



Monitoring report form (Version 03.1)

Gold Standard Monitoring report

Title of the project activity	Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project
Reference number of the project activity	GS1371 (CDM Project Reference: 3462)
Version number of the monitoring report	4
Completion date of the monitoring report	13/01/2014
Registration date of the project activity	Gold Standard - 27/08/2013 CDM registration -21/01/2011
Monitoring period number and duration of this monitoring period	Monitoring period number: 4 Duration 01/04/2012 - 30/09/2013 inclusive of the both days
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 - Waste Handling and Disposal Applied Methodology - ACM0001 "Flaring or use of landfill gas", Version 13.0.0
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	254,556 tCO ₂ e (Estimated ex-ante emission reduction pro rata with the annual ex-ante estimated from 01 April 2012 – 30 September 2013)
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	501,919 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012	246,904 tCO ₂ e,
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013	255,015 tCO ₂ e

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 100,500 tCO₂e yearly over the first 7-year crediting period.

The construction of landfill gas extraction pipe & gas collection system commenced in July 2009 and commissioning on February 2010. The Pre-treatment and three flares were installed from October 2009 to January 2010. 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 **501,919 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.

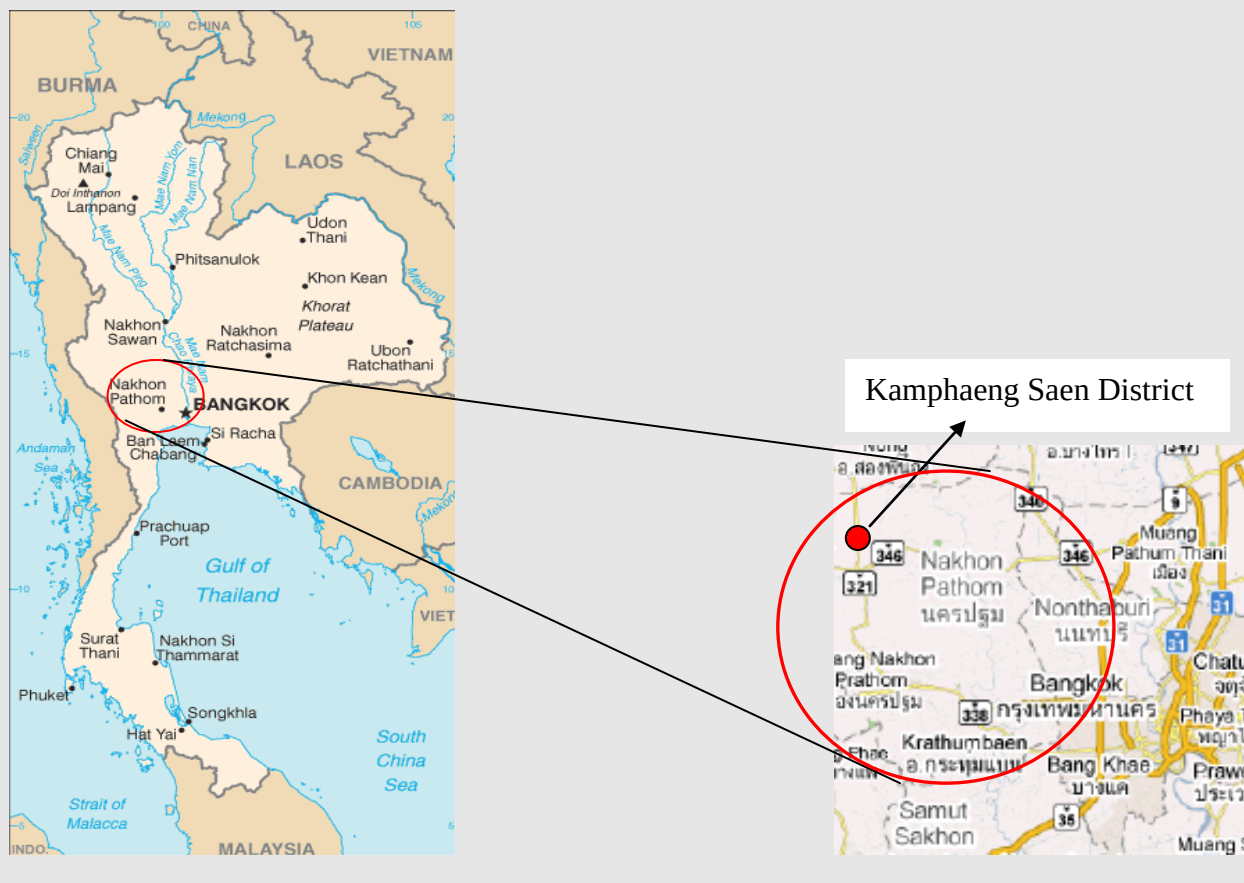




Figure A.2.1 Project coordinate and location

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

- ACM0001 “Flaring or use of landfill gas” Version 13.0.0

And following methodological tools:

- “Emissions from solid waste disposal sites” Version 06.0.1
- “Combined tool to identify the baseline scenario and demonstrate additionality” Version 05.0.0
- “Project emissions from flaring” Version 02.0.0
- “Tool to calculate the emission factor for an electricity system” Version 3.0.0
- “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” Version 01.
- “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” Version 02.0.0
- “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” Version 02

Detailed information regarding these methodologies and tools please refer to UNFCCC methodology

website.

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 1st of April 2012. The end date of the crediting period is same as CDM crediting period on 20th of January 2018.

A.6. Eligibility of project activity

A.6.1 Reference of applied Gold Standard Version

The project activity applied the Gold Standard Version 2.2 which is comprising of:

- The Gold Standard Requirements Version 2.2
- The Gold Standard Toolkit Version 2.2

A.6.2 Scale of project activity

Project Type	Large	Small
	√	

A.6.3 Type of project activity

The project activity falls into the waste handling and disposal category.

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.

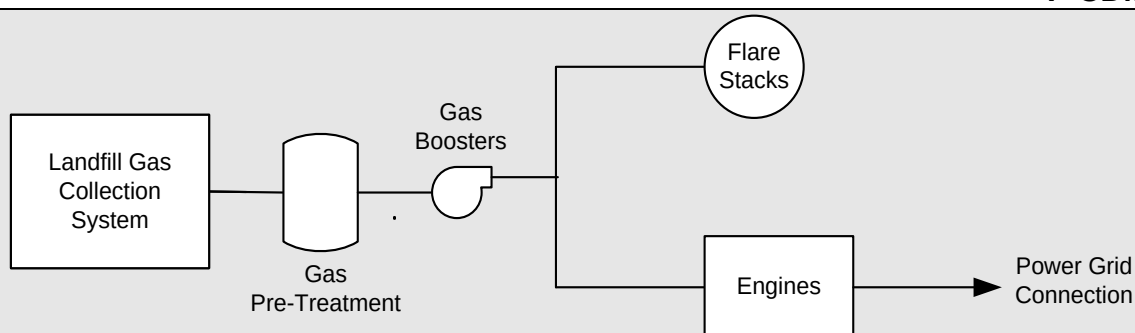


Figure B.1-1 Technical diagram of the project activity

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	1500 r/minute
Rated power	1063 kW
Rated voltage	400 V
Rated frequency	50 Hz

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.

The three Flares were installed between October 2009 and January 2010. Landfill gas has been extracted and combusted by flares since February 2010, and the 3 Flares were completely commissioning on 25/06/2010. 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) and PEA has approval for the increase from 6.3MW to 8MW export on 18/07/2012.

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 fourth monitoring report. The monitoring period covered by this monitoring report is: **01/04/2012 – 30/09/2013 (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 which impact on the operation of the project activity such as downtime, major, overhaul, equipment failure, that exceed more than 24 hours 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.

Previously, there has been changes to the project design during this monitoring period which consists of the use of a diesel generator when there is no on-site electricity and no availability of electricity from the grid (e.g. during the connection of new engines to the grid). This change was added to a revised CDM project design document (CDM PDD) and approved by the UN secretariat, reference PRC-3462-001, on 8th Feb 2013. The project boundary in the revised CDM PDD was consequently modified to include project emissions and parameters for monitoring these project emissions were included in a revised monitoring plan as described in B.2.3.

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.

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

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

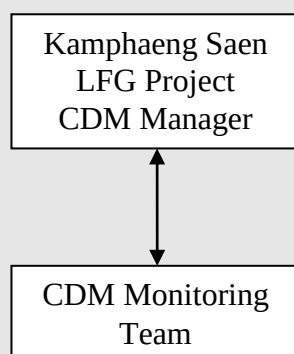


Figure C.1 Organisation Structure of the CDM Team

Responsibility and CDM management: A CDM manager is appointed with responsibility for monitoring all project related activities and organising training. 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 staff has 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.

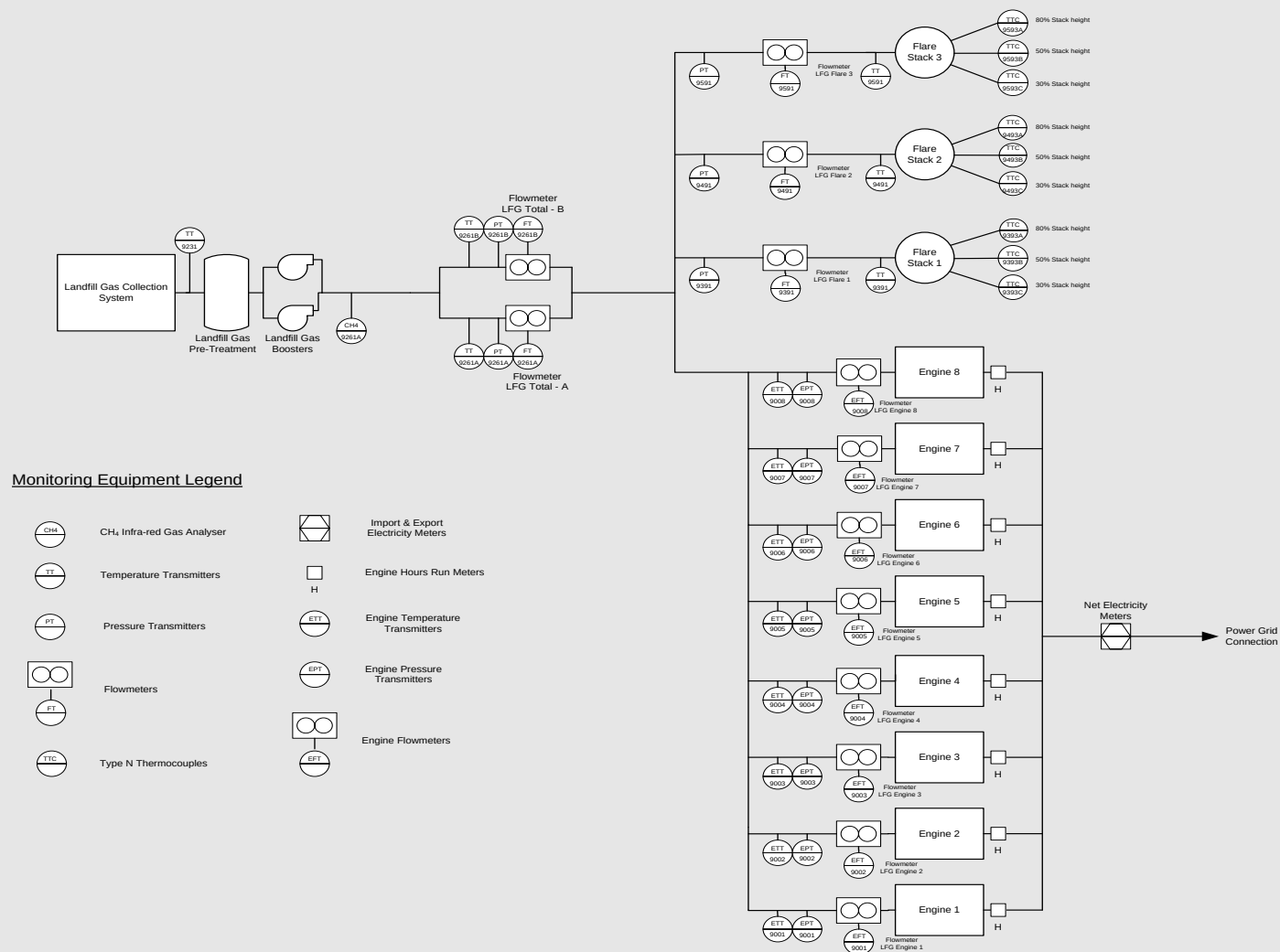
Responsibilities, procedures, methods, equipment types and specifications are described in detail in a site-specific CDM monitoring manual.

The parameters monitored and the monitoring procedure applied for determination of the emission reductions is described in detail in section B.7 of the Gold Standard Project Design Document Version 15 dated 29/05/2013. The document is available on website as link:

http://mer.markit.com/br-reg/public/project.jsp?project_id=103000000001559

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 devices¹

¹ Details of monitoring equipment installation and calibration dates refer to Annex E

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 on daily basis. Spot readings of other values (methane concentration, temperature and pressure) are also recorded periodically and at the times when flow meter readings are taken on daily basis.

- 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 the missing data or erroneous data was left as current. Exceptional, the engine flow back calculation will be implemented, if any elements of engine flow calculation missing whilst the generators are operating (as shown, for example, by electricity output). This calculation is undertaken within the algorithm and checked by the QA/QC team. The error will be recorded in the non-compliance log sheet kept on site and the occurrence of the error will be investigated and rectified as soon as possible.

Any error is recorded in the log sheet and the occurrence of the error will be investigated and rectified as soon as possible. If the on-line system is compromised for more than 24 hours, data will be 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 and available for verification by DOE.

