



Monitoring report form
(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Bangkok Kamphaeng Saen East : Landfill Gas to Electricity Project	
UNFCCC reference number of the project activity	3462	
Version number of the monitoring report	1	
Completion date of the monitoring report	10/11/2015	
Monitoring period number and duration of this monitoring period	Monitoring period 6 Duration : 01/11/2014 - 31/10/2015 (both dates inclusive)	
Project participant(s)	Bangkok Greenpower Co., Ltd. Xentolar Holdings Limited Sindicatum Carbon Capital Ltd.	
Host Party	The Kingdom of Thailand	
Sectoral scope(s)	Sectoral Scope 13 - Waste Handling and Disposal Baseline	
Selected methodology(ies)	ACM0001 (Version 11) - "Consolidated baseline and monitoring methodology for landfill gas project activities"	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	230,940 tCO ₂ e (Estimated ex-ante emission reduction pro rata with the annual ex-ante estimated from 01/11/2014 – 31/10/2015 (both dates inclusive))	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	N/A	398,735 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 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 average annual emission reductions of the project activity indicated in the PDD are approximately 273,081 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 **398,735 tCO₂e**.

A.2. Location of project activity

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

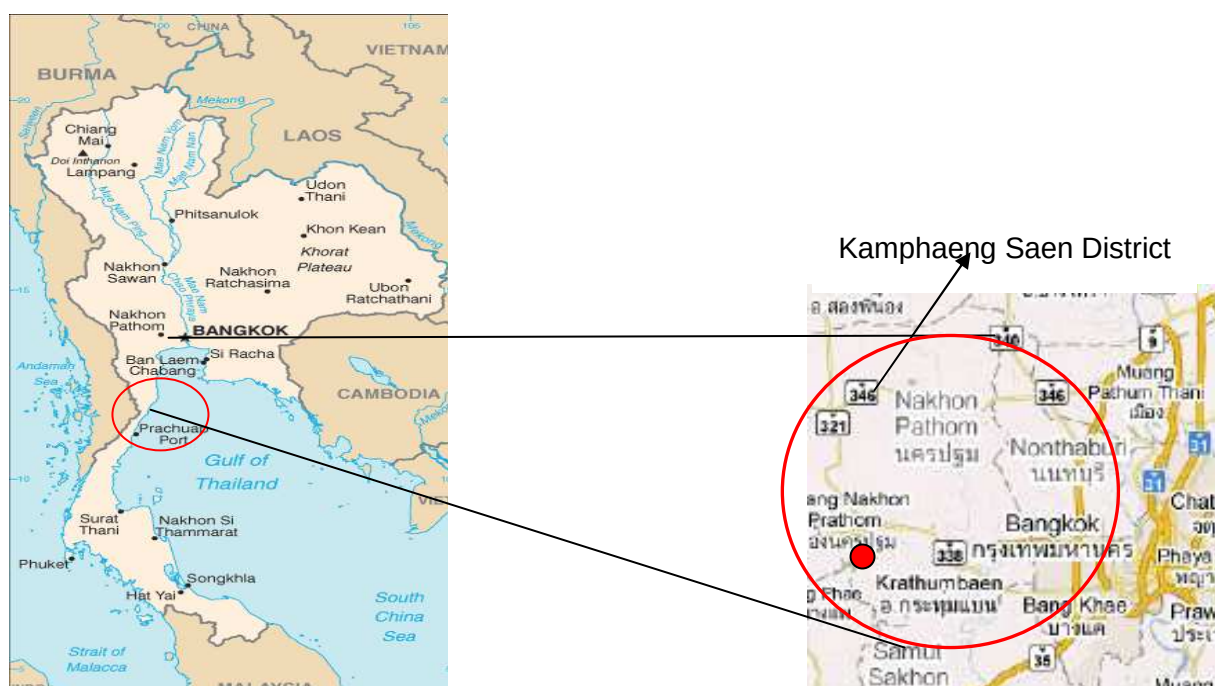




Figure A.2.1 Location of the project activity.

A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether 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 and standardized baseline

- Baseline and monitoring methodology ACM0001 (Version 11) - "Consolidated baseline and monitoring methodology for landfill gas project activities";
- "Tool for the demonstration and assessment of additionality" - Version 05.2
- "Tool to determine project emissions from flaring gases containing methane" - Version 1
- "Tool to calculate the emission factor for an electricity system" - Version 01.1
- "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" - Version 04
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" - Version 1
- "Tool to calculate project or leakage or 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 21-01-2011.

A.6. Contact information of responsible persons/entities

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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.

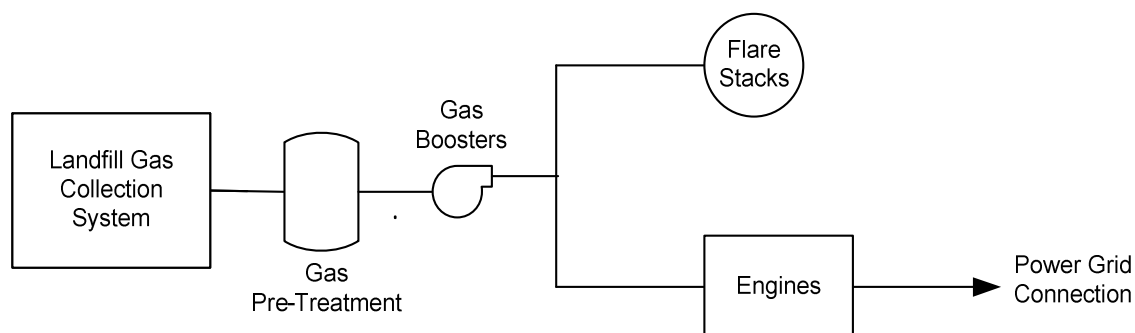


Figure B.1-1 Technical diagram of the project activity

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 08/04/2010. 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 in 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 6th monitoring report. The monitoring period covered by this monitoring report is: **01/11/2014 – 31/10/2015 (both dates 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. Post-registration changes

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

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. Changes to start date of crediting period

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

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

Not applicable

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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

Previously, there have been permanent changes from registered monitoring plan made to include parameters related to the monitoring of project emissions from temporary fossil fuel consumption as a result of a change to the project design. These changes were approved by the UN secretariat; reference PRC-3462-001, on 08/02/2013.

B.2.6. 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 have been changes to the project design during the monitoring period 3 (01/11/2011 to 31/03/2012) 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 project design document (PDD) and approved by the UN secretariat, reference PRC-3462-001, on 08/02/2013.

B.2.7. Types of changes specific to afforestation or reforestation project activity

Not applicable

SECTION C. Description of monitoring system

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

Management structure for the implementation of monitoring plan

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

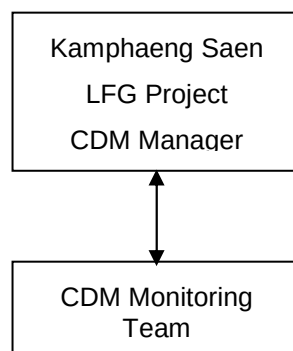


Figure C.1 Organisation Structure of the CDM Team

Responsibility and CDM management:

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

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

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

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

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

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

The parameters monitored and the monitoring procedure applied for determination of the emission reductions is described in detail in section B.7.1 of the Project Design Document Version 9, dated 02/07/2012, and available upon the UNFCCC website:

