oil changing and cleaning all spark plug	No methane destruction by the Engine 6
12/12/2011 3:01	12/12/2011 5:43	Stopped for Engine 2 lube oil changing and cleaning spark plug	No methane destruction by the Engine 2
18/12/2011 7:19	18/12/2011 9:12	Stopped for Engine 4 lube oil changing	No methane destruction by the Engine 4
20/12/2011 7:04	20/12/2011 7:31	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
20/12/2011 7:04	20/12/2011 11:23	Engine 5 trip due to gas collection system and cannot start battery low	No methane destruction by the Engine 5
21/12/2011 1:43	21/12/2011 3:03	Stopped for Engine 1 cleaning all spark plug	No methane destruction by the Engine 1
23/12/2011 6:32	23/12/2011 9:07	Engine 2 schedule maintenance 12,000 OPH	No methane destruction by the Engine 2
25/12/2011 8:44	25/12/2011 9:44	Shutdown power plant for connected generator No. 7 and 8 parasitic load	No methane destruction by the project (MD project = 0)
26/12/2011 2:00	26/12/2011 4:00	Installation EFT9007 S/N 9062901, EPT9007 S/N 02150753 and ETT9007 S/N 100208541	-
26/12/2011 6:00	26/12/2011 9:00	Installation EFT9008 S/N 9062914, EPT9008 S/N 02300673 and EFT9008 S/N 100208537	-
26/12/2011 6:37	26/12/2011 6:45	Span check of CH4 gas analyzer	Replace CH4 reading value by previous hour average
28/12/2011 1:46	28/12/2011 3:08	Stopped for Engine 3 cleaning all spark plug	No methane destruction by the Engine 3
29/12/2011 1:50	29/12/2011 4:07	Stopped for Engine 5 cleaning all spark plug	No methane destruction by the Engine 5
30/12/2011 1:16	30/12/2011 2:14	Shutdown power plant for change password PLC	No methane destruction by the project (MD project = 0)
31/12/2011 2:07	31/12/2011 3:31	Stopped for Engine 2 lube oil changing	No methane destruction by the Engine 2
4/1/2012 2:33	4/1/2012 7:17	Stopped for Engine 1 check engine	No methane destruction by the Engine 1
5/1/2012 2:47	5/1/2012 3:46	Stopped for Engine 1 check Turbo by pass	No methane destruction by the Engine 1
5/1/2012 4:12	8/1/2012 3:52	Stopped for Engine 1 change intercooler and change oil	No methane destruction by the Engine 1
5/1/2012 5:36	5/1/2012 7:09	Flare 2 TTC 9493B calibration period validation	No methane destruction by the Flare 2 (no operation)
5/1/2012 7:10	5/1/2012 7:14	Remove TTC 9393 S/N 22641 C/2A	No methane destruction by Flare 1
5/1/2012 7:15	5/1/2012 7:20	Remove TTC 9393B S/N 22641 C/3A	No methane destruction by Flare 1
5/1/2012 7:22	5/1/2012 7:38	Replaced TTC 9493A S/N 22641 C/1A with S/N 080614379	No methane destruction by Flare 2
7/1/2012 2:17	7/1/2012 2:28	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
8/1/2012 6:21	8/1/2012 9:46	Stopped for Engine 5 lube oil changing	No methane destruction by the Engine 5
8/1/2012 11:42	8/1/2012 13:16	Engine 5 trip due to engine oil temperature high	No methane destruction by the Engine 5
10/1/2012 2:46	10/1/2012 3:48	Engine 5 trip due to leanox controller deviation high	No methane destruction by the Engine 5
10/1/2012 2:47	10/1/2012 2:55	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
11/1/2012 4:23	11/1/2012 4:42	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
12/1/2012 7:05	12/1/2012 8:24	Stopped for Engine 2 check engine	No methane destruction by the Engine 2
12/1/2012 11:37	12/1/2012 12:15	Power Plant trip due to over voltage UPS stop	No methane destruction by the project (MD project = 0)
14/1/2012 1:57	14/1/2012 4:06	Stopped for Engine 6 lube oil changing	No methane destruction by the Engine 6
15/1/2012 2:45	15/1/2012 4:23	Stopped for Engine 3 lube oil changing	No methane destruction by the Engine 3