Non essential data

The on-line monitoring system will also record “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 will assess 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_{CH4}
Unit:	tCO ₂ e/tCH ₄
Description:	Global warming potential of CH ₄
Source of data:	IPCC and change from GWP of 21 to 25 according to decision 4/CMP7 and para 66, EB69
Value(s) applied:	21 for first commitment period (up to Dec 31 st , 2012), 25 for second commitment period starting January 1 st , 2013
Purpose of data:	For baseline and project emission calculation.
Additional comment:	Shall be updated according to any future COP/MOP decisions

Data / Parameter:	EF_{grid,CM,y}
Unit:	tCO ₂ /MWh
Description:	Combined margin emission factor for the grid in year y
Source of data:	Calculate the combined margin emission factor, using the procedures in the Tool to calculate the emission factor for an electricity system version 03.0.0
Value(s) applied:	0.5113 tCO ₂ /MWh
Purpose of data:	For baseline and project emission calculation.
Additional comment:	Only applicable to scenarios A and C (cases C.I and C.III)

Data / Parameter:	SPEC_{flare}
Unit:	Temperature - °C Flow rate or heat flux – kg/h or m ³ /h
Description:	Manufacturer's flare specifications for temperature and flow rate.

Source of data:	• Temperature port fitted to the flares. • V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter
Value(s) applied:	• Minimum/maximum temperature: 500-1200 °C • Minimum/maximum flow rate: 300-2000 Nm³/h
Purpose of data:	For baseline emission and project emission calculation.
Additional comment:	This parameter is applicable as enclosed flares are installed and Option A of the tool “Project emissions from flaring” Version 02.0.0” is selected for this project activity.

Data / Parameter:	OX
Unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data:	Tool “Emissions from solid waste disposal sites” based on an extensive review of published literature on this subject, including IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied:	0.1
Purpose of data:	For baseline emission calculation.
Additional comment:	When methane passes through the top-layer, part of it is oxidized by methanotrophic bacteria to produce CO ₂ . The oxidation factor represents the proportion of methane that is oxidized to CO ₂ . This should distinguish from the methane correction factor (MCF) which is to account for the situation that ambient air might intrude into the SWDS and prevent methane from being formed in the upper layer

D.2. Data and parameters monitored

Data / Parameter:	Management of SWDS
Unit:	N/A
Description:	Management of the SWDS
Measured/ Calculated / Default:	N/A
Source of data:	Use different sources of data • Original design of landfill • Technical specifications for the management of SWDS • Local or national regulations
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:	Original design of the landfill is referred to in order to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the landfill after the implementation of the project activity is justified by referring to technical or regulatory specifications.
Purpose of data:	Justification for any changes in the management of the SWDS as there is an impact on baseline emissions
Additional comment:	-
Data / Parameter:	Op_{i,h}
Unit:	-
Description:	Operation of the equipment that consumes the LFG in hour <i>h</i> . Monitoring of one or more of the following three parameters to ascertain that the plant is operated in hour <i>h</i> : • Temperature. Measure the temperature of the exhaust gas in the flare by appropriate temperature measure equipment. • Flame. Flame detection system is used to ensure that the equipment is in operation; • Products generated. Monitor the generation of electricity.
Measured/ Calculated / Default:	Measured
Source of data:	Use different sources of data. • Temperature port fitted to the flares • Flare flame detector fitted to the flares • Meter
Value(s) of monitored parameter:	Refers to Emission Reductions spreadsheet
Monitoring equipment:	• Type N Thermocouple. See specification details in Annex D. • UV flame detector. See specification details in Annex D. • Measured with individual, software based, run meters on each generator set, readings taken from SCADA system. • See installation date, calibration dates and equipment validity periods in Annex E.
Measuring/ Reading/ Recording frequency:	Continuous measured. Data is aggregated hourly and monthly.
Calculation method (if applicable):	N/A
QA/QC procedures:	Refers to individual parameters
Purpose of data:	If equipment is not working properly as stated above then the baseline and project emission calculations may be affected.
Additional comment:	-
Data / Parameter:	EG_{PJ,y}
Unit:	MWh
Description:	Amount of electricity generated using LFG by the project activity in year <i>y</i>

Measured/ Calculated / Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	Refers to E4.Emission reductions calculation / table
Monitoring equipment:	- Electricity Meter - See specification details in Annex D. - See installation date, calibration dates and equipment validity periods in Annex E.
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 two 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:	This parameter is required for calculating baseline emissions associated with electricity generation ($BE_{EC,y}$) using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Data / Parameter:	$EG_{EC,y}$ (The same parameter as $EC_{PJ,y}$ different nomenclature for ACM0001version 13.0.0 and "Tool to calculate baseline, project and/or leakage emission from electricity consumption" version 01)
Unit:	MWh
Description:	Amount of electricity consumed by the project activity in year y
Measured/ Calculated / Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	Refers to E4.Emission reductions calculation / table
Monitoring equipment:	- Electricity Meter - See specification details in Annex D. - See installation date, calibration dates and equipment validity periods in Annex E.
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 two 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:	This parameter is required for calculating project emissions from electricity consumption due to an alternative waste treatment process ($PE_{EC,y}$) using the 'Tool to calculate baseline, project and/or leakage emissions from electricity consumption'
Data / Parameter:	$V_{t,db}$
Unit:	m ³ dry gas/h
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis
Measured/ Calculated / Default:	Measured
Source of data:	Flow meter reading measured total gas collected, gas fed to generator sets and gas fed to flares.
Value(s) of monitored parameter:	Refers to E4.Emission reductions calculation / table
Monitoring equipment:	• V-Cone Flow Meter – with associated Rosemount 3051CD differential pressure transmitter. • See specification details in Annex D. • See installation date, calibration dates and equipment validity periods in Annex E.
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 will be checked by examining the hourly flow balance. Landfill Gas (LFG) fed to generators and flares was compared with Overall LFG in every minute. The conservative value of 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. On site staff has received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data:	For baseline emission calculation
Additional comment:	In the case where Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was applied

Data / Parameter:	$V_{i,t,db}$
Unit:	m3 gas i/m3 dry gas
Description:	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis
Measured/ Calculated / Default:	Measured
Source of data:	Gas quality analyser reading
Value(s) of monitored parameter:	Refers to E4.Emission reductions calculation / table
Monitoring equipment:	• Infra-Red Gas Monitor. • See specification details in Annex D. • See installation date, calibration dates and equipment validity periods in Annex E. • The maximum permissible error of 2.5% has been applied in a conservative manner during the delay in calibration from 2013-01-24 17:00 to 2013-01-25 16:00 in accordance with paragraph 238§ of the VVS version 05.0
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. 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:	Demonstrate that the gaseous stream is dry to use Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". This is done by: b) Demonstrate that the temperature of the gas stream (T_t) is less than 60°C (333.15 K) at the flow measurement point. When Option A was applied, this parameter is monitored

Data / Parameter:	T_t
Unit:	K/°C
Description:	Temperature of the gaseous stream in time interval t
Measured/ Calculated / Default:	Measured
Source of data:	Temperature probe in LFG pipe work among the gas treatment package, the generator sets and the flares

Value(s) of monitored parameter:	Refers to Emission Reduction spreadsheet.
Monitoring equipment:	• Temperature Transmitter. • See specification details in Annex D. • See installation date, calibration dates and equipment validity periods in Annex E.
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. 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:	Provided all parameters are converted to normal conditions during the monitoring process. Therefore it is metered only when performing such measurements (with same frequency). However, the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted. Therefore, this parameter is monitored continuously to assure the applicability condition is met.

Data / Parameter:	P_t
Unit:	Pa
Description:	Pressure of the gaseous stream in time interval t
Measured/ Calculated / Default:	Measured
Source of data:	Pressure transmitter mounted in LFG pipe work among the gas treatment package, the generator sets and the flares.
Value(s) of monitored parameter:	Refers to Emission Reduction spreadsheet.
Monitoring equipment:	• Absolute Pressure Transmitter. • See specification details in Annex D. • See installation date, calibration dates and equipment validity periods in Annex E.
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. Data is backed up and archived where it will be 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:	Provided all parameters are converted to normal conditions during the monitoring process. Therefore it is metered only when performing such measurements (with same frequency).

Data / Parameter:	TEG_m
Unit:	°C
Description:	Temperature in the exhaust gas of the enclosed flare in minute <i>m</i>
Measured/ Calculated / Default:	Measured
Source of data:	Temperature port fitted to the flares.
Value(s) of monitored parameter:	Refers to Emission Reduction spreadsheet.
Monitoring equipment:	• Type N Thermocouple. • See specification details in Annex D. • See installation date, calibration dates and equipment validity periods in Annex E.
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. Data is backed up and archived where it will be stored for two years after the crediting period or two years after the last issuance of CER's.
Purpose of data:	For baseline emission calculation.
Additional comment:	Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events are noted in the site records along with any corrective action that was implemented to correct the issue. Monitoring of this parameter is applicable as enclosed flares are installed. Measurements are required to ensure that operating temperature during this monitoring period are met the manufacturer's flare specifications.

Data / Parameter:	Flame_m
Unit:	Flame on or Flame off
Description:	Flame detection of flare in the minute <i>m</i>
Measured/ Calculated / Default:	Measured
Source of data:	Project participants
Value(s) of monitored parameter:	N/A
Monitoring equipment:	• Ultra Violet flame detector. • See specification in Annex D. • See installation date and equipment validity periods in Annex E.
Measuring/ Reading/ Recording frequency:	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off.
Calculation method (if applicable):	N/A
QA/QC procedures:	Equipment is maintained in accordance with manufacturer's recommended that no calibration required for this instrument since the measurement is to detect flame on or off.
Purpose of data:	For baseline emission and project emission calculation
Additional comment:	This parameter used for determine that the flare efficiency for the minute <i>m</i> ($\eta_{flare, m}$) is 90% once this parameter is detected, otherwise is 0%.

Data / Parameter:	Maintenance_y
Unit:	Calendar dates
Description:	Maintenance events completed in year <i>y</i>
Measured/ Calculated / Default:	Measured
Source of data:	Project participants
Value(s) of monitored parameter:	-
Monitoring equipment:	Records of maintenance logs of generator sets, pretreatment and Flares
Measuring/ Reading/ Recording frequency:	Annual frequency
Calculation method (if applicable):	N/A
QA/QC procedures:	Records are kept 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 and project emission calculation

Additional comment:	These dates are required to compare with maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacturer ($SPEC_{flare}$)
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Data / Parameter:	$FC_{i,j,y}$
Unit:	Mass or volume unit per year (e.g. ton/yr or m ³ /yr)
Description:	Quantity of fuel type i combusted in process j during the year y. In an emergency situation, diesel oil may be used in the project activity as fuel type i.
Measured/ Calculated / Default:	Measured
Source of data:	Onsite measurements by project participants
Value(s) of monitored parameter:	Refers to Emission Reductions spreadsheet
Monitoring equipment:	Rulers
Measuring/ Reading/ Recording frequency:	Fuel is supplied from small daily tanks and rulers were used to determine mass or volume of the fuel consumed. The fuel consumed was recorded in record sheet on daily basis.
Calculation method (if applicable):	N/A
QA/QC procedures:	The consistency of metered fuel consumption quantities were cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices identified specifically for the CDM project, the metered fuel consumption quantities were cross-checked with available purchase invoices from the financial records.
Purpose of data:	For project emission calculation
Additional comment:	N/A

Data / Parameter:	$NCV_{i,y}$
Unit:	GJ/litre
Description:	Weighted average net calorific value of fuel type i in year y. In an emergency situation, diesel oil may be used in the project activity as fuel type i.
Measured/ Calculated / Default:	Default value
Source of data:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG inventories
Value(s) of monitored parameter:	0.03642 GJ/litre
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Any future revision of the IPCC Guidelines should be taken into account.

Calculation method (if applicable):	N/A
QA/QC procedures:	N/A
Purpose of data:	For project emission calculation
Additional comment:	Applicable where Option B of the “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” (version 02) is used

Data / Parameter:	EF_{CO₂,i,y}
Unit:	tCO ₂ /GJ
Description:	Weighted average CO ₂ emission factor of fuel type i in year
Measured/ Calculated / Default:	Default value
Source of data:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG inventories
Value(s) of monitored parameter:	0.07480 tCO ₂ /GJ
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Any future revision of the IPCC Guidelines should be taken into account
Calculation method (if applicable):	N/A
QA/QC procedures:	N/A
Purpose of data:	For project emission calculation
Additional comment:	-

Data / Parameter:	TDL_{j,y} and TDL_{k,y}
Unit:	Dimensionless
Description:	Average technical transmission and distribution losses for providing electricity to source j or k in year y
Measured/ Calculated / Default:	Calculated
Source of data:	Annual Report Thailand Energy Statistics 2012 (Preliminary) 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:	8.58%
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually

Calculation method (if applicable):	<table border="1"> <thead> <tr> <th>Year</th><th>2012</th></tr> </thead> <tbody> <tr> <td>Electric Supply Generation</td><td>168,471</td></tr> <tr> <td>Electric Supply Net Import</td><td>9,471</td></tr> <tr> <td>Station Service Consumed</td><td>5,492</td></tr> <tr> <td>Line Losses</td><td>9,782</td></tr> <tr> <td>Net Electric Consumed</td><td>162,668</td></tr> <tr> <td>Distribution loss</td><td>8.58%</td></tr> </tbody> </table> Total distribution loss = (Station Service Consumed + Line Losses) / (Electric Supply Generation + Electric Supply Net Import)	Year	2012	Electric Supply Generation	168,471	Electric Supply Net Import	9,471	Station Service Consumed	5,492	Line Losses	9,782	Net Electric Consumed	162,668	Distribution loss	8.58%
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Line Losses	9,782														
Net Electric Consumed	162,668														
Distribution loss	8.58%														
QA/QC procedures:	N/A														
Purpose of data:	For baseline emission and project 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 formula used for determination of the baseline emissions are described in section B.6 of the registered GS PDD for the project activity.