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

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

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

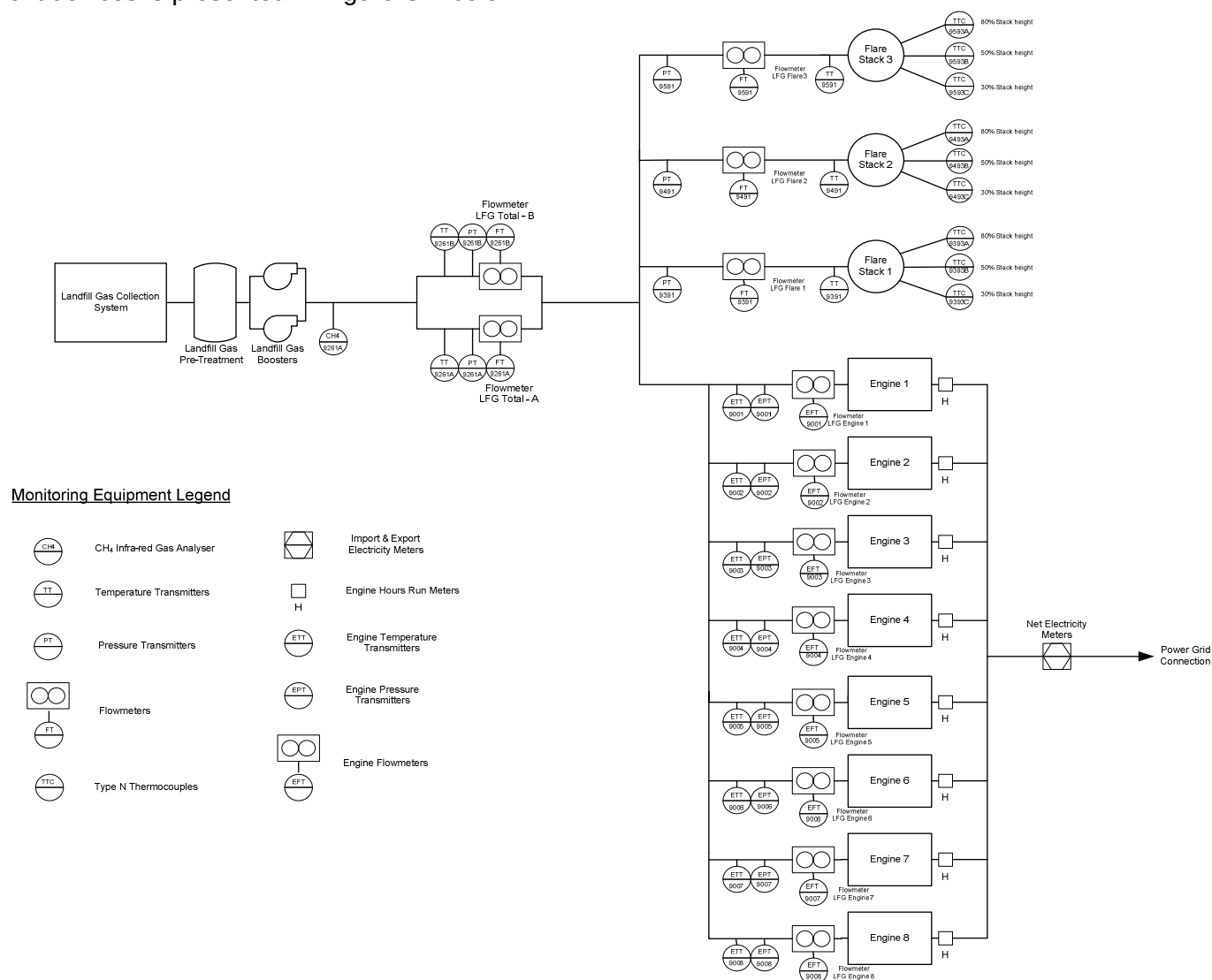


Figure C.2 - Location of the measurement devices¹

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 which are continual measured and manually recorded on monthly basis, 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 whilst the generators are operating (as shown, for example, by electricity output) the missing data can be estimated by taking the lower or higher value of the parameter one hour before the error or one hour after the system restart. If there is evidence that neither of these values is representative, use the average value of the parameter from the previous 24 hours.

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

Any treatment of missing or corrupt data is detailed and available for verification by DOE.

Non-essential data

The on-line monitoring system also records “non-essential” data. Such data is termed non-essential because it is not directly listed in the CDM Monitoring Methodology, but it will constitute a means of corroborating the on-line system. Non-essential data may include measurements of net and gross output from individual generators, certificated conversion efficiency, waste deposition and any other data considered relevant to the project activity.

Document Control

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

Audit function and management review

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

SECTION D. Data and parameters

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

Data/parameter:	GWP_{CH_4}
Unit	tCO ₂ e/tCH ₄
Description	Global warming potential of CH ₄
Source of data	IPCC and change from GWP of 21 to 25 according to decision 4/CMP7 and paragraph 66, EB69
Value(s) applied)	25 after January 1 st , 2013
Choice of data or measurement methods and procedures	As per ACM0001 version 11
Purpose of data	This data is used for baseline and project emission reduction calculations.
Additional comments	Shall be updated according to any future COP/MOP decisions

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

Data/parameter:	$CEF_{elec,BL,y}$ (the same parameter as $EF_{EL,y}$)
Unit	tCO ₂ /MWh
Description	Grid emission factor of electricity

Source of data	Thai grid emission factor calculation
Value(s) applied)	0.57420
Choice of data or measurement methods and procedures	As per “Tool to calculate the emission factor for an electricity system” Version 01.1
Purpose of data	This data is used for baseline emission and project emission calculations.
Additional comments	N/A

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Data/parameter:	$LFG_{total,y}$
Unit	m^3
Description	Total amount of landfill gas captured at Normal Temperature and Pressure
Measured/calculated/default	Measured
Source of data	Flow meter readings
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- V-Cone Flow Meter – with associated Rosemount 3051CD differential pressure transmitter. - See specification details in Annex D. - See installation date, calibration dates and equipment validity periods in Annex E.
Measuring/reading/recording frequency:	Continuous measuring/recorded every minute Data is aggregated monthly and yearly.
Calculation method (if applicable):	N/A
QA/QC procedures:	Data is backed up and archived, where it is stored for two years longer than the crediting period or two years after the last issuance of CERs. For internal cross checking purposes the consistency of flow measurements is checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{flare,h} + LFG_{electricity,h}) = LFG_{total,h}$ 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 staffs have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data:	For baseline emission calculation
Additional comments:	N/A

Data/parameter:	$LFG_{flare,y}$ (The same as $FV_{RG,h}$, different nomenclature for ACM0001 (version 11) and “Tool to determine project emissions from flaring gases containing methane”.)
Unit	m^3
Description	Amount of landfill gas flared at Normal Temperature and Pressure
Measured/calculated/default	Measured
Source of data	Flow meter on the inlet to each flare.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet

Monitoring equipment	- V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter. - See specification details in Annex D. - 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 is be checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{flare,h} + LFG_{electricity,h}) = LFG_{total,h}$ Flow meter is calibrated according to the manufacturer's specifications. Calibrations are carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained. On site staff have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data:	For baseline emission and project emission calculation
Additional comments:	N/A

Data/parameter:	$LFG_{electricity,y}$
Unit	m ³
Description	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure
Measured/calculated/default	Measured
Source of data	Flow meter on the inlet to each generator.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	- V-Cone Flow Meter –with associated Rosemount 3051CD differential pressure transmitter. - See specification details in Annex D. - 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 the longer of two years longer than the crediting period or two years after the last issuance of CERs. For internal cross checking purposes the consistency of flow measurements is be checked by examining the hourly flow balance. The conservative value is used for ER calculation. $(LFG_{flare,h} + LFG_{electricity,h}) = LFG_{total,h}$ Flow meter is calibrated according to the manufacturer's specifications. Calibrations are carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained. On site staff have received training in CDM monitoring and the maintenance requirements of the flow meters.
Purpose of data:	For baseline emission calculation
Additional comments:	N/A

Data/parameter:	$PE_{flare,y}$
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Unit	tCO ₂ e
Description	Project emissions from flaring of the residual gas stream in year y
Measured/calculated/default	Calculated
Source of data	Calculated
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	N/A
Measuring/reading/recording frequency:	N/A
Calculation method (if applicable):	The parameter is calculated as per "Tool to determine project emissions from flaring gases containing Methane".
QA/QC procedures:	Regular maintenance should ensure optimal operation of flares. The enclosed flares are operated and maintained as per the specifications prescribed by the manufacturer.
Purpose of data:	For project emission calculation
Additional comments:	N/A

Data/parameter:	$\omega_{CH_4,y}$ (The same parameter as $fv_{CH_4,RG,h}$ different nomenclature for ACM0001(version 11) and "Tool to determine project emissions from flaring gases containing methane" (version 1).)
Unit	m ³ CH ₄ /m ³ LFG
Description	Methane fraction in the landfill gas
Measured/calculated/default	Measured
Source of data	Gas quality analyzer reading
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet
Monitoring equipment	• Infra-Red Gas Monitor. • See specification details in Annex D. • 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 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 comments:	N/A

Data/parameter:	T
Unit	°C
Description	Temperature of the landfill gas
Measured/calculated/default	Measured
Source of data	Temperature probe in LFG pipe work between the gas treatment package and the generator sets / flares.
Value(s) of monitored parameter	Refer to Emission Reductions spreadsheet

Monitoring equipment	• Temperature Transmitter. • See specification details in Annex D. • 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 comments:	N/A

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

Data / Parameter:	<i>EL_{LFG}</i>
Unit:	MWh
Description:	Net quantity of electricity produced / exported using LFG
Measured/ Calculated/ Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	Refer to Emission Reductions spreadsheet

Monitoring equipment:	- Electricity Meter - See specification details in Annex D. - 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 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the export of power to the grid.
Purpose of data:	For baseline emission calculation
Additional comment:	N/A