17/1/2012 8:20	17/1/2012 8:28	Span check of CH4 gas analyzer	Replace CH4 reading value by previous hour average
17/1/2012 8:20	17/1/2012 8:22	CH4 show fix 0.1%	Replace CH4 reading value by previous hour average
18/1/2012 4:13	18/1/2012 4:28	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
19/1/2012 4:00	19/1/2012 10:47	Stopped for Engine 4 test engine 8	No methane destruction by the Engine 4
20/1/2012 0:00	23/1/2012 8:37	Stopped for Engine 7 test engine by GE	No methane destruction by the Engine 7
20/1/2012 5:01	20/1/2012 5:23	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
20/1/2012 5:01	20/1/2012 6:34	Engine 3 trip due to leanox controller deviation high	No methane destruction by the Engine 3
20/1/2012 5:01	20/1/2012 6:24	Engine 8 trip due to leanox controller deviation high	No methane destruction by the Engine 8
20/1/2012 6:44	20/1/2012 10:53	Stopped for Engine 3 test engine 8	No methane destruction by the Engine 3
21/1/2012 4:07	21/1/2012 5:36	Stopped for Engine 4 lube oil changing	No methane destruction by the Engine 4
23/1/2012 4:30	23/1/2012 4:50	CH4 show fix 0%	Replace CH4 reading value by previous hour average
23/1/2012 6:56	23/1/2012 8:14	Stopped for Engine 2 cleaning all spark plug	No methane destruction by the Engine 2
23/1/2012 7:53	23/1/2012 8:09	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
23/1/2012 7:53	26/1/2012 7:19	Engine 1 trip due to mains failure and clean spark plug all and start engine 8	No methane destruction by the Engine 1
23/1/2012 10:30	24/1/2012 3:39	Stopped for Engine 7 test engine by GE	No methane destruction by the Engine 7
24/1/2012 3:20	26/1/2012 7:09	Stopped for Engine 4 start engine 7	No methane destruction by the Engine 4
24/1/2012 7:06	24/1/2012 8:09	Stopped for Engine 8 test engine by GE	No methane destruction by the Engine 8
25/1/2012 4:03	25/1/2012 5:18	Stopped for Engine 6 check engine and fail safe loop trip by GE	No methane destruction by the Engine 6
25/1/2012 7:23	25/1/2012 9:21	Stopped for Engine 5 check engine by GE	No methane destruction by the Engine 5
25/1/2012 10:13	25/1/2012 10:24	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
26/1/2012 7:35	27/1/2012 2:02	Stopped for Engine 1 test engine 7	No methane destruction by the Engine 1
26/1/2012 7:36	27/1/2012 10:03	Stopped for Engine 4 test new engine	No methane destruction by the Engine 4

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
27/1/2012 2:10	27/1/2012 9:19	Engine 5 schedule maintenance 6,000 OPH	No methane destruction by the Engine 5
27/1/2012 4:44	27/1/2012 4:44	Installation FT9261A S/N 9061213	No methane destruction by the project
27/1/2012 6:52	27/1/2012 7:05	CH4 show fix 0%	Replace CH4 reading value by previous hour average
27/1/2012 10:03	29/1/2012 14:13	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
27/1/2012 10:10	29/1/2012 8:09	Stopped for Engine 4 start new engine	No methane destruction by the Engine 4
28/1/2012 5:05	28/1/2012 5:15	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
29/1/2012 11:58	29/1/2012 13:24	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
29/1/2012 11:58	30/1/2012 4:17	Engine 8 trip due to mains failure and maintenance 150 OPH	No methane destruction by the Engine 8
30/1/2012 2:01	9/2/2012 2:49	Stopped for Engine 4 change intercooler	No methane destruction by the Engine 4
30/1/2012 8:52	2/2/2012 6:06	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
30/1/2012 23:54	31/1/2012 0:42	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
1/2/2012 4:30	1/2/2012 4:40	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