$$BE_y = BE_{CH_4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y} \quad (1)$$

Where:

BE_y	=	Baseline emission in year y (tCO ₂ e)
$BE_{CH_4,y}$	=	Baseline emission of methane from the SWDS in year y (tCO ₂ e/yr)
$BE_{EC,y}$	=	Baseline emissions associated with electricity generation in year y (tCO ₂ e/yr)
$BE_{HG,y}$	=	Baseline emissions associated with heat generation in year y (tCO ₂ e/yr)
$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year y (tCO ₂ e/yr)

In this project there will be no heat generation or natural gas use from LFG therefore:

$$BE_{HG,y} \text{ and } BE_{NG,y} = 0 \quad (2)$$

$$BE_{CH_4,y} = (1 - OX_{top_layer}) \times (F_{CH_4,PJ,y} - F_{CH_4,BL,y}) \times GWP_{CH_4} \quad (3)$$

Where:

$BE_{CH_4,y}$	=	Baseline emissions of LFG from the SWDS in year (tCO ₂ e/yr)
OX_{top_layer}	=	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG that would be flared and/or used in the project activity in year (tCH ₄ /yr)
$F_{CH_4,BL,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year (tCH ₄ /yr)
GWP_{CH_4}	=	Global warming potential of CH ₄ (tCO ₂ e/tCH ₄). The value for the second commitment period it is 25

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y} + F_{CH_4,HG,y} + F_{CH_4,NG,y} \quad (4)$$

Where:

$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year (tCH ₄ /yr)
$F_{CH_4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year (tCH ₄ /yr)
$F_{CH_4,EL,y}$	=	Amount of methane in the LFG which is used for electricity generation in year (tCH ₄ /yr)
$F_{CH_4,HG,y}$	=	Amount of methane in the LFG which is used for heat generation in year (tCH ₄ /yr)
$F_{CH_4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network in year (tCH ₄ /yr)

As the project activity does not include heat generation from LFG or sent to the natural gas distribution network, $F_{CH_4,HG,y}$ and $F_{CH_4,NG,y} = 0$

$F_{CH_4,EL,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 02.0.0 and the operational hours of the power plant, so that no emission reductions are claimed for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year ($Op_{i,h,y}$).

The following requirements have been applied:

- The gaseous stream tool has been applied to the LFG delivery pipeline to each item of electricity. $F_{CH_4,EL,y}$ was then calculated as the sum of mass flows of electricity generation equipment j ;
- CH₄ is the greenhouse gas for which mass flow have been determined;
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the tool);
- The mass flow should be calculated on an hourly basis for each hour h in year y ;
- The mass flow calculated for hour h was 0 if the equipment was not working in hour h ($Op_{i,h} = \text{not working}$), the hourly values were then summed to a yearly unit basis

Methane content measured on a wet basis and if the temperature of the gas stream (T_t) was less than 60°C (333.15 K) at the flow measurement point, gaseous stream then demonstrated as dry gas. It then applied for Option A, otherwise applied for Option C

In case, Option A applied, the mass flow of methane then determined as follows:

$$F_{i,t} = V_{t,db} * v_{i,t,db} * \rho_{i,t} \quad (5)$$

With

$$\rho_{i,t} = \frac{P_t * MM_i}{R_u * T_t} \quad (6)$$

Where:

$F_{i,t}$	=	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)
$V_{t,db}$	=	Volumetric flow of the gaseous stream in time interval t on a dry basis (m ³ dry gas/h)
$v_{i,t,db}$	=	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m ³ gas i /m ³ dry gas)
$\rho_{i,t}$	=	Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i /m ³ gas i)
P_t	=	Absolute pressure of the gaseous stream in time interval t (Pa)
MM_i	=	Molecular mass of greenhouse gas i (kg/kmol)
R_u	=	Universal ideal gases constant (Pa.m ³ /kmol.k)
T_t	=	Temperature of the gaseous stream in team interval t (K)

If Option C applied, the mass flow of methane determined as follows:

$$F_{i,t} = V_{t,wb,n} * v_{i,t,wb} * \rho_{i,n} \quad (7)$$

With

$$\rho_{i,n} = \frac{P_n * MM_i}{R_u * T_n} \quad (8)$$

Where:

$F_{i,t}$	=	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)
$V_{t,wb,n}$	=	Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions (m ³ wet gas/h)
$v_{i,t,wb}$	=	Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis (m ³ gas i /m ³ wet gas)
$\rho_{i,n}$	=	Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i /m ³ wet gas i)
P_n	=	Absolute pressure at normal conditions (Pa)
T_n	=	Temperature at normal conditions (K)
MM_i	=	Molecular mass of greenhouse gas i (kg/kmol)
R_u	=	Universal ideal gases constant (Pa.m ³ /kmol.K)

The following equation is used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb} * [(T_n / T_t) * (P_t / P_n)] \quad (9)$$

Where:

$V_{t,wb,n}$	=	Volumetric flow of the gaseous stream in a time interval t on a wet basis at normal conditions (m ³ wet gas/h)
$V_{t,wb}$	=	Volumetric flow of the gaseous stream in time interval t on a wet basis (m ³ wet gas/h)
P_t	=	Pressure of the gaseous stream in time interval t (K)
T_t	=	Temperature of the gaseous stream in time interval t
P_n	=	Absolute pressure at normal conditions (Pa)
T_n	=	Temperature at normal conditions (K)

$$F_{CH4, flared, y} = F_{CH4, sent_flare, y} - PE_{flare, y} / GWP_{CH4} \quad (10)$$

Where:

$F_{CH4, flared, y}$	=	Amount of methane in the LFG which is destroyed by flaring in year (tCH ₄ /yr)
$F_{CH4, sent_flare, y}$	=	Amount of methane in the LFG which is sent to the flare in year (tCH ₄ /yr)
$PE_{flare, y}$	=	Project emissions from flaring of the residual gas stream in year (tCO ₂ e/yr)
GWP_{CH4}	=	Global warming potential of CH ₄ (t CO ₂ e/t CH ₄)

$F_{CH4, sent_flare, y}$ was determined directly using the requirements stated earlier whereby the gaseous stream tool is applied to the LFG delivery pipeline to each flare. $F_{CH4, sent_flare, y}$ was then calculated as the sum of mass flows to each flare.

$PE_{flare, y}$ was calculated as per the methodological tool "Project emission from flaring" Version 02.0.0. As there are more than one flare then $PE_{flare, y}$ was the sum of the emissions for each flare determined separately.

Project emissions from flaring were calculated as the sum of emissions for each minute m in the year y , based on the methane mass flow in the residual gas ($F_{CH4, RG, m}$) and the flare efficiency ($\eta_{flare, m}$), as follows:

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3} \quad (11)$$

Where:

$PE_{flare,y}$	=	Project emissions from flaring of the residual gas in year y (tCO ₂ e)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (tCO ₂ e/tCH ₄)
$F_{CH4,RG,m}$	=	Mass flow of methane in the residual gas in the minute m (kg)
$\eta_{flare,m}$	=	Flare efficiency in minute m

$F_{CH4,RG,m}$ was determined on a dry basis by using the “Tool to determine the mass flow of a greenhouse gas in a gaseous steam” Version 02.0.0 on in the minute m .

In this project $F_{CH4,BL,y} = 0$ as there was no methane destructed due to regulatory or contractual requirements in the absence of this project.

The baseline emissions associated with electricity generation (electricity exported to the grid) in year y ($BE_{EC,y}$) was calculated using the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” version 01. When the tool applied $EC_{BL,k,y} = EG_{PJ,y}$

Following Scenario A (Electricity consumption from the grid) in the tool, $BE_{EC,y}$ is calculated as follows.

$$BE_{EC,y} = \sum_k EC_{BL,k,y} \times EF_{EL,k,y} \times (1 + TDL_{k,y}) \quad (12)$$

Where:

k	=	Sources of electricity consumption in the baseline
$EG_{PJ,y}$	=	Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y (tCO ₂ /MWh)
$TDL_{k,y}$	=	Average technical transmission and distribution losses for providing electricity to source k in year

The baselines emissions are calculated in the attached ER calculation excel spreadsheets, and summary of calculation results is provided in Tables 1 to 4 of section E.4 below.

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

$$PE_y = PE_{EC,y} + PE_{FC,i,y} \quad (13)$$

Where:

PE_y	=	Project emissions in year y (tCO ₂ /yr)
$PE_{EC,y}$	=	Emission from consumption of electricity due to the project activity in year y (tCO ₂ /yr)
$PE_{FC,i,y}$	=	Emission from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (tCO ₂ /yr)

When fossil fuel was consumed by the project activity, CO₂ emission from fossil fuel combustion in process were calculated based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, $PE_{FC,i,y}$ is determined using the procedure described in Methodological “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” Version 02, follows.

$$PE_{FC,i,y} = \sum_j FC_{i,j,y} \times COEF_{i,y} \quad (14)$$

Where:

$PE_{FC,i,y}$	=	Are the CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr);
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$FC_{i,j,y}$	=	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	=	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
i	=	Are the fuel types combusted in process j during the year y

The CO₂ emission coefficient $COEF_{i,y}$ were calculated using Option B due to the availability of data on the fossil fuel type i , as follows:

Option B: The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y} \quad (15)$$

Where:

$COEF_{i,y}$	=	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO_2,i,y}$	=	Is the weighted average CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ)
i	=	Are the fuel types combusted in process j during the year y

Project emissions from consumption of electricity by the project activity ($PE_{EC,y}$) is determined using the "Tool to calculate baseline, project and/or leakage emissions from energy consumption" Version 01

$$PE_{EC,y} = EC_{PJ,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (16)$$

Where

$EC_{PJ,y}$	=	Electricity imported from the grid and used in the project in year y (MWh/yr)
$EF_{EL,i,y}$	=	CO ₂ emission factor of the Thailand Grid in year y (tCO ₂ e/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to the project in year y (fraction)

The projects emissions are calculated in the attached ER calculation excel spreadsheets, and summary of calculation results is given in Table 5 to 7 of section E.4.

E.3. Calculation of leakage

No leakage effects need to be accounted under ACM0001 version 13

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

Emission reductions are calculated using ACM 0001 version 13, as follows:

$$ER_y = BE_y - PE_y \quad (17)$$

Where:

ER_y	=	Emission reductions in year y (tCO ₂ e/yr)
BE_y	=	Baseline emissions in year y (tCO ₂ e/yr)
PE_y	=	Project emissions in year y (tCO ₂ e/yr)

The emission reductions are calculated in the attached ER calculation excel spreadsheets, and a summary of the calculation results is provided in Table 9.

See registered GS PDD for detailed information as link :

http://mer.markit.com/br-reg/public/project.jsp?project_id=103000000001559

Calculation sheets are provided below.

Notes on ER Calculations:

1. The overall gas fed to power plant and gas fed to generator sets and flares 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 methane mass flow is then determined as stated in section E.1.
2. As enclosed flares are used in the project activity, flare efficiency determination is referred to Option A: Apply for a default value for flare efficiency is selected from the tool "Project emissions from flaring" Version 02.0.0. See annex B for detailed information.

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		Operation of the equipment that consumes the LFG in hour	Amount of total LFG captured measured in Nm3	Amount of LFG fed to flare measured in Nm3	Amount of LFG fed to the power generators measured in Nm3	Average value of concentration of methane in LFG m3CH4/m3LFG	Amount of methane gas fed to the flare used for MD calculation in Nm3	Amount of methane gas fed to the power generators used for MD calculation in Nm3
		Op _{j,h,y}	LFG _{Total, y} (V _{t,db})	LFG _{Flare, y} (V _{t,db})	LFG _{Electricity, y} (V _{t,db})	V _{i,t,db}	V _{CH4,Flare}	V _{CH4,Engine}
01/04/2012	30/04/2012	718	3,817,682	1,165,978	2,612,036	52	607,318	1,357,613
01/05/2012	31/05/2012	743	3,792,978	1,001,157	2,724,881	51	511,654	1,386,364
01/06/2012	30/06/2012	720	3,898,210	934,713	2,927,685	49	457,986	1,431,950
01/07/2012	31/07/2012	738	3,850,750	508,490	3,295,144	51	263,820	1,679,884
01/08/2012	31/08/2012	744	4,100,674	559,779	2,933,391	49	275,466	1,709,211
01/09/2012	30/09/2012	718	3,804,972	833,124	2,918,719	51	435,144	1,472,692
01/10/2012	31/10/2012	744	4,304,372	606,987	3,655,113	50	304,762	1,835,133
01/11/2012	30/11/2012	720	3,864,450	219,160	3,589,778	49	108,880	1,760,164
01/12/2012	31/12/2012	735	3,623,316	44,356	3,512,362	47	22,232	1,662,286
01/01/2013	31/01/2013	744	3,921,456	40,141	3,833,761	44	19,450	1,676,715
01/02/2013	28/02/2013	672	3,531,380	59,579	3,420,685	47	29,780	1,585,475
01/03/2013	31/03/2013	736	3,492,115	24,840	3,217,130	47	12,457	1,505,057
01/04/2013	30/04/2013	718	3,342,674	8,604	3,218,897	46	4,534	1,479,908
01/05/2013	31/05/2013	744	3,515,614	3,647	3,424,127	44	1,944	1,507,382
01/06/2013	30/06/2013	710	3,444,298	3,882	3,399,369	46	2,160	1,569,050
01/07/2013	31/07/2013	744	4,053,291	21	3,838,513	45	10	1,704,487
01/08/2013	31/08/2013	744	3,736,557	12	3,526,444	46	6	1,620,842
01/09/2013	30/09/2013	720	3,549,871	21,199	3,297,562	53	12,640	1,723,878
Remark:	* The LFG fed to the flare and the power generators was compared with the LFG _{total} in every minute. The lowest values of quantity of methane Gas fed to the flare and power generators are presented in this table and are used for calculation of F _{CH4,PJ,V} at next step data process, according to QA/QC.							