Data / Parameter:	EL_{import} (The same parameter as ECPJ,j,y)
Unit:	MWh
Description:	Net amount of electricity imported from the grid for auxiliary use
Measured/ Calculated/ Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	Refer to Emission Reductions spreadsheet
Monitoring equipment:	- Electricity Meter - See specification details in Annex D. - 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 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the import of power from the grid
Purpose of data:	For project emission calculation
Additional comment:	N/A

Data / Parameter:	Operation of the energy plant
Unit:	Hours
Description:	Operation of the energy plant
Measured/ Calculated/ Default:	Measured
Source of data:	Measured with individual, software based, run meters on each generator set, readings taken from SCADA system

Value(s) of monitored parameter:	Engine # 1 : 8,278 hours run Engine # 2 : 8,188 hours run Engine # 3 : 8,137 hours run Engine # 4 : 8,220 hours run Engine # 5 : 8,454 hours run Engine # 6 : 8,504 hours run Engine # 7 : 8,396 hours run Engine # 8 : 8,523 hours run (1/11/2014-31/10/2015 both dates inclusive)
Monitoring equipment:	Run meters
Measuring/ Reading/ Recording frequency:	Continuously Measured
Calculation method (if applicable):	N/A
QA/QC procedures:	N/A
Purpose of data:	For emission reductions calculation
Additional comment:	N/A

Data / Parameter:	T_{flare}
Unit:	°C
Description:	Temperature of the exhaust gas of the flare
Measured/ Calculated/ Default:	Measured
Source of data:	Type N Temperature thermocouple mounted in flare stack
Value(s) of monitored parameter:	Refer to Emission Reductions spreadsheet
Monitoring equipment:	• Type N Thermocouple • See specification details in Annex D. • 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 is stored for the longer of two years longer than the crediting period or two years after the last issuance of CER's.
Purpose of data:	For project emission calculation
Additional comment:	N/A

Data / Parameter:	$TDL_{j,y}$
Unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to Source j
Measured/ Calculated/ Default:	Calculated
Source of data:	Annual Report Energy Balance in Thailand 2014 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:	8.90 %

Monitoring equipment:	N/A												
Measuring/ Reading/ Recording frequency:	Annually												
Calculation method (if applicable):	<table border="1"> <thead> <tr> <th>Year</th><th>2014</th></tr> </thead> <tbody> <tr> <td>Electric Supply Generation</td><td>174,467</td></tr> <tr> <td>Electric Supply Net Import</td><td>10,665</td></tr> <tr> <td>Station Service Consumed</td><td>5,931</td></tr> <tr> <td>Line Losses</td><td>10,545</td></tr> <tr> <td>Distribution loss</td><td>8.90 %</td></tr> </tbody> </table> Total distribution loss = (Station Service Consumed + Line Losses) / (Electric Supply Generation + Electric Supply Net Import)	Year	2014	Electric Supply Generation	174,467	Electric Supply Net Import	10,665	Station Service Consumed	5,931	Line Losses	10,545	Distribution loss	8.90 %
Year	2014												
Electric Supply Generation	174,467												
Electric Supply Net Import	10,665												
Station Service Consumed	5,931												
Line Losses	10,545												
Distribution loss	8.90 %												
QA/QC procedures:	N/A												
Purpose of data:	For project emission calculation												
Additional comment:	N/A												

Data / Parameter:	Other flare operation parameters								
Unit:	°C, m ³ CH ₄ /m ³ LFG, and m ³								
Description:	The following parameters have been detailed earlier, however these parameters are also used to ensure that the flares are operating within their specifications and the flare efficiency default value is allocated accordingly: <table border="1"> <thead> <tr> <th>Parameter</th><th>Range for technical specifications</th></tr> </thead> <tbody> <tr> <td>Temperature of flare exhaust gas ($T_{flare,}$)</td><td>500-1,200 °C</td></tr> <tr> <td>Methane fraction in landfill gas ($\omega_{CH_4,y}$)</td><td>25-65%</td></tr> <tr> <td>Amount of landfill gas flared at Normal temperature and pressure (LFG_{flare})</td><td>300-2,000 Nm³/h</td></tr> </tbody> </table> The flare efficiency is determined as set out in Annex A and B	Parameter	Range for technical specifications	Temperature of flare exhaust gas ($T_{flare,}$)	500-1,200 °C	Methane fraction in landfill gas ($\omega_{CH_4,y}$)	25-65%	Amount of landfill gas flared at Normal temperature and pressure (LFG_{flare})	300-2,000 Nm ³ /h
Parameter	Range for technical specifications								
Temperature of flare exhaust gas ($T_{flare,}$)	500-1,200 °C								
Methane fraction in landfill gas ($\omega_{CH_4,y}$)	25-65%								
Amount of landfill gas flared at Normal temperature and pressure (LFG_{flare})	300-2,000 Nm ³ /h								
Measured/ Calculated/ Default:	Measured								
Source of data:	- Temperature transmitter - Infra-Red Gas Monitor - V-Cone Flow Meter – with associated Rosemount 3051CD differential pressure transmitter								
Value(s) of monitored parameter:	Refer to emission reduction spreadsheet								
Monitoring equipment:	N/A								
Measuring/ Reading/ Recording frequency:	Continuously								
Calculation method (if applicable):	N/A								
QA/QC procedures:	Refer to individual parameters								
Purpose of data:	For determination of default flare efficiency for project emission calculation								
Additional comment:	N/A								

Data / Parameter:	Regulatory requirements relating to landfill gas projects
Unit:	-
Description:	Regulatory requirements relating to landfill gas projects may affect the value of AF or MD _{reg,y}

Measured/ Calculated/ Default:	Measurements by project participants
Source of data:	See details in Annex C.
Value(s) of monitored parameter:	N/A
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	N/A
Purpose of data:	For baseline emission calculation
Additional comment:	N/A

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
Measured/ Calculated/ Default:	Measured
Source of data:	Onsite measurements by project participants
Value(s) of monitored parameter:	Refer to Emission Reductions spreadsheet
Monitoring equipment:	Rulers
Measuring/ Reading/ Recording frequency:	In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed. It shall have a book or record sheet of control for fuel consumed recording (on a daily basis or per shift).
Calculation method (if applicable):	N/A
QA/QC procedures:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be 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 per mass or volume unit (e.g. GJ/m ³ , GJ/ton)
Description:	Weighted average net calorific value of fuel type i in year y
Measured/ Calculated/ Default:	Default value

Source of data:	The following data sources may be used if the relevant conditions apply: <table border="1"> <thead> <tr> <th>Data source</th><th>Conditions for using the data source</th></tr> </thead> <tbody> <tr> <td>a) Values provided by the fuel supplier in invoice</td><td>This is the preferred source</td></tr> <tr> <td>b) Measurements by the project participants</td><td>If a) is not available</td></tr> <tr> <td>c) Regional or national default values</td><td>If a) is not available</td></tr> <tr> <td>d) 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</td><td>If a) is not available</td></tr> </tbody> </table>	Data source	Conditions for using the data source	a) Values provided by the fuel supplier in invoice	This is the preferred source	b) Measurements by the project participants	If a) is not available	c) Regional or national default values	If a) is not available	d) 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	If a) is not available
Data source	Conditions for using the data source										
a) Values provided by the fuel supplier in invoice	This is the preferred source										
b) Measurements by the project participants	If a) is not available										
c) Regional or national default values	If a) is not available										
d) 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	If a) is not available										
Value(s) of monitored parameter:	Refer to Emission Reductions spreadsheet										
Monitoring equipment:	N/A										
Measuring/ Reading/ Recording frequency:	N/A										
Calculation method (if applicable):	The parameter is calculated as per "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" (version 02).										
QA/QC procedures:	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standard.										
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:	0.07480 tCO ₂ /GJ
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:	N/A
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	For a) and b): Measurements should be undertaken in line with national or international fuel standards.
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.