2/2/2012 1:57	2/2/2012 2:04	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
2/2/2012 2:50	2/2/2012 4:43	Engine 5 trip due to gas collection system	No methane destruction by the Engine 5
2/2/2012 4:08	2/2/2012 4:16	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
2/2/2012 4:41	5/2/2012 3:40	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
2/2/2012 6:55	2/2/2012 7:04	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
4/2/2012 3:21	4/2/2012 3:28	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
5/2/2012 3:41	5/2/2012 8:09	Stopped for Engine 2 lube oil changing	No methane destruction by the Engine 2
5/2/2012 7:18	6/2/2012 8:09	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
6/2/2012 8:12	11/2/2012 1:45	Stopped for Engine 1 start new engine	No methane destruction by the Engine 1
10/2/2012 11:03	11/2/2012 8:55	Stopped for Engine 5 lube oil changing	No methane destruction by the Engine 5
11/2/2012 9:01	13/2/2012 1:47	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
11/2/2012 20:37	14/2/2012 6:26	Engine 7 trip due to jacket water pressure low and change water pump	No methane destruction by the Engine 7
13/2/2012 1:55	13/2/2012 8:55	Engine 6 schedule maintenance 6,000 OPH and lube oil change	No methane destruction by the Engine 6
13/2/2012 9:04	15/2/2012 2:37	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
14/2/2012 3:55	14/2/2012 4:13	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
14/2/2012 6:50	17/2/2012 4:03	Stopped for Engine 4 start new engine	No methane destruction by the Engine 4
14/2/2012 17:23	14/2/2012 18:06	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
15/2/2012 2:42	15/2/2012 5:35	Stopped for Engine 1 lube oil changing	No methane destruction by the Engine 1

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
15/2/2012 8:21	16/2/2012 3:32	Engine 7 trip due to room temperature high and shutdown start new engine	No methane destruction by the Engine 1
16/2/2012 6:46	17/2/2012 12:34	Engine 1 trip due to room temperature high and change gasket exhaust turbo changer	No methane destruction by the Engine 1
16/2/2012 7:12	16/2/2012 7:19	Span check of CH4 gas analyzer	Replace CH4 reading value by previous hour average
17/2/2012 4:09	19/2/2012 8:09	Stopped for Engine 3 lube oil changing	No methane destruction by the Engine 3
17/2/2012 12:40	20/2/2012 17:52	Stopped for Engine 5 start new engine	No methane destruction by the Engine 5
18/2/2012 21:59	19/2/2012 0:08	Engine 4 trip due to leanox controller deviation high	No methane destruction by the Engine 4
19/2/2012 8:17	20/2/2012 5:13	Stopped for Engine 2 cleaning spark plug and change connector	No methane destruction by the Engine 2
20/2/2012 5:20	21/2/2012 7:51	Stopped for Engine 6 start new engine	No methane destruction by the Engine 6
20/2/2012 17:11	21/2/2012 4:26	Engine 4 trip due to leanox controller deviation high and manual shutdown	No methane destruction by the Engine 4
21/2/2012 5:40	22/2/2012 4:37	Engine 4 trip due to leanox controller deviation high and manual shutdown	No methane destruction by the Engine 4
21/2/2012 9:09	22/2/2012 8:38	Stopped for Engine 6 start new engine	No methane destruction by the Engine 6
22/2/2012 4:41	23/2/2012 9:49	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
22/2/2012 8:43	23/2/2012 9:59	Stopped Engine 4 and change compensator elbow	No methane destruction by the Engine 4
23/2/2012 9:27	24/2/2012 8:28	Engine 1 trip due to engine oil temperature high and shutdown start new engine	No methane destruction by the Engine 1