Table 2 Baseline emission associated with electricity generation

Date		Amount of methane gas fed to the power generators measured in Nm3	Average methane density in LFG fed to the power generators (kg-CH ₄ /m ³ -CH ₄)	Amount of methane in the LFG used for electricity generation (t-CH ₄)	Amount of electricity generated using LFG (MWh)	CO ₂ emission factor for electricity generation (tCO ₂ e/MWh)	Average technical transmission and distribution losses for providing electricity to Thai Grid	Baseline emission associated with electricity generation (tCO ₂ e)
		V _{CH₄,Engine}	P _{i,t}	F _{CH₄, EL,y}	EG _{PJ,y}	EF _{EL,k,y}	TDL _{k,y}	BE _{EC,y}
01/04/2012	30/04/2012	1,357,613	0.7163	972	4,151.75	0.5113	8.58%	2,305
01/05/2012	31/05/2012	1,386,364	0.6980	970	4,242.36	0.5113	8.58%	2,355
01/06/2012	30/06/2012	1,431,950	0.6917	992	4,280.04	0.5113	8.58%	2,376
01/07/2012	31/07/2012	1,679,884	0.7092	1,199	4,658.71	0.5113	8.58%	2,586
01/08/2012	31/08/2012	1,709,211	0.7116	1,216	4,990.68	0.5113	8.58%	2,771
01/09/2012	30/09/2012	1,472,692	0.7041	1,039	4,507.56	0.5113	8.58%	2,502
01/10/2012	31/10/2012	1,835,133	0.7085	1,300	5,465.16	0.5113	8.58%	3,034
01/11/2012	30/11/2012	1,760,164	0.7110	1,251	5,268.84	0.5113	8.58%	2,925
01/12/2012	31/12/2012	1,662,286	0.7085	1,190	4,924.44	0.5113	8.58%	2,734
01/01/2013	31/01/2013	1,676,715	0.7160	1,200	4,870.80	0.5113	8.58%	2,704
01/02/2013	28/02/2013	1,585,475	0.7111	1,127	4,760.04	0.5113	8.58%	2,643
01/03/2013	31/03/2013	1,505,057	0.6915	1,068	4,962.72	0.5113	8.58%	2,755
01/04/2013	30/04/2013	1,479,908	0.6877	1,035	4,575.48	0.5113	8.58%	2,540
01/05/2013	31/05/2013	1,507,382	0.7115	1,072	4,533.84	0.5113	8.58%	2,517
01/06/2013	30/06/2013	1,569,050	0.7057	1,121	4,839.24	0.5113	8.58%	2,687
01/07/2013	31/07/2013	1,704,487	0.7070	1,204	5,221.32	0.5113	8.58%	2,899
01/08/2013	31/08/2013	1,620,842	0.7089	1,147	4,801.56	0.5113	8.58%	2,666
01/09/2013	30/09/2013	1,723,878	0.7156	1,229	5,346.33	0.5113	8.58%	2,968
Remark	** Data in this table are aggregated from hourly results; calculation formulas are used in hourly level. The average value during the month of methane density are presented in this and are used for calculation of F _{CH₄,EL,y}							

Table 3-1 Methane destroyed by flaring (Flare 1)

Date		Amount of methane gas fed to flare measured in Nm3	Average methane density in LFG fed to flare (kg-CH ₄ /m ³ -CH ₄)	Amount of methane in the LFG sent to the flare (tCH ₄)	Global warming potential of methane (tCO ₂ e/tCH ₄)	Project emissions from flaring of the residual gas (tCO ₂ e)	Amount of methane in the LFG destroyed by flaring (tCH ₄)
		V _{CH₄,flare1}	ρ _{i,t}	F _{CH₄,sent_flare,y}	GWP _{CH₄}	PE _{flare,y}	F _{CH₄,flared,y}
01/04/2012	30/04/2012	167,460	0.6697	107	21	271	94
01/05/2012	31/05/2012	119,834	0.6866	77	21	195	68
01/06/2012	30/06/2012	124,411	0.6864	80	21	200	70
01/07/2012	31/07/2012	191,952	0.6587	123	21	312	109
01/08/2012	31/08/2012	193,485	0.6606	124	21	312	109
01/09/2012	30/09/2012	256,964	0.6488	163	21	410	144
01/10/2012	31/10/2012	249,922	0.6403	160	21	401	141
01/11/2012	30/11/2012	96,807	0.6938	62	21	158	54
01/12/2012	31/12/2012	11,875	0.7302	8	21	20	7
01/01/2013	31/01/2013	308	0.7460	0	25	1	0
01/02/2013	28/02/2013	15,214	0.7351	10	25	26	9
01/03/2013	31/03/2013	5,920	0.7380	4	25	11	3
01/04/2013	30/04/2013	4,041	0.7319	3	25	7	2
01/05/2013	31/05/2013	1,208	0.7382	1	25	4	1
01/06/2013	30/06/2013	884	0.7349	1	25	3	0
01/07/2013	31/07/2013	10	0.7499	0	25	0	0
01/08/2013	31/08/2013	6	0.7536	0	25	0	0
01/09/2013	30/09/2013	11,877	0.7515	8	25	22	7
Remark	*** Methane density and Project emissions from flaring in this table are aggregated from minutely results; calculation formulas are used in minutely level. Amount of methane in the LFG destroyed by flaring are aggregated and calculated from hourly results; calculation formulas are used in hourly results.						

Table 3-2 Methane destroyed by flaring (Flare 2)

Date		Amount of methane gas fed to flare measured in Nm3	Average methane density in LFG fed to flare (kg-CH ₄ /m ³ -CH ₄)	Amount of methane in the LFG sent to the flare (tCH ₄)	Global warming potential of methane (tCO ₂ e/tCH ₄)	Project emissions from flaring of the residual gas (tCO ₂ e)	Amount of methane in the LFG destroyed by flaring (tCH ₄)
		V _{CH₄,flare2}	ρ _{i,t}	F _{CH₄,sent_flare,y}	GWP _{CH₄}	PE _{flare,y}	F _{CH₄,flared,y}
01/04/2012	30/04/2012	199,574	0.6442	128	21	320	112
01/05/2012	31/05/2012	172,960	0.6568	110	21	278	97
01/06/2012	30/06/2012	78,311	0.7029	49	21	124	44
01/07/2012	31/07/2012	71,774	0.7062	46	21	118	40
01/08/2012	31/08/2012	81,979	0.7024	52	21	134	46
01/09/2012	30/09/2012	177,608	0.6628	113	21	284	99
01/10/2012	31/10/2012	54,840	0.7163	35	21	49	33
01/11/2012	30/11/2012	12,070	0.7367	8	21	21	7
01/12/2012	31/12/2012	10,355	0.7321	7	21	19	6
01/01/2013	31/01/2013	19,063	0.7385	12	25	32	11
01/02/2013	28/02/2013	14,566	0.7357	9	25	25	8
01/03/2013	31/03/2013	6,537	0.7384	4	25	11	4
01/04/2013	30/04/2013	423	0.7361	0	25	1	0
01/05/2013	31/05/2013	731	0.7406	0	25	2	0
01/06/2013	30/06/2013	1,275	0.7349	1	25	3	1
01/07/2013	31/07/2013	0	0.7504	0	25	0	0
01/08/2013	31/08/2013	0	0.7551	0	25	0	0
01/09/2013	30/09/2013	763	0.7580	1	25	2	0
Remark	*** Methane density and Project emissions from flaring in this table are aggregated from minutely results; calculation formulas are used in minutely level. Amount of methane in the LFG destroyed by flaring are aggregated and calculated from hourly results; calculation formulas are used in hourly results.						

Table 3-3 Methane destroyed by flaring (Flare 3)

Date		Amount of methane gas fed to flare measured in Nm3	Average methane density in LFG fed to flare (kg-CH ₄ /m ³ -CH ₄)	Amount of methane in the LFG sent to the flare (tCH ₄)	Global warming potential of methane (tCO ₂ e/tCH ₄)	Project emissions from flaring of the residual gas (tCO ₂ e)	Amount of methane in the LFG destroyed by flaring (tCH ₄)
		V _{CH₄,flare3}	ρ _{i,t}	F _{CH₄,sent_flare,y}	GWP _{CH₄}	PE _{flare,y}	F _{CH₄,flared,y}
01/04/2012	30/04/2012	240,283	0.6565	157	21	399	138
01/05/2012	31/05/2012	218,860	0.6673	142	21	359	125
01/06/2012	30/06/2012	255,265	0.6516	166	21	414	146
01/07/2012	31/07/2012	95	0.7406	0	21	1	0
01/08/2012	31/08/2012	1	0.7428	0	21	0	0
01/09/2012	30/09/2012	571	0.7394	0	21	1	0
01/10/2012	31/10/2012	0	0.7396	0	21	0	0
01/11/2012	30/11/2012	2	0.7454	0	21	0	0
01/12/2012	31/12/2012	2	0.7394	0	21	0	0
01/01/2013	31/01/2013	78	0.7508	0	25	1	0
01/02/2013	28/02/2013	0	0.7460	0	25	0	0
01/03/2013	31/03/2013	1	0.7438	0	25	0	0
01/04/2013	30/04/2013	70	0.7375	0	25	1	0
01/05/2013	31/05/2013	5	0.7418	0	25	0	0
01/06/2013	30/06/2013	0	0.7351	0	25	0	0
01/07/2013	31/07/2013	0	0.7500	0	25	0	0
01/08/2013	31/08/2013	0	0.7541	0	25	0	0
01/09/2013	30/09/2013	0	0.7577	0	25	0	0
Remark	*** Methane density and Project emissions from flaring in this table are aggregated from minutely results; calculation formulas are used in minutely level. Amount of methane in the LFG destroyed by flaring are aggregated and calculated from hourly results; calculation formulas are used in hourly results.						

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 Baseline emission of LFG from the SWDS

Date		Amount of methane in the LFG flared and used in the project activity (t-CH ₄)	Amount of methane in the LFG flared in the baseline	Global warming potential of methane (tCO ₂ e/tCH ₄)	Oxidation factor (reflecting the amount of methane from landfill that is oxidised in the soil or other material covering the waste)	Baseline emission of LFG from the SWDS
		F _{CH4,PJ,y}	F _{CH4,BL,y}	GWP _{CH4}	OX	BE _{CH4,y}
01/04/2012	30/04/2012	1,317	0	21	0.1	24,885
01/05/2012	31/05/2012	1,260	0	21	0.1	23,813
01/06/2012	30/06/2012	1,252	0	21	0.1	23,655
01/07/2012	31/07/2012	1,348	0	21	0.1	25,472
01/08/2012	31/08/2012	1,371	0	21	0.1	25,906
01/09/2012	30/09/2012	1,282	0	21	0.1	24,238
01/10/2012	31/10/2012	1,474	0	21	0.1	27,850
01/11/2012	30/11/2012	1,312	0	21	0.1	24,792
01/12/2012	31/12/2012	1,202	0	21	0.1	22,723
01/01/2013	31/01/2013	1,211	0	25	0.1	27,253
01/02/2013	28/02/2013	1,144	0	25	0.1	25,744
01/03/2013	31/03/2013	1,075	0	25	0.1	24,192
01/04/2013	30/04/2013	1,038	0	25	0.1	23,350
01/05/2013	31/05/2013	1,073	0	25	0.1	24,145
01/06/2013	30/06/2013	1,122	0	25	0.1	25,250
01/07/2013	31/07/2013	1,204	0	25	0.1	27,093
01/08/2013	31/08/2013	1,147	0	25	0.1	25,803
01/09/2013	30/09/2013	1,236	0	25	0.1	27,814

Table 5 Project emissions from consumption of fossil fuels (Diesel generator)

Date		Quantity of fuel combustion (Diesel) (litres)	Net calorific value of Diesel (GJ/litre)	CO ₂ emission factor of Diesel (tCO ₂ /GJ)	CO ₂ emission coefficient of Diesel (tCO ₂ /litre)	Project emission from fossil fuels consumption (tCO ₂ e)
		FC _{i,j,y}	NCV _{i,y}	EF _{CO2,i,y}	COEF _{i,y}	PE _{FC,i,y}
01/04/2012	30/04/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/05/2012	31/05/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/06/2012	30/06/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/07/2012	31/07/2012	3,600.00	0.03642	0.07480	0.0027242	9.81
01/08/2012	31/08/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/09/2012	30/09/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/10/2012	31/10/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/11/2012	30/11/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/12/2012	31/12/2012	0.00	0.03642	0.07480	0.0027242	0.00
01/01/2013	31/01/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/02/2013	28/02/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/03/2013	31/03/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/04/2013	30/04/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/05/2013	31/05/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/06/2013	30/06/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/07/2013	31/07/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/08/2013	31/08/2013	0.00	0.03642	0.07480	0.0027242	0.00
01/09/2013	30/09/2013	0.00	0.03642	0.07480	0.0027242	0.00