D.3. Implementation of sampling plan

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

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

$$BE_y = (MD_{project,y} - MD_{BL,y}) * GWP_{CH4} + EL_{LFG,y} * CEF_{elec,BL,y} + ET_{LFG,y} * CEF_{ther,BL,y} \quad (1)$$

Where:

- BE_y = Baseline emission in year y (tCO₂e)
 $MD_{project,y}$ = The amount of methane that would have been destroyed/combusted during year y (tCH₄) in project scenario
 $MD_{BL,y}$ = The amount of methane that would have been destroyed/combusted during year y in the absence of the project due to regulatory and/or contractual requirement (tCH₄) this is zero for this project
 GWP_{CH4} = Global Warming Potential value for methane of 25 after January 1st, 2013 (tCO₂e/tCH₄).
 $EL_{LFG,y}$ = Net quantity of electricity produced using LFG, which in the absence of this project activity would have been produced by power plants connected to the Thai Grid during year y (MWh)
 $CEF_{elec,BL,y}$ = CO₂ emission factor of the Thai Grid (tCO₂e/MWh)
 $ET_{LFG,y}$ = The quantity of thermal energy produced utilizing the landfill gas, which in the absence of project activity would have been produced from onsite/offsite fossil fuel fired boiler, during the year y (TJ)
 $CEF_{ther,BL,y}$ = CO₂ emission intensity of the fuel used by boiler to generate thermal energy which is displaced by LFG based thermal energy generation (tCO₂e/TJ)

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

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

Where:

- $MD_{flared,y}$ = measured quantity of methane destruction in flares during the year y;
 $MD_{electricity,y}$ = measured quantity of methane destruction in power plant during the year y;

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH4,y} * D_{CH4} \quad (3)$$

Where:

- $LFG_{electricity,y}$ = quantity of LFG destroyed by the generators in m³
 $w_{CH4,y}$ = average concentration of methane in LFG (m³CH₄/m³LFG)
 D_{CH4} = density of methane (tCH₄/m³)

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

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

Where:

- $LFG_{\text{flared},y}$ = quantity of landfill gas fed to the flare during the year measured in cubic meters (m^3),
- $w_{CH_4,y}$ = the average methane fraction of the landfill gas as measured during the year and expressed as a fraction (m^3CH_4/m^3LFG);
- D_{CH_4} = methane density, (tCH_4/m^3CH_4)
- $PE_{\text{flare},y}$ = the project emissions from flaring of the residual gas stream in year y (tCO_2e)

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

Where:

- $PE_{\text{flare},y}$ = Project emissions from flaring of the residual gas stream in year y (tCO_2e);
- $TM_{RG,h}$ = Mass flow rate of methane in the residual gas in the hour h ($kgCH_4/h$);
- $\eta_{\text{flare},h}$ = Flare efficiency in hour h(%), IPCC default value 90% is taken;
- GWP_{CH_4} = Global Warming Potential value for methane of 25 after January 1st, 2013 (tCO_2e/tCH_4).

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

Where:

- $TM_{RG,h}$ = Mass flow rate of methane in residual gas in the hour h (kg/h);
- $FV_{RG,h}$ = Volumetric flow rate of the residual gas in dry basis at normal condition in hour h (m^3/h);
- $fV_{CH_4,RG,h}$ = Volumetric fraction of methane in the residual gas on dry basis in hour h;
- $\rho_{CH_4,n}$ = Density of methane at normal condition (0.7168) (kg/m^3);

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

The value of D_{CH_4} under standard temperature and air pressure (1.013bar and 0°C) is $0.0007168 tCH_4/m^3CH_4$.

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

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

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

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

Where:

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

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

Although $PE_{FC,j,y}$ does not normally need to be accounted for as there is no thermal generation by the project activity. In the case where fossil fuel is used in the project activity, CO₂ emission from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels,

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (8)$$

Where:

$PE_{FC,j,y}$ = Are the CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr);

$FC_{i,j,y}$ = 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 CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

i = Are the fuel types combusted in process j during the year y

The CO₂ emission coefficient $COEF_{i,y}$ can be 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:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y} \quad (9)$$

Where:

$COEF_{i,y}$ = Is the CO₂ emission coefficient of fuel type i in year y (tCO₂/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 CO₂ emission factor of fuel type i in year y (tCO₂/GJ)

i = Are the fuel types combusted in process j during the year y

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

$$PE_{EC,y} = EC_{P,y} \times EF_{EL,y} \times (1 + TDL_{j,y}) \quad (10)$$

Where:

$EC_{P,y}$ = Electricity imported from the grid and used in the project in year y (MWh/yr)

$EF_{EL,y}$ = CO₂ emission factor of the Thailand Grid in year y (tCO₂e/MWh)

TDL_y = Average technical transmission and distribution losses for providing

electricity to the project in year y (fraction)

E.3. Calculation of leakage

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

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

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

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

$$ER_y = BE_y - PE_y \quad (11)$$

Where:

ER_y = Emission reductions in year y(tCO₂e/yr)

BE_y = Baseline emissions in year y(tCO₂e/yr)

PE_y = Project emissions in year y(tCO₂e/yr)

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

See registered PDD for detailed information.

<http://cdm.unfccc.int/UserManagement/FileStorage/R28ZCYKV731O6DHP9GSQ0LTUWJXF5N>

Calculation sheets are provided below.

Notes on ER Calculations:

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

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		Quantity of total Landfill gas captured measured in Nm ³	Quantity of Landfill gas fed to flare measured in Nm ³	Quantity of landfill gas fed to the power generators measured in Nm ³ *	Average value of concentration of methane in landfill gas m ³ CH ₄ /m ³ LFG	Quantity of Methane Gas fed to the flare used for MD calculation in Nm ³	Quantity of Methane Gas fed to the power generators used for MD calculation in Nm ³
		LFG total, y	LFG flare, y	LFG Electricity,y *	wCH ₄ ,y	CH ₄ Flare, y	CH ₄ Electricity, y
01/11/2014	30/11/2014	3,028,708	66,538	2,797,864	59%	39,080	1,636,983
01/12/2014	31/12/2014	3,152,240	56,887	2,937,270	59%	33,775	1,722,581
01/01/2015	31/01/2015	3,172,483	143,035	2,850,559	59%	84,951	1,666,012
01/02/2015	28/02/2015	2,994,097	32,665	2,764,106	58%	19,183	1,602,816
01/03/2015	31/03/2015	3,351,762	46,822	3,074,848	56%	28,196	1,723,799
01/04/2015	30/04/2015	3,392,895	1,867	3,168,989	53%	1,018	1,693,768
01/05/2015	31/05/2015	3,280,216	41,802	3,106,036	57%	23,636	1,758,715
01/06/2015	30/06/2015	2,879,946	8,583	2,747,358	57%	4,889	1,560,563
01/07/2015	31/07/2015	3,256,538	0	3,114,344	54%	0	1,685,580
01/08/2015	31/08/2015	3,022,432	45	2,931,070	54%	25	1,589,037
01/09/2015	30/09/2015	3,365,188	449	3,298,892	51%	232	1,659,153
01/10/2015	31/10/2015	3,609,140	103	3,571,669	51%	55	1,814,476
Remark:	* The Total LFG fed to compound, LFG fed to the flare and the power generators were compared with the LFGtotal 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 MDProject,y at next step data process, according to QA/QC.						

Table 2. Methane destruction attributes to power generation

Date		Quantity of Methane Gas fed to the power generators measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane destroyed by generator (tCH ₄)	Global warming potential of methane	Quantity of equivalent Carbon dioxide destroyed by power generation (tCO ₂)
		CH ₄ Electricity, y	D CH ₄	MD electricity, y	GWP CH ₄	MD electricity, y
01/11/2014	30/11/2014	1,636,983	0.0007168	1173	25	29,335
01/12/2014	31/12/2014	1,722,581	0.0007168	1235	25	30,869
01/01/2015	31/01/2015	1,666,012	0.0007168	1194	25	29,855
01/02/2015	28/02/2015	1,602,816	0.0007168	1149	25	28,722
01/03/2015	31/03/2015	1,723,799	0.0007168	1236	25	30,890
01/04/2015	30/04/2015	1,693,768	0.0007168	1214	25	30,352
01/05/2015	31/05/2015	1,758,715	0.0007168	1261	25	31,516
01/06/2015	30/06/2015	1,560,563	0.0007168	1119	25	27,965
01/07/2015	31/07/2015	1,685,580	0.0007168	1208	25	30,206
01/08/2015	31/08/2015	1,589,037	0.0007168	1139	25	28,476
01/09/2015	30/09/2015	1,659,153	0.0007168	1189	25	29,732
01/10/2015	31/10/2015	1,814,476	0.0007168	1301	25	32,515
Remark:	** Data in this table are aggregated from hourly results; calculation formulas are used in hourly level.					

Table 3. Methane destruction attributes to LFG flaring**Flare 1**

Date		Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)	Project emissions from flaring of the residual gas stream (tCH ₄)	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)	Quantity of methane destroyed by flaring (tCH ₄)
		CH ₄ total, y	D CH ₄		PE flare CH ₄ , y	GWP CH ₄	PE flare CO ₂ , y	MD flare, y
01/11/2014	30/11/2014	31,689	0.0007168	22.71	3.42	25	85.49	19.30
01/12/2014	31/12/2014	29,366	0.0007168	21.05	2.84	25	70.97	18.21
01/01/2015	31/01/2015	67,053	0.0007168	48.06	7.04	25	176.10	41.02
01/02/2015	28/02/2015	13,937	0.0007168	9.99	1.40	25	35.00	8.59
01/03/2015	31/03/2015	27,028	0.0007168	19.37	2.83	25	70.84	16.54
01/04/2015	30/04/2015	54	0.0007168	0.04	0.04	25	0.97	0.00
01/05/2015	31/05/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/06/2015	30/06/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/07/2015	31/07/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/08/2015	31/08/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/09/2015	30/09/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/10/2015	31/10/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
Remark:	** Data in this table are aggregated from hourly results; calculation formulas are used in hourly level.							