23/2/2012 10:04	24/2/2012 8:00	Engine 4 trip due to leanox controller deviation high and manual shutdown	No methane destruction by the Engine 4
24/2/2012 8:34	25/2/2012 8:37	Stopped for Engine 8 lube oil changing	No methane destruction by the Engine 8
25/2/2012 8:09	26/2/2012 12:14	Stopped for Engine 1 start engine 8	No methane destruction by the Engine 1
25/2/2012 9:14	26/2/2012 2:30	Engine 3 trip due to engine oil temperature high and shutdown start new engine	No methane destruction by the Engine 3
26/2/2012 2:36	27/2/2012 9:05	Stopped for Engine 5 and change compensator	No methane destruction by the Engine 5
26/2/2012 8:51	27/2/2012 7:23	Engine 3 trip due to engine oil temperature high and shutdown start new engine	No methane destruction by the Engine 3
27/2/2012 4:00	27/2/2012 4:44	Reinstall V-Cone FT9261A S/N 9061213	-
27/2/2012 7:29	29/2/2012 4:36	Engine 1 trip due to engine oil temperature high and shutdown start new engine	No methane destruction by the Engine 1
28/2/2012 8:20	29/2/2012 2:50	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
29/2/2012 2:57	2/3/2012 3:29	Stopped for Engine 4 start new engine	No methane destruction by the Engine 4
29/2/2012 4:46	1/3/2012 1:55	Stopped for Engine 5 start new engine	No methane destruction by the Engine 5
29/2/2012 10:20	29/2/2012 11:28	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
29/2/2012 11:39	29/2/2012 11:43	Shutdown power plant for system stop change to engine mode	No methane destruction by the project (MD project = 0)
29/2/2012 12:11	29/2/2012 13:09	Power Plant trip due to gas collection system	No methane destruction by the project (MD project = 0)
1/3/2012 2:03	1/3/2012 8:55	Engine 3 schedule maintenance 14,000 OPH	No methane destruction by the Engine 3
1/3/2012 4:03	1/3/2012 4:10	change Engine 1 temperature transmitter	Replace value according QA/QC procedures

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
1/3/2012 4:11	1/3/2012 4:33	change Engine 2 temperature transmitter	Replace value according QA/QC procedures
1/3/2012 6:44	1/3/2012 4:53	change Engine 3 temperature transmitter	Replace value according QA/QC procedures
1/3/2012 6:54	1/3/2012 7:04	change Engine 4 temperature transmitter	Replace value according QA/QC procedures
1/3/2012 8:57	1/3/2012 9:05	change Engine 5 temperature transmitter	Replace value according QA/QC procedures
1/3/2012 9:06	1/3/2012 9:14	change Engine 6 temperature transmitter	Replace value according QA/QC procedures
1/3/2012 14:28	2/3/2012 3:17	Engine 5 trip due to mains failure and shutdown start new engine	No methane destruction by the Engine 5
2/3/2012 10:42	6/3/2012 3:40	Engine 4 trip due to leanox controller deviation high and manual shutdown	No methane destruction by the Engine 4
3/3/2012 9:09	5/3/2012 9:31	Engine 1 trip due to engine oil temperature high and shutdown start new engine	No methane destruction by the Engine 1
5/3/2012 9:39	6/3/2012 7:53	Stopped for Engine 7 lube oil changing	No methane destruction by the Engine 7
6/3/2012 11:27	6/3/2012 12:34	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
8/3/2012 2:00	8/3/2012 9:01	Stopped for Engine 6 cleaning all spark plug	No methane destruction by the Engine 6
8/3/2012 9:25	8/3/2012 12:09	Engine 6 trip due to misfiring	No methane destruction by the Engine 6
8/3/2012 13:30	9/3/2012 2:17	Engine 6 trip due to misfiring and change connecting spark plug 13	No methane destruction by the Engine 6
9/3/2012 6:54	9/3/2012 9:26	Shutdown power plant for connect diesel generator for COD	No methane destruction by the project (MD project = 0)