Table 6 Project emission from consumption of electricity

Date		Amount of electricity imported from the grid and used in the project (MWh)	CO ₂ emission factor for electricity generation (tCO ₂ e/MWh)	Average technical transmission and distribution losses for providing electricity to the project	Project emission from electricity consumption (tCO ₂ e)
		EC _{PJ,y}	EF _{EL,j,y}	TDL _{j,y}	PE _{EC,y}
01/04/2012	30/04/2012	0.36	0.5113	8.58%	0.20
01/05/2012	31/05/2012	2.04	0.5113	8.58%	1.14
01/06/2012	30/06/2012	0.24	0.5113	8.58%	0.14
01/07/2012	31/07/2012	0.36	0.5113	8.58%	0.20
01/08/2012	31/08/2012	0.60	0.5113	8.58%	0.34
01/09/2012	30/09/2012	1.32	0.5113	8.58%	0.74
01/10/2012	31/10/2012	0.36	0.5113	8.58%	0.20
01/11/2012	30/11/2012	0.48	0.5113	8.58%	0.27
01/12/2012	31/12/2012	1.32	0.5113	8.58%	0.74
01/01/2013	31/01/2013	0.60	0.5113	8.58%	0.34
01/02/2013	28/02/2013	0.36	0.5113	8.58%	0.20
01/03/2013	31/03/2013	1.08	0.5113	8.58%	0.60
01/04/2013	30/04/2013	0.96	0.5113	8.58%	0.54
01/05/2013	31/05/2013	0.60	0.5113	8.58%	0.34
01/06/2013	30/06/2013	1.08	0.5113	8.58%	0.60
01/07/2013	31/07/2013	0.12	0.5113	8.58%	0.07
01/08/2013	31/08/2013	0.36	0.5113	8.58%	0.20
01/09/2013	30/09/2013	0.24	0.5113	8.58%	0.14

Table 7 Total project emissions

Date		Project emission from electricity consumption (tCO ₂ e)	Project emission from fossil fuels consumption (tCO ₂ e)	Project emissions (tCO ₂ e)
		PE _{EC,y}	PE _{FC,i,y}	PE _y
01/04/2012	30/04/2012	0.20	0.00	0.20
01/05/2012	31/05/2012	1.14	0.00	1.14
01/06/2012	30/06/2012	0.14	0.00	0.14
01/07/2012	31/07/2012	0.20	9.81	10.01
01/08/2012	31/08/2012	0.34	0.00	0.34
01/09/2012	30/09/2012	0.74	0.00	0.74
01/10/2012	31/10/2012	0.20	0.00	0.20
01/11/2012	30/11/2012	0.27	0.00	0.27
01/12/2012	31/12/2012	0.74	0.00	0.74
01/01/2013	31/01/2013	0.34	0.00	0.34
01/02/2013	28/02/2013	0.20	0.00	0.20
01/03/2013	31/03/2013	0.60	0.00	0.60
01/04/2013	30/04/2013	0.54	0.00	0.54
01/05/2013	31/05/2013	0.34	0.00	0.34
01/06/2013	30/06/2013	0.60	0.00	0.60
01/07/2013	31/07/2013	0.07	0.00	0.07
01/08/2013	31/08/2013	0.20	0.00	0.20
01/09/2013	30/09/2013	0.14	0.00	0.14

Table 8 Total GHG Emission reductions of the monitoring period

Date		Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)
		BE _y	PE _y		ER _y
01/04/2012	30/04/2012	27,189	0.20	0	27,189
01/05/2012	31/05/2012	26,168	1.14	0	26,167
01/06/2012	30/06/2012	26,030	0.14	0	26,030
01/07/2012	31/07/2012	28,058	10.01	0	28,048
01/08/2012	31/08/2012	28,676	0.34	0	28,676
01/09/2012	30/09/2012	26,740	0.74	0	26,739
01/10/2012	31/10/2012	30,884	0.20	0	30,884
01/11/2012	30/11/2012	27,716	0.27	0	27,716
01/12/2012	31/12/2012	25,457	0.74	0	25,456
01/01/2013	31/01/2013	29,957	0.34	0	29,957
01/02/2013	28/02/2013	28,386	0.20	0	28,386
01/03/2013	31/03/2013	26,947	0.60	0	26,946
01/04/2013	30/04/2013	25,889	0.54	0	25,888
01/05/2013	31/05/2013	26,661	0.34	0	26,661
01/06/2013	30/06/2013	27,936	0.60	0	27,935
01/07/2013	31/07/2013	29,991	0.07	0	29,991
01/08/2013	31/08/2013	28,469	0.20	0	28,469
01/09/2013	30/09/2013	30,782	0.14	0	30,782

Table 9 Summary of GHG Emission reductions of the monitoring period

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)
Total	501,936	17	0	501,919

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 CO₂e)	*2012 = $155,139 \times 275 / 366 = 116,566$ *2013 = $184,492 \times 273 / 365 = 137,990$ Total Monitoring Period = 254,556	501,919

*Estimated ex-ante emission reductions of year 2012 and 2013 (reference, section B.6.4 of the registered PDD) pro rata with the annual ex-ante emission reductions from 1st April 2012 to 30th September 2013. Moreover, the estimated ex-ante calculation for year 2012 stated in section E.5 above is different from figure of 116,355 tCO₂e specified in registered PDD due to the number of days during period of 1st April 2012 to 31st December 2012 are applied for estimation instead of the number of months during the period used in registered spreadsheet.

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

The ex-ante emission reduction calculation included in the registered GS PDD estimates a total of 254,556 tCO₂e for the current monitoring period (calculation as per table section E.5). **501,919** tCO₂e have actually been generated during the current monitoring period which is 97% higher than the estimated value. Any increase is due to higher amount of 68,325 tons of waste tipping, higher gas collected and operation performance to date compared to that envisaged at this stage in the registered GS PDD.

The table below presents actual waste tipping, gas collected and engine operational hours during this monitoring period 1st April 2012 to 30th September 2013 compared to registered GS PDD version 13.

Item	Amount of waste tipped (Tons)	Methane collected (Nm3)	Average daily engine operational hours (hours/day)**
Actual value achieved during this monitoring period	1,266,353	31,738,333	21.5
GS PDD	2012 = $845,908 \times 275 / 366 = 635,587$ 2013 = $751,981 \times 273 / 365 = 562,441$ Total = 1,198,027	2012 = $10,027,170 \times 275 / 366 = 7,534,076$ 2013 = $10,244,811 \times 273 / 365 = 7,662,558$ Total = 15,196,633	2012 = $7,200 / 366 = 19.7$ 2013 = $7,200 / 365 = 19.7$ Average = 19.7

**Average daily engine operational hours during previous monitoring period from 1st November 2011 to 31th March 2012 is 20.5 hours/day.

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)	246,904	255,015

Annex A. Emission Reduction 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 is described in the registered GS PDD page 25 onwards.

Determination of the of flare efficiency in minute m :

In the case of enclosed flares are used in this project activity, and Option A: Apply a default value for flare efficiency is selected from the tool "Project emissions from flaring" (Version 02.0.0).

Option A: Default value

The flare efficiency for the minute m ($\eta_{flare, m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

- 1) The temperature of the flare ($T_{EG, m}$) and the flow rate of the residual gas to the flare ($F_{RG, m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m and
- 2) The flame is detected in minute m ($Flame_m$)

Otherwise $\eta_{flare, m}$ is 0%.

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. Thung Bua 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
Public Health Act (Issue 2) 2007	Repealed section 18 of Public Health Act 1992 and enforce section 9 of this act. Governs the operation of the landfill provides a mechanism for regulation by local administrative body via the issuance of the license to the landfill and not apply this amended law to the disposal of hazardous waste as defined by the factory laws. Currently, Thung Bua Sub-district Administrative Organisation has not set out and announced the specific regulations relating to the license. No impact on parameters monitored during the current crediting period.	2007

Annex D. Specification of GS CDM Monitoring Equipment						
Parameter	Instrument Type	Manufacturer	Instrument Model	Instrument Range	Accuracy	Calibration Requirements
LFG _{total} (V _{t,db})	V-Cone Flow Meter	Kingways	KVS14IICD23FSN with Rosemount 3051 CD Differential Pressure Transmitter	750 - 7500 m. ³ /hr.	±0.5%	2 yearly
		Shanghai Kent	KVCFF-350-AON/2 (PN10) with Rosemount 3051 CD Differential Pressure Transmitter	750 - 7500 m. ³ /hr.	±0.5%	2 yearly
LFG _{flare} (V _{t,db})	V-Cone Flow Meter	Kingways	KVS08IIC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	250 - 2500 m. ³ /hr.	±0.5%	2 yearly
		KVS Lamways	RVM-VS08IIF63N2 with Rosemount 3051 CD Differential Pressure Transmitter	250 - 2500 m. ³ /hr.	±0.5%	2 yearly
LFG _{electricity} , (V _{t,db})	V-Cone Flow Meter	Kingways	KVS06IIC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	200 - 2000 m. ³ /hr.	±0.5%	2 yearly
		Kingways	KVS06IIC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	100 - 1000 m. ³ /hr.		
		KVS Lamways	RVM-VS06JF63N2 with Rosemount 3051 CD Differential Pressure Transmitter			
		Shanghai Kent	KVCFF150CD1N/6 with Rosemount 3051 CD Differential Pressure Transmitter			
V _{i,t,db}	Infra Red Gas Analyser	Edinburgh Instruments Limited	Guardian Plus Infra-Red Gas Monitor	0 - 100%	± 2.5% Full Scale Deflection	Annually
T _t	Temperature Transmitter	Honeywell	STT830-171	- 58 to 500°C	(0.3+0.005ltl)°C	Annually
P _t	Absolute Pressure Transmitter	Rosemount	Model 3051TA	0 - 207 kPa	± 0.075 % of span	Annually
EG _{PJ}	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
EC _{PJ}	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
TEG _m	Type N Thermocouple	Honeywell	STT830-173	0 - 1200°C	Accuracy Class II (allowable deviation ±(0.0075ltl))	Annually
		Uniflare	32-N-LTS-176-6.0-2I-TXLIN/EXI	0 - 1300°C	Accuracy Class II (allowable deviation ±(0.0075ltl))	Annually
Flame _m	UV flame detector	Honeywell	C7027A	-18 to 102°C	-	No requirement

Annex E. GS CDM Monitoring Equipment Installation and Calibration Dates

Notes :

1. Since LFG flow monitoring equipment consist of 2 components i.e. V-cone flow meter and differential pressure transmitter. Therefore, FT9261A, FT9261B, FT9391-FT9591 and EFT9001- EFT9008 serial no. information are presented as
“serial no. of V-cone flow meter / serial no. of differential pressure transmitter”
2. “Equipment Start Date” and “Equipment End Date” mean the installation period of the individual equipment over the current monitoring period.
3. For EG_{PJ}, the electricity primary and secondary meter serial no. 205610065/PEA19936922 and serial no. 205610126/PEA19936983 Are the PEA’s electricity meters which used for temporary during PEA calibrate the permanent export meter.
4. For EC_{PJ}, the electricity primary and secondary meter serial no. 205610067/PEA19936924 is the PEA’s electricity meter which used for temporary during PEA calibration the permanent import meter.
5. If the PEA registered no. (PEA no.) of any power meter used for monitoring the parameter EL_{export} and EL_{import} are available, the serial no. information are presented as
“serial no. of power meter / PEA no. of power meter”

Name	Tag No.	Serial No.	Equipment Start Date	Equipment End Date	Calibration ertification Validity Period	Certificate Reference
LFG _{Total} (V _{t,db})	FT 9261 A	9061213/ 5058731	2012-04-01	2013-09-30	2011-12-01 to 2013-11-30	D11-1128-JG
	FT 9261 B	9061212/ 5058730	2012-04-01	2013-07-05	2011-07-29 to 2013-07-28	D11-733-JG-01
		KT13050301399/ 02886985	2013-07-05	2013-09-30	2013-06-05 to 2015-06-04	D13-415-JG
LFG _{Flare} (V _{t,db})	FT 9391	9061210/ 5058738	2012-04-01	2013-07-05	2011-09-14 to 2013-09-13	LC1109-046
		9062916/ 5058737	2013-07-05	2013-09-30	2013-06-25 to 2015-06-24	LC1306-087
	FT 9491	9062916/ 5058745	2012-04-01	2013-06-04	2011-06-21 to 2013-06-20	LC1106-080
		10071510/ 5476731	2013-06-04	2013-09-30	2013-04-19 to 2015-04-18	L1304-375
	FT 9591	9061205/ 5058733	2012-04-01	2013-06-04	2011-06-18 to 2013-06-17	LC1106-075
		10071509/ 4959893	2013-06-04	2013-09-30	2013-04-19 to 2015-04-18	L1304-374
LFG _{Electricity} (V _{t,db})	EFT 9001	9062903/ 5058756	2012-04-01	2013-06-04	2011-06-13 to 2013-06-12	LC1106-025
		10071503/ 5058744	2013-06-04	2013-09-30	2012-10-01 to 2014-09-03	L1210-028
	EFT 9002	10071503/ 5058744	2012-04-01	2012-08-05	2010-08-23 to 2012-08-22	D10-783-JG-04
		10071504/ 5476737	2012-08-05	2013-09-30	2011-11-07 to 2013-11-06	LC1111-081
	EFT 9003	9062907/ 5058760	2012-04-01	2013-06-04	2011-06-13 to 2013-06-12	LC1106-026
		10071505/ 5476725	2013-06-04	2013-09-30	2013-04-19 to 2015-04-18	L1304-376
	EFT 9004	9062913/ 5058766	2012-04-01	2013-06-04	2011-06-13 to 2013-06-12	LC1106-027
		10071506/ 5964086	2013-06-04	2013-09-30	2013-04-19 to 2015-04-18	L1304-377