Flare 2

Date		Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)	Project emissions from flaring of the residual gas stream (tCH ₄)	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)	Quantity of methane destroyed by flaring (tCH ₄)
		CH ₄ total, y	D CH ₄		PE flare CH ₄ , y	GWP CH ₄	PE flare CO ₂ , y	MD flare, y
01/11/2014	30/11/2014	7,390	0.0007168	5.30	2.45	25	61.32	2.85
01/12/2014	31/12/2014	3,372	0.0007168	2.42	1.17	25	29.22	1.25
01/01/2015	31/01/2015	11,151	0.0007168	7.99	3.17	25	79.22	4.82
01/02/2015	28/02/2015	4,669	0.0007168	3.35	1.68	25	41.98	1.67
01/03/2015	31/03/2015	1,168	0.0007168	0.84	0.47	25	11.73	0.37
01/04/2015	30/04/2015	0	0.0007168	0.00	0.00	25	0.01	0.00
01/05/2015	31/05/2015	23,636	0.0007168	16.94	16.94	25	423.57	0.00
01/06/2015	30/06/2015	4,889	0.0007168	3.50	3.50	25	87.62	0.00
01/07/2015	31/07/2015	0	0.0007168	0.00	0.00	25	0.01	0.00
01/08/2015	31/08/2015	0	0.0007168	0.00	0.00	25	0.01	0.00
01/09/2015	30/09/2015	232	0.0007168	0.17	0.17	25	4.17	0.00
01/10/2015	31/10/2015	55	0.0007168	0.04	0.04	25	0.99	0.00
Remark:	** Data in this table are aggregated from hourly results; calculation formulas are used in hourly level.							

Flare 3

Date		Quantity of Methane Gas fed to the flare measured in Nm ³	Methane density expressed in tonnes of methane per cubic meter of methane tCH ₄ /m ³ CH ₄	Quantity of methane fed to flaring (tCH ₄)	Project emissions from flaring of the residual gas stream (tCH ₄)	Global warming potential of methane	Project emissions from flaring of the residual gas stream (tCO ₂ eq)	Quantity of methane destroyed by flaring (tCH ₄)
		CH ₄ total, y	D CH ₄		PE flare CH ₄ , y	GWP CH ₄	PE flare CO ₂ , y	MD flare, y
01/11/2014	30/11/2014	0	0.0007168	0.00	0.00	25	0.00	0.00
01/12/2014	31/12/2014	1,037	0.0007168	0.74	0.74	25	18.58	0.00
01/01/2015	31/01/2015	6,746	0.0007168	4.84	4.84	25	120.90	0.00
01/02/2015	28/02/2015	577	0.0007168	0.41	0.41	25	10.35	0.00
01/03/2015	31/03/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/04/2015	30/04/2015	964	0.0007168	0.69	0.69	25	17.27	0.00
01/05/2015	31/05/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/06/2015	30/06/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/07/2015	31/07/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/08/2015	31/08/2015	25	0.0007168	0.02	0.02	25	0.45	0.00
01/09/2015	30/09/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
01/10/2015	31/10/2015	0	0.0007168	0.00	0.00	25	0.00	0.00
Remark:	** Data in this table are aggregated from hourly results; calculation formulas are used in hourly level.							

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

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

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

Date		The amount of methane that have been destroyed in the project scenario (tCH ₄)	The amount of methane that have been destroyed in the absence of the project (tCH ₄)	Net methane destruction attributable to the project activity (tCH ₄)	Net methane destruction attributable to the project activity (tCO ₂)
		MD project, y	MD BL, y	MD project, y - MD BL, y	= (MD project, y - MD BL, y)*GWPCH ₄
01/11/2014	30/11/2014	1,195.53	0.00	1,195.53	29,888.24
01/12/2014	31/12/2014	1,254.21	0.00	1,254.21	31,355.13
01/01/2015	31/01/2015	1,240.04	0.00	1,240.04	31,001.04
01/02/2015	28/02/2015	1,159.16	0.00	1,159.16	28,978.89
01/03/2015	31/03/2015	1,252.53	0.00	1,252.53	31,313.17
01/04/2015	30/04/2015	1,214.09	0.00	1,214.09	30,352.32
01/05/2015	31/05/2015	1,260.65	0.00	1,260.65	31,516.17
01/06/2015	30/06/2015	1,118.61	0.00	1,118.61	27,965.28
01/07/2015	31/07/2015	1,208.22	0.00	1,208.22	30,205.59
01/08/2015	31/08/2015	1,139.02	0.00	1,139.02	28,475.54
01/09/2015	30/09/2015	1,189.28	0.00	1,189.28	29,732.02
01/10/2015	31/10/2015	1,300.62	0.00	1,300.62	32,515.40
Total 01/11/2014 – 31/10/2015 (both dates inclusive)					363,298

Table 5. Project emission from Diesel Generator

Date (inclusive)		Quantity of fossil fuel combustion (Diesel) (liters)	CO ₂ emission coefficient of Diesel (tCO ₂ /liter)	PE _{fc,j,y} emission of heat (from fossil fuel combustion) to meet project requirement (tCO ₂ e)
		$\sum FC_{i,j,y}$	COEF _{i,y}	
01/11/2014	31/10/2015	0	0.0027	0

Table 6. The net amount of electricity exported to the grid

Date (inclusive)		Total amount of electricity exported (MWh)	CO ₂ emissions intensity of the baseline source of electricity displaced (tCO ₂ e/MWh)	CO ₂ emissions (exported electricity) (tCO ₂ e)
		EL _{LFG, month}	CEF _{elec, BL, month}	
01/11/2014	31/10/2015	61,721.28	0.5742	35,440

Table 7. The net amount of electricity imported for the project purpose (project emissions)

Date (inclusive)		Total amount of electricity imported (MWh)	CO ₂ emissions intensity of the baseline source of electricity displaced (tCO ₂ e/MWh)	Average technical transmission and distribution losses for providing electricity	CO ₂ emissions (imported electricity) (tCO ₂ e)
		EL _{IM, month}	CEF _{elec, BL, month}	TDL _{grid, month}	
01/11/2014	31/10/2015	4.80	0.5742	8.90 %	3.08

Table 8. Total GHG Emission reductions of the monitoring period

Reporting Period	Net methane destruction attributable to the project activity (tCO ₂)	CO ₂ emissions intensity (imported electricity) (tCO ₂ e)	CO ₂ emissions intensity (fossil fuel combustion) (tCO ₂ e)	CO ₂ emissions intensity (exported electricity) (tCO ₂ e)	Total emission reductions (tCO ₂ e)
Total 01/11/2014 – 31/10/2015 (inclusive)	363,298	3	N/A	35,440	398,735

Table 9. Summary of GHG Emission reductions for 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)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	400,085	1,350	0	N/A	398,735	398,735

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

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	*2014 = $291,757 \times 61 / 365 = 48,759$ *2015 = $218,737 \times 304 / 365 = 182,181$ Total Monitoring Period = 239,940 (Case A)	398,735

* Estimated ex-ante emission reductions of year 2014 and 2015 (reference, section B.6.4. of the registered PDD) pro rata with the annual ex-ante emission reductions from 1st November 2014 to 31th October 2015.

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

The ex-ante emission reduction calculation included in the PDD estimates a total of 239,940 tCO₂e for the current monitoring period (calculation as per table section E.5). **398,735** tCO₂e have actually been generated during the current monitoring period which is higher than the estimated value. Any increase is due to the higher GWP (25) of methane used from 1st Jan 2013 compared to the registered PDD and higher operation performance at 22.84 hours/day compared to 19.7 hours/day (7,200 hours/day) which is given in the registered PDD.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Sindicatum Carbon Capital Ltd
Street/P.O. Box	Sindicatum Sustainable Resources Group, 80 Anson Road, #28-02,
Building	Fuji Xerox Towers
City	Singapore
State/region	
Postcode	079907
Country	Singapore
Telephone	+65 6732 8897
Fax	+65 6732 9767
E-mail	jay.mariyappan@sindicatum.com
Website	http://www.sindicatum.com
Contact person	Jay Mariyappan
Title	Managing Director, Delivery
Salutation	Mr
Last name	Mariyappan
Middle name	-
First name	Jay
Department	Delivery
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	jmariyappan@gmail.com

Annex A. Emission Reductions Calculation Sheets

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

Annex B. Flare Efficiency

Refer to page 3 of the “Tool to determine project emissions from flaring gases containing methane” version 01, the temperature in the exhaust gas of the flare is measured to determine whether the flare is operating or not. The flare efficiency for enclosed flares shall be continuously monitored and determined as per the determination set by the tool.