10/3/2012 3:55	10/3/2012 4:15	Reinstall Thermocouple Flare 1 TCC9393A S/N 22641 C/1 and TCC9393B S/N 22641 C/3	No methane destruction by Flare 1
10/3/2012 10:07	10/3/2012 10:37	Shutdown power plant for disconnect diesel generator for COD	No methane destruction by the project (MD project = 0)
11/3/2012 5:54	12/3/2012 3:42	Engine 6 trip due to generator reverse power and shutdown	No methane destruction by the Engine 6
12/3/2012 8:05	13/3/2012 9:13	Engine 6 trip due to room temperature high and shutdown	No methane destruction by the Engine 6
13/3/2012 3:23	13/3/2012 3:31	Span check of CH4 gas analyzer	Replace CH4 reading value by previous hour average
14/3/2012 7:14	15/3/2012 7:07	Stopped for Engine 6 change compensator	No methane destruction by the Engine 6
15/3/2012 23:36	16/3/2012 8:32	Engine 1 trip due to generator loss off excitation and maintenance 14,000 OPH	No methane destruction by the Engine 1
15/3/2012 23:36	16/3/2012 0:37	Engine 2 trip due to generator loss off excitation	No methane destruction by the Engine 2
15/3/2012 23:36	16/3/2012 0:37	Engine 3 trip due to generator loss off excitation	No methane destruction by the Engine 3
15/3/2012 23:36	16/3/2012 0:38	Engine 4 trip due to generator loss off excitation	No methane destruction by the Engine 4
16/3/2012 6:11	16/3/2012 7:56	Stopped for Engine 5 check PF/AVR	No methane destruction by the Engine 5
16/3/2012 8:01	16/3/2012 9:35	Stopped for Engine 6 check PF/AVR	No methane destruction by the Engine 6
16/3/2012 8:40	17/3/2012 2:17	Stopped for Engine 4 start new engine	No methane destruction by the Engine 4
16/3/2012 9:45	17/3/2012 2:28	Stopped for Engine 6 start new engine	No methane destruction by the Engine 6
17/3/2012 2:26	17/3/2012 8:25	Stopped for Engine 5 lube oil changing	No methane destruction by the Engine 5
17/3/2012 2:29	17/3/2012 9:16	Stopped for Engine 6 lube oil changing	No methane destruction by the Engine 6

Start Time (UTC)	Finish Time (UTC)	Event/Cause	Impact on ER Calculation
17/3/2012 7:23	20/3/2012 8:58	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
17/3/2012 8:24	18/3/2012 2:57	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
18/3/2012 2:58	18/3/2012 8:19	Stopped for Engine 2 lube oil changing	No methane destruction by the Engine 2
18/3/2012 8:30	20/3/2012 8:48	Stopped for Engine 4 start engine 2 and engine 8	No methane destruction by the Engine 4
20/3/2012 10:34	22/3/2012 7:05	Stopped for Engine 1 start new engine	No methane destruction by the Engine 1
20/3/2012 10:34	21/3/2012 7:29	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
21/3/2012 7:31	21/3/2012 10:06	Stopped for Engine 4 start new engine	No methane destruction by the Engine 4
21/3/2012 10:13	22/3/2012 4:18	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
22/3/2012 7:15	23/3/2012 1:45	Stopped for Engine 3 start new engine	No methane destruction by the Engine 3
22/3/2012 7:50	25/3/2012 6:55	Stopped for Engine 2 start new engine	No methane destruction by the Engine 2
23/3/2012 1:35	23/3/2012 4:58	Stopped for Engine 4 lube oil changing	No methane destruction by the Engine 4
24/3/2012 12:02	24/3/2012 12:34	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
27/3/2012 3:39	31/3/2012 23:59	Stopped for Engine 4 and schedule maintenance 14,000 OPH	No methane destruction by the Engine 4
27/3/2012 3:59	27/3/2012 4:09	Power Plant Grid connection failures	No methane destruction by the project (MD project = 0)
29/3/2012 20:20	31/3/2012 7:10	Stopped for Engine 3 lube oil changing	No methane destruction by the Engine 3
31/3/2012 7:13	31/3/2012 9:15	Stopped for Engine 8 lube oil changing	No methane destruction by the Engine 8