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
LFG Electricity ($V_{t,db}$)	EFT 9005	1104-0160/02443474	2012-04-01	2013-07-05	2011-07-14 to 2013-07-13	LC1106-082
		9062907/5058760	2013-07-05	2013-09-30	2013-06-24 to 2015-06-23	LC1306-090
	EFT 9006	1104-0159/02443472	2012-04-01	2013-07-05	2011-07-20 to 2013-07-19	LC1106-081
		9062903/5058756	2013-07-05	2013-09-30	2013-06-24 to 2015-06-23	LC1306-089
	EFT 9007	9062901/5058746	2012-04-01	2013-06-04	2011-06-13 to 2013-06-12	LC1106-024
		10071502/5615483	2013-06-04	2013-09-30	2013-04-19 to 2015-04-18	L1304-372
	EFT 9008	9062914/5058767	2012-04-01	2013-07-05	2011-09-13 to 2013-09-12	LC1109-045
		9062901/5058746	2013-07-05	2013-09-30	2013-06-24 to 2015-06-23	LC1306-088
$V_{i,t,db}$	CH4 9261 A	31426	2012-04-01	2012-05-18	2011-06-03 to 2012-06-02	L1106-104
		31421	2012-05-18	2012-08-29	2011-09-02 to 2012-09-01	L1109-038
		29692	2012-08-29	2012-08-29	2012-06-18 to 2013-06-17	L1206-165
		31421	2012-08-29	2012-08-29	2011-09-02 to 2012-09-01	L1109-038
		29690	2012-08-29	2013-01-25	2012-01-25 to 2013-01-24	1299
		29690	2013-01-25	2013-09-30	2013-01-25 to 2014-01-24	C1301-1053
T_t	TT 9261 A	080625355	2012-04-01	2012-08-06	2011-08-08 to 2012-08-07	11/1867
		080638016	2012-08-06	2013-07-26	2012-07-31 to 2013-07-30	12/1539
		080625360	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1864
	TT 9261 B	080625360	2012-04-01	2012-08-06	2011-08-09 to 2012-08-08	11/1870
		100208514	2012-08-06	2013-07-26	2012-07-31 to 2013-07-30	12/1543
		080625355	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1863
	TT 9391	100208523	2012-04-01	2012-08-06	2011-08-08 to 2012-08-07	11/1875
		080625347	2012-08-06	2013-07-26	2012-07-31 to 2013-07-30	12/1541
		100208523	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1865
	TT 9491	080625400	2012-04-01	2012-08-06	2011-08-08 to 2012-08-07	11/1868
		080625397	2012-08-06	2013-07-26	2012-07-31 to 2013-07-30	12/1540
		090536657	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1867
	TT 9591	090536657	2012-04-01	2012-08-06	2011-08-08 to 2012-08-07	11/1876
		080625432	2012-08-06	2013-07-26	2012-07-31 to 2013-07-30	12/1544
		080625400	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1866
	ETT 9001	100208540	2012-04-01	2012-08-06	2011-08-09 to 2012-08-08	11/1871
		100208541	2012-08-06	2013-07-18	2012-08-06 to 2013-08-05	12/1669
		090536658	2013-07-18	2013-09-30	2013-02-22 to 2014-02-21	13/0388
	ETT 9002	100208515	2012-04-01	2012-06-08	2011-08-09 to 2012-08-08	12/0401
		100211940	2012-06-08	2013-02-20	2012-03-01 to 2013-02-28	12/0336

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
T _t	ETT 9002	080638031	2013-02-20	2013-09-30	2012-11-05 to 2013-11-04	12/2383
	ETT 9003	090536658	2012-04-01	2013-02-20	2012-03-01 to 2013-02-28	12/0333
		080638042	2013-02-20	2013-09-30	2012-11-05 to 2013-11-04	12/2384
	ETT 9004	090543121	2012-04-01	2013-02-20	2012-03-01 to 2013-02-28	12/0334
		080638069	2013-02-20	2013-09-30	2012-11-05 to 2013-11-04	12/2385
	ETT 9005	090536683	2012-04-01	2013-02-20	2012-03-01 to 2013-02-28	12/0332
		100208537	2013-02-20	2013-07-18	2012-08-06 to 2013-08-05	12/1668
		090543121	2013-07-18	2013-09-30	2013-02-22 to 2014-02-21	13/0393
	ETT 9006	090543120	2012-04-01	2013-02-20	2012-03-01 to 2013-02-28	12/0335
		100208540	2013-02-20	2013-07-18	2012-08-08 to 2013-08-07	12/1675
		090536683	2013-07-18	2013-09-30	2013-02-22 to 2014-02-21	13/0391
	ETT 9007	100208541	2012-04-01	2012-08-06	2011-08-09 to 2012-08-08	11/1872
		100208515	2012-08-06	2013-07-18	2012-07-31 to 2013-07-30	12/1542
		090543120	2013-07-18	2013-09-30	2013-02-22 to 2014-02-21	13/0390
	ETT 9008	100208537	2012-04-01	2012-08-06	2011-08-09 to 2012-08-08	11/1873
		100098212	2012-08-06	2013-02-22	2012-03-01 to 2013-02-28	12/0337
		100211940	2013-02-22	2013-09-30	2013-02-22 to 2014-02-21	13/0389
P _t	PT 9261 A	5466080	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-158
		5466002	2012-06-11	2013-06-05	2012-06-11 to 2013-06-10	C1206-273
		5466080	2013-06-05	2013-09-30	2013-06-05 to 2014-06-04	C1306-250
	PT 9261 B	5466089	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-159
		5466003	2012-06-11	2013-06-05	2012-06-11 to 2013-06-10	C1206-274
		5466089	2013-06-05	2013-09-30	2013-06-05 to 2014-06-04	C1306-251
	PT 9391	5466010	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-155
		5466004	2012-06-11	2013-06-05	2012-06-11 to 2013-06-10	C1206-278
		5466010	2013-06-05	2013-09-30	2013-06-05 to 2014-06-04	C1306-254
	PT 9491	5466007	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-156
		5466006	2012-06-11	2013-06-05	2012-06-11 to 2013-06-10	C1206-279
		5466007	2013-06-05	2013-09-30	2013-06-05 to 2014-06-04	C1306-255
	PT 9591	5466015	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-157
		5466083	2012-06-11	2013-06-05	2012-06-11 to 2013-06-10	C1206-280
		5466015	2013-06-05	2013-09-30	2013-06-05 to 2014-06-04	C1306-256
	EPT 9001	02443480	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-160
		02166916	2012-06-11	2012-11-02	2011-11-10 to 2012-11-09	C1111-012
		02443480	2012-11-02	2013-06-05	2012-06-11 to 2013-06-10	C1206-281
		02300672	2013-06-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-111

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
P _t	EPT 9002	02443481	2012-04-01	2012-06-11	2011-06-14 to 2012-06-13	L1106-161
		02150750	2012-06-11	2012-11-02	2011-11-10 to 2012-11-09	C1111-013
		02443481	2012-11-02	2013-06-05	2012-06-11 to 2013-06-10	C1206-282
		02300674	2013-06-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-113
	EPT 9003	02166915	2012-04-01	2012-11-02	2011-11-10 to 2012-11-09	C1111-014
		02715553	2012-11-02	2013-06-05	2012-08-07 to 2013-08-06	L1208-032
		02150753	2013-06-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-106
	EPT 9004	02300672	2012-04-01	2012-11-05	2011-11-10 to 2012-11-09	C1111-015
		02150751	2012-11-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-107
	EPT 9005	02150751	2012-04-01	2012-11-05	2011-11-10 to 2012-11-09	C1111-011
		02300673	2012-11-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-112
	EPT 9006	02300674	2012-04-01	2012-11-05	2011-11-10 to 2012-11-09	C1111-017
		02150750	2012-11-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-109
	EPT 9007	02150753	2012-04-01	2012-11-05	2011-11-10 to 2012-11-09	C1111-010
		02166915	2012-11-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-110
	EPT 9008	02300673	2012-04-01	2012-11-05	2011-11-10 to 2012-11-09	C1111-016
		02166916	2012-11-05	2013-09-30	2012-11-05 to 2013-11-04	C1211-108
EG _{PJ}	Primary	201005194/ PEA 15850695	2012-04-01	2012-07-04	2011-07-12 to 2012-07-11	-
		205610065/ PEA 19936922	2012-07-04	2012-07-04	2011-08-08 to 2012-08-07	-
		201005194/ PEA 15850695	2012-07-04	2013-07-03	2012-07-04 to 2013-07-03	-
		205610126/ PEA 19936983	2013-07-03	2013-07-03	2012-09-10 to 2013-09-09	-
		201005194/ PEA 15850695	2013-07-03	2013-09-30	2013-07-03 to 2014-07-02	-
	Secondary	201007272/ PEA 15852773	2012-04-01	2012-07-04	2011-07-13 to 2012-07-12	-
		205610065/ PEA 19936922	2012-07-04	2012-07-04	2011-08-08 to 2012-08-07	-
		201007272/ PEA 15852773	2012-07-04	2013-07-03	2012-07-04 to 2013-07-03	-
		205610126/ PEA 19936983	2013-07-03	2013-07-03	2012-09-10 to 2013-09-09	-
		212607309	2013-07-03	2013-09-30	2013-07-03 to 2014-07-02	-
EC _{PJ}	Primary	201006718/ PEA 15852219	2012-04-01	2012-07-04	2011-07-12 to 2012-07-11	-
		205610067/ PEA 19936924	2012-07-04	2012-07-04	2011-08-08 to 2012-08-07	-
		201006718/ PEA 15852219	2012-07-04	2013-07-03	2012-07-04 to 2013-07-03	-
		205610067/ PEA 19936924	2013-07-03	2013-07-03	2012-08-09 to 2013-08-08	-
		201006718/ PEA 15852219	2013-07-03	2013-09-30	2013-07-03 to 2014-07-02	-
	Secondary	201005191/ PEA 15850692	2012-04-01	2012-07-04	2011-07-13 to 2012-07-12	-
		205610067/ PEA 19936924	2012-07-04	2012-07-04	2011-08-08 to 2012-08-07	-

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
EC _{PJ}	Secondary	201005191/ PEA 15850692	2012-07-04	2012-10-03	2012-07-04 to 2013-07-03	-
		210422526	2012-10-03	2013-07-03	2012-10-01 to 2013-09-30	-
		205610067/ PEA 19936924	2013-07-03	2013-07-03	2012-08-09 to 2013-8-08	-
		210422526	2013-07-03	2013-09-30	2013-07-03 to 2014-07-02	-
TEG _m	TTC 9393 A	22641 C/1	2012-04-01	2012-07-26	2012-02-07 to 2013-02-06	12/0203
		080614298	2012-07-26	2013-02-06	2012-03-22 to 2013-03-21	12/0491
		080614289	2013-02-06	2013-07-26	2012-10-12 to 2013-10-11	12/2186
		080614373	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1860
	TTC 9393 B	22641 C/3	2012-04-01	2012-07-26	2012-02-07 to 2013-02-06	12/0205
		080614290	2012-07-26	2013-02-06	2012-03-22 to 2013-03-21	12/0492
		090326009	2013-02-06	2013-07-26	2012-10-05 to 2013-10-04	12/2140
		090326012	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1861
	TTC 9393 C	090329527	2012-04-01	2012-07-26	2011-08-09 to 2012-08-08	11/1861
		090326006	2012-07-26	2013-02-06	2012-03-22 to 2013-03-21	12/0490
		090326007	2013-02-06	2013-07-26	2012-10-12 to 2013-10-11	12/2187
		090326013	2013-07-26	2013-09-30	2013-07-16 to 2014-07-15	13/1862
	TTC 9493 A	080614379	2012-04-01	2012-07-26	2011-09-07 to 2012-09-06	11/2183
		080614320	2012-08-05	2013-07-26	2012-08-01 to 2013-07-31	12/1547
		080614290	2013-07-26	2013-09-30	2013-02-21 to 2014-02-20	13/0381
	TTC 9493 B	080614305	2012-04-01	2012-07-26	2011-09-07 to 2012-09-06	11/2185
		080614305	2012-08-05	2013-07-26	2012-08-01 to 2013-07-31	12/1546
		080614323	2013-07-26	2013-09-30	2013-03-06 to 2014-03-05	13/0511
	TTC 9493 C	080614306	2012-04-01	2012-07-26	2011-09-07 to 2012-09-06	11/2184
		080614379	2012-08-05	2013-07-26	2012-08-01 to 2013-07-31	12/1545
		080614298	2013-07-26	2013-09-30	2013-02-21 to 2014-02-20	13/0382
	TTC 9593 A	080614323	2012-04-01	2012-07-26	2011-08-09 to 2012-08-08	11/1896
		090329527	2012-09-19	2013-07-26	2012-08-02 to 2013-08-01	12/1550
		090326006	2013-07-26	2013-09-30	2013-02-21 to 2014-02-20	13/0380
	TTC 9593 B	080614321	2012-04-01	2012-07-26	2011-08-09 to 2012-08-08	11/2072
		080614306	2012-09-19	2013-07-26	2012-08-02 to 2013-08-01	12/1548
		090326010	2013-07-26	2013-09-30	2013-03-06 to 2014-03-05	13/0512
	TTC 9593 C	080614320	2012-04-01	2012-07-26	2011-08-09 to 2012-08-08	11/1897
		080614297	2012-09-19	2013-07-26	2012-08-02 to 2013-08-01	12/1549
		080614321	2013-07-26	2013-09-30	2013-03-06 to 2014-03-05	13/0510

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
Flame _m	BT9393	-	2012-04-01	2013-09-30	-	-
	BT9493	-	2012-04-01	2013-09-30	-	-
	BT9593	-	2012-04-01	2013-09-30	-	-