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

Determination of the hourly flare efficiency:

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

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

The flare efficiency shall be determined as zero only in case of there is no record of the temperature of the exhaust gas of the flare or if the recorded temperature is less than 500°C for any particular hour.

The actual default values are taken from checking the temperatures of each flare (T_{flare}) from the minute data, and that the flare is being operated within the manufacturers specifications. The manufacturer's specifications indicated above specify that the flow should be between 300-2000 Nm³/h, and temperature (T_{flare}) between 500-1200 °C.

Methane composition is measured for operational purposes at least once daily, and it has been confirmed that the methane content of the LFG entering the flare is between 25-65% as mentioned in the flare specification.

If any non-compliance of the flow meter specification i.e. flow rate lower than 300 Nm³/hr or methane composition out of range 25-65% in the minute m , flare flow rate in that minute shall be adjusted to zero for conservative approach.

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

Annex C. Monitored Laws and Regulations

Regulation	Impact	Date of application
Public Health Act 1992	Stated in PDD. Governs the operation of the landfill and provides a mechanism for regulation by local administrative body via the issuance of the license to the landfill. 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 CDM Monitoring Equipment

Parameter	Instrument Type	Manufacturer	Instrument Model	Instrument Range	Accuracy	Calibration Requirements
LFG _{total}	V-Cone Flow Meter	Kingways	KVS14IHKD23FSN 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-Cone Flow Meter	Kingways	KVS08IHKC23FSN 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-Cone Flow Meter	Kingways	KVS06IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	200 - 2000 m. ³ /hr.	±0.5%	2 yearly
		Kingways	KVS06IHKC23FSN with Rosemount 3051 CD Differential Pressure Transmitter	100 - 1000 m. ³ /hr.		
		KVS Lamways	RVM-VS06JF63N2 with Rosemount 3051 CD Differential Pressure Transmitter			
		Shanghai Kent	KVCFF150CD1N/6 with Rosemount 3051 CD Differential Pressure Transmitter			
ω _{CH4}	Infra Red Gas Analyser	Edinburgh Instruments Limited	Guardian Plus Infra-Red Gas Monitor	0 - 100%	± 2.0% Full Scale Deflection	Annually
			Guardian NG Infra-Red Gas Monitor	0 - 100%	± 2.0% Full Scale Deflection	Annually
T	Temperature Transmitter	Honeywell	STT830-171	- 58 to 500°C	± (0.3+0.005ItI) °C	Annually
		Inor	Mini iPAQ-HLP-PT100	-200to1000°C	± 0.15 % of Temperature Span	Annually
P	Absolute Pressure Transmitter	Rosemount	Model 3051TA	0 - 207 kPa	± 0.075 % of span	Annually
EL _{LFG}	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
EL _{import}	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
T _{flare}	Type N Thermocouple	Honeywell	STT830-173	0 - 1200°C	Accuracy Class II (allowable deviation ±(0.0075ItI))	Annually
		Uniflare	32-N-LTS-176-6.0-2I-TXLIN/EXI	0 - 1300°C	Accuracy Class II (allowable deviation ±(0.0075ItI))	Annually
		Inor	Mini iPAQ-HLP-Type N	0 - 1200°C	± 0.15 % of Temperature Span	Annually

Annex E. CDM Monitoring Equipment Installation & 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 EL_{LFG}, the electricity primary and secondary meter serial no. 205610126 / PEA 19936983 is the PEA's electricity meters which used for temporary during PEA's officer calibrate the permanent export meters as per the annual calibration schedule.
4. For EL_{import}, the electricity primary and secondary meter serial no. 205610065/ PEA 19936922 is the PEA's electricity meter which used for temporary during PEA's officer calibrate the permanent import meters as per the annual calibration schedule.
5. If the PEA registered no. (PEA no.) of any electricity meter used for monitoring the parameter EL_{LFG} and EL_{import} are available, the serial no. information are presented as

“Serial no. of electricity meter / PEA no. of electricity meter”

Name	Tag No.	Serial No.	Equipment Start Date	Equipment End Date	Calibration Certification Validity Period	Certificate Reference	Causes of Changing	Undertaken Person
LFG _{Total}	FT 9261 A	9061212 / 5058730	01/11/2014	18/10/2015	2013/10/22 to 2015/10/21	D13-740-JG-01	Calibration Due	PP-Thongchai
		9062918 / 5058755	18/10/2015	24/09/2017	2015/09/25 to 2017/09/24	L1505-552	On Duty	PP-Thongchai
	FT 9261 B	KT13050301399 / 02886985	01/11/2014	03/06/2015	2013/06/05 to 2015/06/04	D13-415-JG	Calibration Due	PP-Thongchai
		9061213 / 5058731	03/06/2015	21/01/2016	2014/01/22 to 2016/01/21	L1401-394	On Duty	PP-Thongchai
LFG _{Flare}	FT 9391	9062916 / 5058745	01/11/2014	03/06/2015	2013/06/25 to 2015/06/24	LC1306-087	Calibration Due	PP-Thongchai
		9061209 / 5058737	03/06/2015	10/03/2017	2015/03/11 to 2017/03/10	L1502-518	On Duty	PP-Thongchai
	FT 9491	10071510 / 5476731	01/11/2014	11/04/2015	2013/04/19 to 2015/04/18	L1304-375	Calibration Due	PP-Thongchai
		9061205 / 5058733	11/04/2015	10/03/2017	2015/03/11 to 2017/03/10	L1502-520	On Duty	PP-Thongchai
	FT 9591	10071509 / 4959893	01/11/2014	11/04/2015	2013/04/19 to 2015/04/18	L1304-374	Calibration Due	PP-Thongchai
		9061210 / 5058738	11/04/2015	10/03/2017	2015/03/11 to 2017/03/10	L1502-519	On Duty	PP-Thongchai
LFG _{Electricity}	EFT 9001	10071504 / 5476737	01/11/2014	18/10/2015	2013/12/23 to 2015/12/22	L1312-210	Calibration Due	PP-Thongchai
		9062901 / 5058746	18/10/2015	28/06/2017	2015/06/29 to 2017/06/28	L1506-271	On Duty	PP-Thongchai
	EFT 9002	9062914 / 5058767	01/11/2014	24/07/2015	2013/08/30 to 2015/08/29	LC1308-105	Calibration Due	PP-Thongchai
		9062903 / 5058756	24/07/2015	28/06/2017	2015/06/29 to 2017/06/28	L1506-272	On Duty	PP-Thongchai