Annex F. Special Events Table

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
01/04/2012 00:00	02/04/2012 04:04	28:05	Stopped for Engine 4 due to change intercooler	No methane destruction by the Engine 4
01/04/2012 05:29	04/04/2012 03:05	69:37	Stopped for Engine 2 due to Maintenance 14,000 hrs and change intercooler	No methane destruction by the Engine 2
02/04/2012 07:29	04/04/2012 01:35	42:07	Stopped for Engine 3 due to Start new engine	No methane destruction by the Engine 3
05/04/2012 08:50	07/04/2012 02:26	41:37	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
06/04/2012 08:11	08/04/2012 03:33	43:23	Stopped for Engine 3 due to Start new engine	No methane destruction by the Engine 3
08/04/2012 11:02	22/04/2012 08:40	333:39	Stopped for Engine 3 due to Knocking failure and change cylinder head #20 / Waiting spare part 7 cylinder head/ Maintenance (clean cylinder head)Test and start up after maintenance (clean cylinder head)	No methane destruction by the Engine 3
08/04/2012 12:02	19/04/2012 08:31	260:30	Stopped for Engine 4 due to Waiting & Change turbo charger and intercooler	No methane destruction by the Engine 4
20/04/2012 20:04	24/04/2012 03:18	79:15	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
24/04/2012 10:51	26/04/2012 07:11	44:21	Stopped for Engine 1 due to Start new engine	No methane destruction by the Engine 1
26/04/2012 02:44	29/04/2012 16:57	86:14	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
26/04/2012 08:07	30/04/2012 03:30	91:24	Stopped for Engine 1 due to Start new engine	No methane destruction by the Engine 1
03/05/2012 04:01	04/05/2012 08:22	28:22	Stopped for Engine 1 due to PEA change VT	No methane destruction by the Engine 1
03/05/2012 04:01	04/05/2012 08:22	28:22	Stopped for Engine 2 due to PEA change VT and test run 8 MW	No methane destruction by the Engine 2
05/05/2012 06:21	06/05/2012 09:12	26:52	Stopped for Engine 4 due to Start new engine and change lube oil	No methane destruction by the Engine 4
05/05/2012 10:27	08/05/2012 07:55	69:29	Stopped for Engine 3 due to Start new engine	No methane destruction by the Engine 3
06/05/2012 09:28	08/05/2012 02:19	40:52	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
08/05/2012 02:24	11/05/2012 08:18	77:55	Stopped for Engine 1 due to Start new engine	No methane destruction by the Engine 1
11/05/2012 08:26	13/05/2012 02:54	42:29	Stopped for Engine 4 due to Start new engine	No methane destruction by the Engine 4
11/05/2012 10:41	15/05/2012 04:12	89:32	Stopped for Engine 3 due to Generator reverse power and start new engine	No methane destruction by the Engine 3
13/05/2012 03:03	18/05/2012 06:53	123:51	Stopped for Engine 1 due to Start new engine / Change turbo charger	No methane destruction by the Engine 1
15/05/2012 19:49	22/05/2012 07:59	156:11	Stopped for Engine 2 due to Knocking failure/Waiting & change cylinder head 1,4,14,18 & 20 / Regap & Clean all spark plug	No methane destruction by the Engine 2
19/05/2012 09:11	22/05/2012 07:21	70:11	Stopped for Engine 1 due to Start new engine	No methane destruction by the Engine 1

Annex F. Special Events Table (Cont.)

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
22/05/2012 09:49	26/05/2012 03:17	89:29	Stopped for Engine 1 due to Start new engine	No methane destruction by the Engine 1
24/05/2012 02:43	25/05/2012 03:21	24:39	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
25/05/2012 03:37	30/05/2012 07:04	123:28	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
27/05/2012 08:49	05/06/2012 02:56	210:08	Stopped for Engine 1 due to Start new engine / Waiting & Change circuit board	No methane destruction by the Engine 1
30/05/2012 04:50	07/06/2012 09:17	196:28	Stopped for Engine 3 due to Exhaust gas temperature deviation high cylinder #15 and start new engine / Clean spark plug cylinder #14 and change spark plug cylinder #14, 15, 18, 8	No methane destruction by the Engine 3
07/06/2012 06:45	13/06/2012 10:46	148:02	Stopped for Engine 6 due to Waiting & intercooler	No methane destruction by the Engine 6
13/06/2012 10:53	15/06/2012 07:49	44:57	Stopped for Engine 1 due to Clean spark plug cylinder #14 / Waiting and Change intercooler	No methane destruction by the Engine 1
16/06/2012 09:32	19/06/2012 09:35	72:04	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
19/06/2012 08:45	20/06/2012 09:35	24:51	Stopped for Engine 1 due to Leanox cont. deviation high	No methane destruction by the Engine 1
20/06/2012 09:41	09/07/2012 11:32	457:52	Stopped for Engine 1 due to Waiting / Change turbo charger	No methane destruction by the Engine 1
24/06/2012 07:45	27/06/2012 04:43	68:59	Stopped for Engine 2 due to Exhaust gas temperature high cylinder # 6 / Waiting and change cylinder head # 6	No methane destruction by the Engine 2
06/07/2012 23:23	09/07/2012 14:28	63:06	Stopped for Engine 4 due to Waiting & Change cylinder head #18	No methane destruction by the Engine 4
08/07/2012 17:19	10/07/2012 14:05	44:47	Stopped for Engine 2 due to Waiting and change cylinder head # 7,8,12 / Change compensator	No methane destruction by the Engine 2
13/07/2012 15:35	15/07/2012 08:07	40:33	Stopped for Engine 6 due to Start new engine	No methane destruction by the Engine 6
26/07/2012 06:54	05/08/2012 02:49	235:57	Flare 2 stopped due to Thermocouples broken i.e. TTC 9493A, TTC 9493B and TTC 9493C removed out and waiting repaired thermocouple to replace	No methane destruction by Flare 2
26/07/2012 07:16	19/09/2012 07:08	1,319:57	Flare 3 stopped due to Thermocouples broken i.e. TTC 9593A, TTC 9593B and TTC 9593C removed out and waiting repaired thermocouple to replace	No methane destruction by Flare 3
05/08/2012 04:12	06/08/2012 12:01	31:50	Stopped for Engine 4 due to Exhaust gas temperature deviation high cylinder # 8 and change cylinder head	No methane destruction by the Engine 4
07/08/2012 01:23	11/08/2012 09:15	103:53	Stopped for Engine 5 due to DE-COKE and maintenance 10,000 hrs. running service	No methane destruction by the Engine 5
13/08/2012 02:50	14/08/2012 10:35	31:46	Stopped for Engine 4 due to Waiting & change cylinder head cylinder #16	No methane destruction by the Engine 4

Annex F. Special Events Table (Cont.)

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
16/08/2012 21:32	22/08/2012 13:53	136:22	Stopped for Engine 4 due to Knocking failure and change cylinder head cylinder #4	No methane destruction by the Engine 4
21/08/2012 01:46	05/09/2012 04:51	363:06	Stopped for Engine 6 due to DE-COKE and maintenance 10,000 hrs. running service	No methane destruction by the Engine 6
11/09/2012 00:49	13/09/2012 09:37	56:49	Stopped for Engine 3 due to Change intercooler	No methane destruction by the Engine 3
14/09/2012 13:36	03/10/2012 09:00	451:25	Stopped for Engine 6 due to Engine oil temperature high / Check piston and liner and waiting for service piston and liner / Service and install piston cylinder #8 and liner cylinder #8, 11 and change lube oil	No methane destruction by the Engine 6
15/09/2012 09:41	17/09/2012 04:32	42:52	Stopped for Engine 2 due to Valve no.13 broken & Change head cylinder # 13,15,19	No methane destruction by the Engine 2
15/09/2012 13:51	18/09/2012 05:19	63:29	Stopped for Engine 1 due to Waiting for service generator / service generator	No methane destruction by the Engine 1
18/09/2012 08:36	28/09/2012 17:53	249:18	Stopped for Engine 1 due to Waiting for generator repairing / Service generator and change lube oil	No methane destruction by the Engine 1
08/11/2012 21:56	10/11/2012 08:51	34:56	Stopped for Engine 3 due to Fuel mixture temperature high and change cylinder head cylinder #3,10,11,19 and change cylinder head gasket cylinder #17,18	No methane destruction by the Engine 3
14/11/2012 05:40	15/11/2012 09:34	27:55	Stopped for Engine 1 due to Leanox cont. deviation high and change turbo charger and PLC guard	No methane destruction by the Engine 1
06/12/2012 01:22	07/12/2012 10:37	33:16	Stopped for Engine 4 due to Change inter cooler	No methane destruction by the Engine 4
10/12/2012 10:27	15/12/2012 04:37	114:11	Stopped for Engine 6 due to Waiting part and change inter cooler	No methane destruction by the Engine 6
04/01/2013 08:54	07/01/2013 08:43	71:50	Stopped for Engine 4 due to Stop engine from suction swing	No methane destruction by the Engine 4
08/01/2013 06:30	09/01/2013 06:34	24:05	Stopped for Engine 2 due to Leanox cont. deviation high	No methane destruction by the Engine 2
09/01/2013 16:41	12/01/2013 06:45	62:05	Stopped for Engine 2 due to Start new engine	No methane destruction by the Engine 2
13/01/2013 06:28	19/01/2013 11:18	148:51	Stopped for Engine 4 due to Maintenance 20,000 hrs. running service	No methane destruction by the Engine 4
27/01/2013 08:09	01/02/2013 10:36	122:28	Stopped for Engine 3 due to Maintenance 20,000 hrs. running service	No methane destruction by the Engine 3
04/02/2013 02:13	05/02/2013 05:14	27:02	Stopped for Engine 4 due to Change inter cooler	No methane destruction by the Engine 4
09/02/2013 20:13	12/02/2013 05:45	57:33	Stopped for Engine 6 due to Change inter cooler	No methane destruction by the Engine 6
03/03/2013 23:59	09/03/2013 04:45	124:47	Stopped for Engine 2 due to Maintenance 20,000 hrs. running service	No methane destruction by the Engine 2

Annex F. Special Events Table (Cont.)

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
04/03/2013 04:28	05/03/2013 05:09	24:42	Stopped for Engine 5 due to Change cylinder # 5, 12, 17	No methane destruction by the Engine 5
31/03/2013 04:05	06/04/2013 05:55	145:51	Stopped for Engine 1 due to Maintenance 20,000 Hrs. running service	No methane destruction by the Engine 1
21/04/2013 18:08	25/04/2013 00:16	78:09	Stopped for Engine 7 due to DE-COKE and maintenance 10,000 hrs. running service	No methane destruction by the Engine 7
28/04/2013 19:02	01/05/2013 21:27	74:26	Stopped for Engine 8 due to DE-COKE and maintenance 10,000 hrs. running service	No methane destruction by the Engine 8
13/05/2013 03:52	03/06/2013 04:38	504:47	Stopped for Engine 5 due to Waiting part and change inter cooler	No methane destruction by the Engine 5
14/05/2013 00:50	15/05/2013 03:17	26:28	Stopped for Engine 3 due to Replace generator	No methane destruction by the Engine 3
07/06/2013 22:40	09/06/2013 19:23	44:44	Stopped for Engine 5 due to Engine oil temperature high	No methane destruction by the Engine 5
10/06/2013 01:44	13/06/2013 03:59	74:16	Stopped for Engine 3 due to DE-COKE and maintenance 10,000 hrs. running service	No methane destruction by the Engine 3
15/07/2013 20:57	17/07/2013 21:06	48:10	Stopped for Engine 6 due to Change cylinder # 4, 11, 14, 15, 17, 18 and Compensator 2 units	No methane destruction by the Engine 6

The following tables show monitoring data of sustainable development indicators as stated in Section G. Sustainability Monitoring Plan of the GS Passport during the current monitoring period.

No	1											
Indicator	Air quality											
Mitigation measure	Reduction of baseline SO ₂ and NO _x emissions: The Project, by replacing electricity from fossil fuel combustion and the related fuel consumption, reduces the baseline SO ₂ and NO _x emissions from electricity generation. The emission reductions of SO ₂ and NO _x will be calculated by multiplying net electricity generation from the project activity with SO ₂ and NO _x emission factors using publicly available information. Using engines with suitable low emissions. Stack emissions are below the local requirements stipulated in the Initial Environmental Evaluation and checked regularly by local authorities											
Chosen parameter	a) SO ₂ reductions b) NO _x reductions c) Stack emissions below local/IEE requirements											
Current situation of parameter	Parameter a) and b), Since 86,400.87 MWh of electricity have been generated during the current monitoring period. Therefore, SO ₂ and NO _x emission have been reduced 0.35 tons of SO ₂ and 21.78 tons of NO _x respectively through this monitoring period. The demonstrating of air quality improvement by the project activity is stated by the comparison table of SO ₂ and NO _x emission generated approached to project's emission factor and Thailand baseline emission factor as below.											
	<table><tr><td>Air emission factor for the monitoring period</td><td>SO₂ emission factor (g/kWh)</td><td>NO_x emission factor (g/kWh)</td></tr><tr><td>Thailand baseline emission factor</td><td>0.410</td><td>1.26</td></tr><tr><td>Average Project's stack emission factor</td><td>0.004</td><td>0.25</td></tr></table>			Air emission factor for the monitoring period	SO ₂ emission factor (g/kWh)	NO _x emission factor (g/kWh)	Thailand baseline emission factor	0.410	1.26	Average Project's stack emission factor	0.004	0.25
	Air emission factor for the monitoring period	SO ₂ emission factor (g/kWh)	NO _x emission factor (g/kWh)									
	Thailand baseline emission factor	0.410	1.26									
	Average Project's stack emission factor	0.004	0.25									
	<table><tr><td>Air emission reductions by the project activity for the monitoring period</td><td>SO₂ emission reductions (Ton-SO₂)</td><td>NO_x emission reductions (Ton-NO_x)</td></tr><tr><td>Approached to Thailand baseline emission factor</td><td>35.42</td><td>108.87</td></tr><tr><td>Approached to Project's emission factor</td><td>0.35</td><td>21.78</td></tr></table>			Air emission reductions by the project activity for the monitoring period	SO ₂ emission reductions (Ton-SO ₂)	NO _x emission reductions (Ton-NO _x)	Approached to Thailand baseline emission factor	35.42	108.87	Approached to Project's emission factor	0.35	21.78
	Air emission reductions by the project activity for the monitoring period	SO ₂ emission reductions (Ton-SO ₂)	NO _x emission reductions (Ton-NO _x)									
	Approached to Thailand baseline emission factor	35.42	108.87									
Approached to Project's emission factor	0.35	21.78										
Reference: - Journal of Sustainable Energy & Environmental 2 (2011) Emission Inventory of Electricity Generation in Thailand												

- Environmental Monitoring Report of 2nd/2012, Tested date: December 11-15, 2012 and February 28, 2013 prepared by Intertek Testing Services (Thailand) Limited

Parameter c), Annual stack emissions monitoring has been performed regarding IEE requirement on December 11-15, 2012 and February 28, 2013. Air emissions from the project comply with local requirements, and therefore, mitigation measures were sufficient. The analysis result present as table below.

Engine no.	SO ₂ emission results	Standard SO ₂ ²	NO _x emission results	Standard NO _x as NO ₂ ²	Standard Compliance
	(ppm)	(ppm)	(ppm)	(ppm)	
W1	0.37	60	82.5	200	Complied
W2	0.72	60	89.42	200	Complied
W3	0.39	60	79.79	200	Complied
W4	1.08	60	85.12	200	Complied
W5	1.26	60	47.06	200	Complied
W6	0.76	60	58.83	200	Complied
W7	0.56	60	55.79	200	Complied
W8	1.16	60	50.92	200	Complied

Reference: Environmental Monitoring Report of 2nd/2012, Tested date: December 11-15, 2012 and February 28, 2013 prepared by Intertek Testing Services (Thailand) Limited

Estimation of baseline situation of parameter	Before the project is implemented, emissions were emitted due to electricity generated by grid which will now be displaced by the project. Multiply the expected annual electricity generated by the project by the SO ₂ and NO _x emission factors	
Future target for parameter	To reduce SO ₂ and NO _x emissions in Thailand by displacing fossil fuel generated electricity with electricity from the project activity, thereby contributing to improved air quality.	
Way of monitoring	How	Chosen parameter a) SO ₂ reductions and b) NO _x reductions will calculated by multiplying the net electricity generation of the Project with SO ₂ and NO _x emission factors for Thailand SO ₂ emission factor is 0.41g/kWh NO _x emission factor is 1.26 g/kWh Reference: Journal of Sustainable Energy & Environment 2 (2011) Emission Inventory of Electricity Generation

² The notification of the Ministry of Industry, B.E. 2547 (2004), Emission Standards for Power Plants (New Power Plant - Biogas fuel), Published in the Royal Government Gazette, Vol. 121, Part 113D date October 7, B.E.2547 (2004). The concentrations of air emission are based on the reference condition 25 C at 1 atm (760 mmHg) dry basic and 7 % oxygen content.S

		in Thailand Chosen parameter c) Measured by standard method regarding to local requirements																		
	When	Parameter a) and b) During the current monitoring period Parameter c) December 11-15, 2012 and February 28, 2013																		
	By who	Parameter a) and b) Bangkok Greenpower; Project owner. Parameter c) Intertek Testing Services (Thailand) Limited																		
No	2																			
Indicator	Other pollutants																			
Mitigation measure	Noise pollution will be mitigated by sourcing engine, pretreatment and flares that will meet local noise requirements																			
Chosen parameter	Noise levels																			
Current situation of parameter	Noise and nuisance levels have been tested every year since the start of operation by local authorities. Annual noise level monitoring performed on December 11-15, 2012 and February 28, 2013. The noise test report has shown that the project activity has so far been in compliance with local requirements and the IEE. <table><tr><th rowspan="2">Parameter</th><th>Noise level</th><th>Standard Noise and Nuisance level³</th><th rowspan="2">Standard compliance</th></tr><tr><th>dBA</th><th>dBA</th></tr><tr><td>Equivalent sound level (L_{eq} 24 hr)</td><td>68.6 - 69.2</td><td>70</td><td>Complied</td></tr><tr><td>Maximum sound level (L_{max})</td><td>82.1 - 84.8</td><td>115</td><td>Complied</td></tr><tr><td>Nuisance noise</td><td>6.7 - 7.3</td><td>10</td><td>Complied</td></tr></table> Reference: Environmental Monitoring Report of 2 nd /2012, Tested date: December 11-15, 2012 and February 28, 2013 prepared by Intertek Testing Services (Thailand) Limited		Parameter	Noise level	Standard Noise and Nuisance level ³	Standard compliance	dBA	dBA	Equivalent sound level (L _{eq} 24 hr)	68.6 - 69.2	70	Complied	Maximum sound level (L _{max})	82.1 - 84.8	115	Complied	Nuisance noise	6.7 - 7.3	10	Complied
Parameter	Noise level	Standard Noise and Nuisance level ³		Standard compliance																
	dBA	dBA																		
Equivalent sound level (L _{eq} 24 hr)	68.6 - 69.2	70	Complied																	
Maximum sound level (L _{max})	82.1 - 84.8	115	Complied																	
Nuisance noise	6.7 - 7.3	10	Complied																	
Estimation of baseline situation of parameter	No noise																			
Future target for parameter	To keep noise levels within the local requirements																			
Way of monitoring	How	Measured by standard methods to local requirements																		
	When	December 11-15, 2012 and February 28, 2013																		
	By who	Intertek Testing Services (Thailand) Limited																		

³ 1) The Notification of the National Environmental Board No. 15, Regarding Community Noise Standard, B.E. 2540 (1997). 2) The Notification of the National Environmental Board No. 29, Regarding Annoyance Noise Standard, B.E. 2550 (2007). 3) The Notification of the Ministry of Industry Regarding Annoyance Noise from Factory Standard, B.E. 2548 (2005).

No	3																							
Indicator	Quality of Employment																							
Mitigation measure	Safe and healthy working conditions																							
Chosen parameter	a) Relevant health and safety precautions taken, and b) Training given to staff to develop skills																							
Current situation of parameter	All full-time employees have been received health and safety training, and have been participated in various training programmes and classes provided by 3rd party accredited organizations or in-house experts. 51 training courses have been performed during the current monitoring period as categorized below: <table><tr><th>Training Category</th><th>No. of Training performed</th></tr><tr><td>Health and safety</td><td>18</td></tr><tr><td>CDM and climate change</td><td>5</td></tr><tr><td>Engine maintenance and operation</td><td>4</td></tr><tr><td>Pretreatment maintenance and operation</td><td>1</td></tr><tr><td>Landfill gas operation</td><td>7</td></tr><tr><td>Monitoring equipment on site calibration</td><td>1</td></tr><tr><td>Purchasing</td><td>3</td></tr><tr><td>Human potential development</td><td>9</td></tr><tr><td>Corporate laws and regulations</td><td>3</td></tr><tr><td>Total</td><td>51</td></tr></table>		Training Category	No. of Training performed	Health and safety	18	CDM and climate change	5	Engine maintenance and operation	4	Pretreatment maintenance and operation	1	Landfill gas operation	7	Monitoring equipment on site calibration	1	Purchasing	3	Human potential development	9	Corporate laws and regulations	3	Total	51
Training Category	No. of Training performed																							
Health and safety	18																							
CDM and climate change	5																							
Engine maintenance and operation	4																							
Pretreatment maintenance and operation	1																							
Landfill gas operation	7																							
Monitoring equipment on site calibration	1																							
Purchasing	3																							
Human potential development	9																							
Corporate laws and regulations	3																							
Total	51																							
Estimation of baseline situation of parameter	Prior to the implementation of the project, no one was employed and therefore there was no health and safety precautions or training																							
Future target for parameter	Employment of adequate full-time staff trained with skills to carry out their job functions in a safe manner and good working environment																							
Way of monitoring	How	Number of contracts Health and Safety procedures and records Training records																						
	When	During January 1, 2012 to September 30, 2013.																						
	By who	Bangkok Greenpower; Project owner																						
No	4																							
Indicator	Quantitative employment and income generation																							

Mitigation measure	N/A																													
Chosen parameter	Number of jobs created for the operation of the project activity																													
Current situation of parameter	As of September 30, 2013, there are 16 permanent employees working for the Bangkok Greenpower (the project owner) for the operation of the landfill gas energy project, plus 4 permanent staff employed by Sindicatum Carbon Capital (2 permanent staff resigned during the monitoring period), Thailand and indirectly and temporarily a number of contractors engaged with the pipework. All staffs are based locally and are from Thailand, part from one experienced landfill gas to energy expert/manager from the UK. Bangkok Greenpower Employment: <table><tr><th>Position</th><th>No. of employee</th></tr><tr><td>Engine Operators</td><td>3</td></tr><tr><td>CDM Coordinator/ Manager</td><td>2</td></tr><tr><td>Civil Supervisor/ Engineer</td><td>2</td></tr><tr><td>Administrator</td><td>1</td></tr><tr><td>Cleaner</td><td>1</td></tr><tr><td>Landfill Worker</td><td>6</td></tr><tr><td>Store Keeper M&E/ Landfill</td><td>1</td></tr><tr><td>Total</td><td>16</td></tr></table> Sindicatum Carbon Capital Employment: <table><tr><th>Position</th><th>No. of employee</th></tr><tr><td>Project Manager (From UK)</td><td>1</td></tr><tr><td>Site Manager</td><td>1</td></tr><tr><td>Accountants/ Finance</td><td>2</td></tr><tr><td>Total</td><td>4</td></tr></table> Furthermore, separate spreadsheet of individual working hours during the current monitoring period have been provided the purpose of verification.		Position	No. of employee	Engine Operators	3	CDM Coordinator/ Manager	2	Civil Supervisor/ Engineer	2	Administrator	1	Cleaner	1	Landfill Worker	6	Store Keeper M&E/ Landfill	1	Total	16	Position	No. of employee	Project Manager (From UK)	1	Site Manager	1	Accountants/ Finance	2	Total	4
Position	No. of employee																													
Engine Operators	3																													
CDM Coordinator/ Manager	2																													
Civil Supervisor/ Engineer	2																													
Administrator	1																													
Cleaner	1																													
Landfill Worker	6																													
Store Keeper M&E/ Landfill	1																													
Total	16																													
Position	No. of employee																													
Project Manager (From UK)	1																													
Site Manager	1																													
Accountants/ Finance	2																													
Total	4																													
Estimation of baseline situation of parameter	Prior to the project implementation, no people were employed for operating the project, thus the baseline number of employees is 0.																													
Future target for parameter	Number of people employed for the operation of the project will be greater than 1, and temporary staff will also be employed for manual work																													
Way of monitoring	How	By checking employee records, number of people employed full time and temporarily and working hours																												
	When	As of September 30, 2013																												

	By who	Bangkok Greenpower; Project owner
No	5	
Indicator	Technology transfer and technological self-reliance	
Mitigation measure	N/A	
Chosen parameter	Number of visitors from other organisations	
Current situation of parameter	Currently, there have been approximately 211 people who have visited the project since project started. 137 of 211 people who have visited the project during the current monitoring period.	
Estimation of baseline situation of parameter	Prior to the project implementation, there was no technology transfer, thus the baseline was that the technology was not applied commercially in Thailand	
Future target for parameter	Number of people from outside of the project owners who have visited the project to learn more about the technology and its implementation	
Way of monitoring	How	By noting attendance of organisations and individuals who have attended a site visit and/or presentation on the project and its technology
	When	During April 1, 2012 to September 30, 2013.
	By who	Bangkok Greenpower; Project owner

Annex H. Data and Parameters not monitored

Some data and parameters stated in the GS PDD are not used (ex-ante) or monitored during the current monitoring for the reasons stated in the table below.

Table 1 Applied for ex-ante emission reduction calculation ($F_{CH_4,PJ,y}$ and $BE_{CH_4,SWDS,y}$)

Data / Parameter	Description
1. η_{PJ}	Efficiency of the LFG capture system that will be installed in the project activity
2. Φ_{default}	Default value for the model correction factor to account for model uncertainties
3. F	Fraction of methane in the SWDS gas (volume fraction)
4. $DOC_{f,\text{default}}$	Default value for fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
5. MCF_{default}	Methane correction factor
6. DOC_j	Fraction of degradable organic carbon in the waste type j (weight fraction)
7. k_j	Decay rate for the waste type j

Table 2 Data and parameters to be monitored

Data / Parameter	Description	Reason
1. $C_{H_2O,t,db,n}$	Moisture content of the gaseous stream at normal conditions, in time interval t	This parameter is not used during the current monitoring period as the temperature of the gas stream (T_t) showed that the gaseous stream is dry
2. $P_{H_2O,t,sat}$	Saturation pressure of H_2O at temperature T_t in time interval t	This parameter is not used during the current monitoring period as the temperature of the gas stream (T_t) showed that the gaseous stream is dry
3. $V_{t,wb}$	Volumetric flow of the gaseous stream in time interval t on a wet basis	This parameter is not monitored during the current monitoring period as Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) is chosen for the project activity
4. $V_{i,t,wb}$	Volumetric fraction of greenhouse gas i in a time interval t on a wet basis	This parameter is not monitored during the current monitoring period as Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) is chosen for the project activity
5. $V_{k,t,db}$	Volumetric fraction of gas k in the gaseous stream in time interval t on a dry basis	This parameter is not monitored during the current monitoring period as Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) is chosen for the project activity
6. $V_{k,t,wb}$	Volumetric fraction of gas k in the gaseous stream in time interval t on a wet basis	This parameter is not monitored during the current monitoring period as Option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) is chosen for the project activity
7. $w_{C,i}$	Weighted average mass fraction of carbon in fuel type i in year y	This parameter is not monitored during the current monitoring period as Option B of the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" (version 02) is chosen for the project activity
8. $\rho_{i,y}$	Weighted average density of fuel type i in year y	This parameter is not monitored during the current monitoring period as Option B of the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" (version 02) is chosen for the project activity

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.
Decision Class: Regulatory Document Type: Form Business Function: issuance Keywords: monitoring report, performance monitoring		