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	Causes of Changing	Undertaken Person
LFG Electricity	EFT 9003	10071505 / 5476725	01/11/2014	11/04/2015	2013/04/19 to 2015/04/18	L1304-376	Calibration Due	PP-Thongchai
		1104-0159 / 02443472	11/04/2015	10/03/2017	2015/03/11 to 2017/03/10	L1502-523	On Duty	PP-Thongchai
	EFT 9004	10071506 / 4964086	01/11/2014	11/04/2015	2013/04/19 to 2015/04/18	L1304-377	Calibration Due	PP-Thongchai
		1104-0160 / 02443474	11/04/2015	10/03/2017	2015/03/11 to 2017/03/10	L1502-522	On Duty	PP-Thongchai
	EFT 9005	9062907 / 5058760	01/11/2014	03/06/2015	2013/06/24 to 2015/06/23	LC1306-090	Calibration Due	PP-Thongchai
		10071506 / 4964086	03/06/2015	29/05/2017	2015/05/30 to 2017/05/29	L1505-557	On Duty	PP-Thongchai
	EFT 9006	9062903 / 5058756	01/11/2014	03/06/2015	2013/06/24 to 2015/06/23	LC1306-089	Calibration Due	PP-Thongchai
		10071505 / 5476725	03/06/2015	28/05/2017	2015/05/29 to 2017/05/28	L1505-556	On Duty	PP-Thongchai
	EFT 9007	10071502 / 5615483	01/11/2014	11/04/2015	2013/04/19 to 2015/04/18	L1304-372	Calibration Due	PP-Thongchai
		9062913 / 5058766	11/04/2015	18/04/2015	2015/03/11 to 2017/03/10	L1502-521	On Duty	PP-Thongchai
	EFT 9008	9062901 / 5058746	01/11/2014	03/06/2015	2013/06/24 to 2015/06/23	LC1306-088	Calibration Due	PP-Thongchai
		10071502 / 5615483	03/06/2015	29/05/2017	2015/05/30 to 2017/05/29	L1505-555	On Duty	PP-Thongchai
ω _{CH4}	CH4 9261 A	31421	01/11/2014	04/04/2015	2014/04/17 to 2015/04/16	1677	Calibration Due	PP-Thongchai
		29684	04/04/2015	28/09/2015	2014/10/03 to 2015/10/02	1779	Calibration Due	PP-Thongchai
		29684	28/09/2015	27/09/2016	2015/09/28 to 2016/09/27	C1509-2277	On Duty	PP-Thongchai
T	TT 9261 A	080638016	01/11/2014	10/07/2015	2014/07/15 to 2015/07/14	14/1706	Calibration Due	PP-Thongchai
		080625360	10/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1702	On Duty	PP-Thongchai
	TT 9261 B	100208514	01/11/2014	10/07/2015	2014/07/15 to 2015/07/14	14/1705	Calibration Due	PP-Thongchai
		N1249.693062	10/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1703	On Duty	PP-Thongchai
	TT 9391	080625397	01/11/2014	10/07/2015	2014/07/15 to 2015/07/14	14/1703	Calibration Due	PP-Thongchai
		090536657	10/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1701	On Duty	PP-Thongchai
	TT 9491	080625432	01/11/2014	10/07/2015	2014/07/15 to 2015/07/14	14/1704	Calibration Due	PP-Thongchai
		080625400	10/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1704	On Duty	PP-Thongchai
	TT 9591	080638034	01/11/2014	10/07/2015	2014/07/15 to 2015/07/14	14/1702	Calibration Due	PP-Thongchai
		N1249.693066	10/07/2015	09/07/2016	2015/07/01 to 2016/07/09	15/1705	On Duty	PP-Thongchai
	ETT 9001	080638031	01/11/2014	10/02/2015	2014/02/19 to 2015/02/18	14/0312	Calibration Due	PP-Thongchai
		100208540	10/02/2015	10/07/2015	2014/07/17 to 2015/07/16	14/1788	Calibration Due	PP-Thongchai
		N1249.693067	10/07/2015	15/02/2016	2015/02/16 to 2016/02/15	15/0574	On Duty	PP-Thongchai
	ETT 9002	090536658	01/11/2014	10/02/2015	2014/02/19 to 2015/02/18	14/0313	Calibration Due	PP-Thongchai
		100208515	10/02/2015	10/07/2015	2014/07/17 to 2015/07/16	14/1785	Calibration Due	PP-Thongchai
		080638042	10/07/2015	15/02/2016	2015/02/17 to 2016/02/16	15/0571	On Duty	PP-Thongchai

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	Causes of Changing	Undertaken Person
T	ETT 9003	090543121	01/11/2014	10/02/2015	2014/02/19 to 2015/02/18	14/0314	Calibration Due	PP-Thongchai
		080638069	10/02/2015	10/07/2015	2014/07/17 to 2015/07/16	14/1782	Calibration Due	PP-Thongchai
		N1249.693065	10/07/2015	10/02/2016	2015/02/11 to 2016/02/10	15/0562	On Duty	PP-Thongchai
	ETT 9004	090536683	01/11/2014	10/02/2015	2014/02/19 to 2015/02/18	14/0316	Calibration Due	PP-Thongchai
		100208541	10/02/2015	11/07/2015	2014/07/17 to 2015/07/16	14/1789	Calibration Due	PP-Thongchai
		090543121	11/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1706	On Duty	PP-Thongchai
	ETT 9005	100098212	01/11/2014	11/02/2015	2014/02/19 to 2015/02/18	14/0309	Calibration Due	PP-Thongchai
		090543121	11/02/2015	11/07/2015	2015/02/11 to 2016/02/10	15/0563	Reading not Stable	PP-Thongchai
		090543120	11/07/2015	15/02/2016	2015/02/16 to 2016/02/15	15/0572	On Duty	PP-Thongchai
	ETT 9006	080638042	01/11/2014	11/02/2015	2014/02/19 to 2015/02/18	14/0308	Calibration Due	PP-Thongchai
		090536658	11/02/2015	10/02/2016	2015/02/11 to 2016/02/10	15/0561	On Duty	PP-Thongchai
	ETT 9007	100211940	01/11/2014	11/02/2015	2014/02/19 to 2015/02/18	14/0311	Calibration Due	PP-Thongchai
		100208537	11/02/2015	11/07/2015	2014/07/17 to 2015/07/16	14/1787	Calibration Due	PP-Thongchai
		N1249.693026	11/07/2015	09/07/2016	2015/07/10 to 2016/07/09	15/1707	On Duty	PP-Thongchai
	ETT 9008	090543120	01/11/2014	11/02/2015	2014/02/19 to 2015/02/18	14/0315	Calibration Due	PP-Thongchai
		100098212	11/02/2015	10/02/2016	2015/02/11 to 2016/02/10	15/0560	On Duty	PP-Thongchai
P	PT 9261 A	5466002	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-257	Calibration Due	PP-Thongchai
		5466080	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-539	On Duty	PP-Thongchai
	PT 9261 B	5466003	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-258	Calibration Due	PP-Thongchai
		5466089	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-540	On Duty	PP-Thongchai
	PT 9391	5466004	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-259	Calibration Due	PP-Thongchai
		5466010	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-537	On Duty	PP-Thongchai
	PT 9491	5466006	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-260	Calibration Due	PP-Thongchai
		5466007	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-536	On Duty	PP-Thongchai
	PT 9591	5466083	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-265	Calibration Due	PP-Thongchai
		5466015	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-538	On Duty	PP-Thongchai
	EPT 9001	02443480	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-252	Calibration Due	PP-Thongchai
		02300672	02/06/2015	25/05/2016	2015/05/26 to 2016/05/25	L1505-543	On Duty	PP-Thongchai
	EPT 9002	02443481	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-253	Calibration Due	PP-Thongchai
		02300673	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-544	On Duty	PP-Thongchai
	EPT 9003	02715553	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-254	Calibration Due	PP-Thongchai
		02300674	02/06/2015	25/05/2016	2015/05/26 to 2016/05/25	L1505-545	On Duty	PP-Thongchai
	EPT 9004	02777923	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-255	Calibration Due	PP-Thongchai
		02150750	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-541	On Duty	PP-Thongchai

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	Causes of Changing	Undertaken Person
P	EPT 9005	02777924	01/11/2014	02/06/2015	2014/06/03 to 2015/06/02	C1406-256	Calibration Due	PP-Thongchai
		02166915	02/06/2015	24/05/2016	2015/05/25 to 2016/05/24	L1505-542	On Duty	PP-Thongchai
	EPT 9006	02150753	01/11/2014	07/10/2015	2014/10/24 to 2015/10/23	C1410-2444	Calibration Due	PP-Thongchai
		02715553	07/10/2015	01/06/2016	2015/06/02 to 2016/06/01	C1506-120	On Duty	PP-Thongchai
	EPT 9007	02150751	01/11/2014	07/10/2015	2014/10/24 to 2015/10/23	C1410-2446	Calibration Due	PP-Thongchai
		02777923	07/10/2015	01/06/2016	2015/06/02 to 2016/06/01	C1506-121	On Duty	PP-Thongchai
	EPT 9008	02166916	01/11/2014	07/10/2015	2014/10/24 to 2015/10/23	C1410-2447	Calibration Due	PP-Thongchai
		02777924	07/10/2015	01/06/2016	2015/06/02 to 2016/06/01	C1506-122	On Duty	PP-Thongchai
EL _{LFG}	Primary	201005194/ PEA 15850695	01/11/2014	01/07/2015	2014/07/02 to 2015/07/01	-	Calibration Due	PEA
		205610126 / PEA 19936983	01/07/2015	01/07/2015	2015/05/25 to 2016/05/24	-	Temporary Meter	PEA
		201005194/ PEA 15850695	01/07/2015	30/06/2016	2015/07/01 to 2016/06/30	-	On Duty	PEA
	Secondary	212607309	01/11/2014	01/07/2015	2014/07/02 to 2015/07/01	-	Calibration Due	PEA
		205610126 / PEA 19936983	01/07/2015	01/07/2015	2015/05/25 to 2016/05/24	-	Temporary Meter	PEA
		212607309	01/07/2015	30/06/2016	2015/07/01 to 2016/06/30	-	On Duty	PEA
EL _{import}	Primary	201006718 / PEA 15852219	01/11/2014	01/07/2015	2014/07/02 to 2015/07/01	-	Calibration Due	PEA
		205610065 / PEA 19936922	01/07/2015	01/07/2015	2015/05/25 to 2016/05/24	-	Temporary Meter	PEA
		201006718 / PEA 15852219	01/07/2015	30/06/2016	2015/07/01 to 2016/06/30	-	On Duty	PEA
	Secondary	210422526	01/11/2014	01/07/2015	2014/07/02 to 2015/07/01	-	Calibration Due	PEA
		205610065 / PEA 19936922	01/07/2015	01/07/2015	2015/05/25 to 2016/05/24	-	Temporary Meter	PEA
		210422526	01/07/2015	30/06/2016	2015/07/01 to 2016/06/30	-	On Duty	PEA
T _{Flare}	TTC 9393A	080614321	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0814	Calibration Due	PP-Thongchai
		080614320	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0579	On Duty	PP-Thongchai
	TTC 9393B	090326010	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0817	Calibration Due	PP-Thongchai
		090326007	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0584	On Duty	PP-Thongchai
	TTC 9393 C	080614298	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0815	Calibration Due	PP-Thongchai
		090326012	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0583	On Duty	PP-Thongchai
	TTC 9493 A	080614290	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0812	Calibration Due	PP-Thongchai
		090326013	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0581	On Duty	PP-Thongchai

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	Causes of Changing	Undertaken Person
T Flare	TTC 9493 B	080614323	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0813	Calibration Due	PP-Thongchai
		080614289	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0580	On Duty	PP-Thongchai
	TTC 9493 C	090326006	01/11/2014	17/03/2015	2014/03/22 to 2015/03/21	14/0816	Calibration Due	PP-Thongchai
		080614306	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0576	On Duty	PP-Thongchai
	TTC 9593 A	080614379	01/11/2014	17/03/2015	2014/07/02 to 2015/07/01	14/1516	Calibration Due	PP-Thongchai
		080614373	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0577	On Duty	PP-Thongchai
	TTC 9593 B	090326009	01/11/2014	17/03/2015	2014/07/02 to 2015/07/01	14/1517	Calibration Due	PP-Thongchai
		090329527	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0578	On Duty	PP-Thongchai
	TTC 9593 C	090329544	01/11/2014	17/03/2015	2014/07/01 to 2015/06/30	14/1518	Calibration Due	PP-Thongchai
		080614305	17/03/2015	24/02/2016	2015/02/25 to 2016/02/24	15/0582	On Duty	PP-Thongchai

Annex F. Special Events Table

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
11/02/2015 08:28	12/02/2015 14:33	30:06	Stopped for Engine 1 due to Change inter cooler	No methane destruction by the Engine 1
22/11/2014 04:46	25/11/2014 17:42	84:57	Stopped for Engine 7 due to Generator reverse power / Change Turbo charger	No methane destruction by the Engine 7
06/12/2014 10:42	07/12/2014 14:33	27:52	Stopped for Engine 3 due to Change cylinder head, Linener & Piston No. 11,	No methane destruction by the Engine 3
31/12/2014 23:11	02/01/2015 12:26	37:16	Stopped for Engine 4 due to Fuel mixture temperature high / Change cylinder head No. 3,15,18	No methane destruction by the Engine 4
05/01/2015 09:25	07/01/2015 15:21	53:57	Stopped for Engine 5 due to MTN 30 K / Change engine lube oil	No methane destruction by the Engine 5
26/01/2015 09:05	28/01/2015 15:08	54:04	Stopped for Engine 6 due to MTN 30 K De-Coke	No methane destruction by the Engine 6
01/02/2015 12:00	02/02/2015 11:58	23:59	Stopped for Engine 3 due to Exh. Gas temp high cyl No.1 & 4 / Change cylinder head No.1 & 4	No methane destruction by the Engine 3
04/03/2015 02:00	06/03/2015 13:55	59:56	Stopped for Engine 2 due to Exh. Gas temperature high / Change inter cooler & Turbo charger	No methane destruction by the Engine 2
31/03/2015 11:02	01/04/2015 17:01	30:00	Stopped for Engine 4 due to Exh. Gas temp high	No methane destruction by the Engine 4
10/04/2015 15:38	11/04/2015 16:13	24:36	Stopped for Engine 4 due to operation off / Change cyl No.7	No methane destruction by the Engine 4
12/04/2015 07:06	13/04/2015 12:31	29:26	Stopped for Engine 3 due to Leanox / Waiting part for change cylinder head No.12 & 14 / Change engine lube oil	No methane destruction by the Engine 3
13/04/2015 09:44	15/04/2015 12:07	50:24	Stopped for Engine 4 due to Change cylinder head screw No.19 / Change oil engine	No methane destruction by the Engine 4
07/05/2015 16:29	08/05/2015 16:40	24:12	Stopped for Engine 4 due to Change cylinder head No. 8, 16 & 20	No methane destruction by the Engine 4
11/05/2015 11:29	12/05/2015 13:40	26:12	Stopped for Engine 1 due to Change cylinder head No.4 & 18	No methane destruction by the Engine 1
17/05/2015 09:10	18/05/2015 15:27	30:18	Stopped for Engine 1 due to Change cylinder head No.1, 14 & 20	No methane destruction by the Engine 1
01/06/2015 07:37	06/06/2015 17:06	129:30	Stopped for Engine 4 due to MTN 40 K Service	No methane destruction by the Engine 4
05/06/2015 16:02	06/06/2015 18:34	26:33	Stopped for Engine 7 due to Leanox Control / Change cylinder head No. 1 & 14	No methane destruction by the Engine 7
07/06/2015 09:27	09/06/2015 17:11	55:45	Stopped for Engine 7 due to Change inter cooler & Cylinder head No. 13	No methane destruction by the Engine 7
21/06/2015 08:44	22/06/2015 16:58	32:15	Stopped for Engine 5 due to Change inter cooler	No methane destruction by the Engine 5
27/06/2015 12:00	28/06/2015 15:36	27:37	Stopped for Engine 1 due to Exh. Gas temp high / Change cylinder head No. 5 & 19	No methane destruction by the Engine 1
28/06/2015 09:38	29/06/2015 16:58	31:21	Stopped for Engine 2 due to Fuel mixture temp high Change cylinder head No.16	No methane destruction by the Engine 2
14/07/2015 14:15	15/07/2015 14:14	24:00	Stopped for Engine 3 due to Change cylinder head No. 19 & 20	No methane destruction by the Engine 3

Annex F. Special Events Table (Cont.)

Start Time (UTC)	Finish Time (UTC)	Downtime (hr:mm)	DESCRIPTION OF EVENT	Impact on ER Calculation
18/07/2015 18:39	20/07/2015 13:44	43:06	Stopped for Engine 1 due to Change cylinder head No.6	No methane destruction by the Engine 1
19/07/2015 09:49	20/07/2015 12:04	26:16	Stopped for Engine 5 due to Change cylinder head No. 14	No methane destruction by the Engine 5
22/07/2015 16:25	23/07/2015 16:46	24:22	Stopped for Engine 1 due to Change cylinder head No. 2,7,8,9,10,11,12 & 13	No methane destruction by the Engine 1
03/08/2015 08:02	08/08/2015 15:16	127:15	Stopped for Engine 3 due to MTN 40 K	No methane destruction by the Engine 3
12/08/2015 16:38	14/08/2015 14:38	46:01	Stopped for Engine 3 due to Engine Trip - Check PF & AVR Controller / Excitation voltage test	No methane destruction by the Engine 3
17/08/2015 08:47	22/08/2015 13:27	124:41	Stopped for Engine 2 due to MTN 40 K	No methane destruction by the Engine 2
08/09/2015 08:33	09/09/2015 11:45	27:13	Stopped for Engine 6 due to Change engine lube oil / Change inter cooler	No methane destruction by the Engine 6
14/09/2015 00:45	19/09/2015 15:38	134:54	Stopped for Engine 1 due to MTN 40 K	No methane destruction by the Engine 1
16/09/2015 14:54	17/09/2015 16:08	25:15	Stopped for Engine 6 due to Change cylinder head No.13 & 14	No methane destruction by the Engine 6
25/09/2015 16:01	26/09/2015 16:44	24:44	Stopped for Engine 5 due to Mains failure	No methane destruction by the Engine 5
28/09/2015 08:47	02/10/2015 14:57	102:11	Stopped for Engine 8 due to MTN 30 K	No methane destruction by the Engine 8
12/10/2015 08:45	14/10/2015 16:34	55:50	Stopped for Engine 7 due to MTN 30 K Service	No methane destruction by the Engine 7
27/10/2015 10:11	28/10/2015 11:14	25:04	Stopped for Engine 5 due to Leanox control / Change cylinder head No. 4, 8, 15, 19 & 20	No methane destruction by the Engine 5

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
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 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		