



GOLD STANDARD VERIFICATION REPORT

— 1ST PERIODIC —

XENTOLAR HOLDINGS LIMITED

BANGKOK KAMPHAENG SAEN EAST:
LANDFILL GAS TO ELECTRICITY PROJECT

GOLD STANDARD REF. No.: GS1371

Monitoring Period: 2012-04-01 to 2013-09-30
(incl. both days)

Report No: MY-PVerGS 13/013 – 13/170

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Project:	Title:	UNFCCC-No	Registration date:	Gold Standard No.:
	Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project	3683	2013-08-27	GS1371
			Verification No.:	
			1st periodic verification	
Project Participant(s):	Non Annex 1 country:	Annex 1 country:		
	The Kingdom of Thailand	UK		
	PP from non Annex 1 country:	PP from Annex 1 country:		
	Bangkok Greenpower Co., Ltd	Xentolar Holdings Limited Sindicatum Carbon Capital Limited		
Applied methodology/ies:	Title:	No.:	Scope(s) / TA(s)	
	Flaring or use of landfill gas	ACM0001 ver. 13.0.0	13 / 13.1	
Monitoring period and monitoring report	Monitoring period (MP):		Monitoring Report:	
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Summary of Verification opinion	Xentolar Holdings Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project: "Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project", with regard to the relevant Gold Standard requirements. As a result of this verification, the verifier confirms that: ☒ all operations of the project are implemented and installed as planned and described in the validated project design document and Gold Standard additional Annexes to the project design document, ☒ the monitoring plan is in accordance with the applied approved CDM methodology, ☒ the monitoring plan as set out in the validated project design document and the validated additional Annexes has been followed, ☒ the project contributes to sustainability development ☒ the monitoring system is in place and functional. The project has generated GHG emission reductions, and ☒ the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:			
Emission reductions: [t CO_{2e}]	Verified amount			As per PDD:
	501,919			100,500/a
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Abbreviations:

CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO₂	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CL	Clarification Request
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GS	Gold Standard
GSPP	Gold Standard Passport
MP	Monitoring Plan
MR	Monitoring Report
PA	Project Activity
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet
GS	Gold Standard
TN CERT	TÜV NORD Certification GmbH
GST	Gold Standard Toolkit (GSv2.2)
GSP	Gold Standard Passport

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1. INTRODUCTION

Xentolar Holdings Limited has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 1st periodic Gold Standard (GS) verification of the project

“Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project”

with regard to the relevant requirements for Gold Standard project activities. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered Gold Standard project.

GHG data as well as sustainability aspects for the monitoring period were verified in detailed manner applying the set of requirements, audit practices and principles as required under the Validation and Verification Standard ^{/VVS/} of the UNFCCC and additional Gold Standard requirements^{/GS/}.

This report summarizes the findings and conclusions of this 1st periodic verification of the above mentioned registered Gold Standard project activity.

1.1 Objective

The objective of the verification is the review and ex-post determination by an independent entity of the GHG emission reductions and the contribution to sustainable development. It includes the verification of the:

- implementation and operation of the project activity as given in the PDD and GS Passport,
- compliance of the actual monitoring system and procedures with the provisions of the monitoring plan as a part of registered PDD, the GS monitoring matrix and the applied approved monitoring methodology,
- data given in the monitoring report by checking the monitoring records, the emissions reduction calculation and supporting evidence,
- accuracy of the monitoring equipment,
- quality of evidence,
- significance of reporting risks and risks of material misstatements.

1.2 Scope

The verification of this registered project is based on the validated project design document ^{/PDD/}, the validated Gold Standard Passport^{/GSP/}, the carbon monitoring and sustainability monitoring report ^{/MR/}, the registered GS validation report^{/VAL/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this project activity:

- Article 12 of the Kyoto Protocol ^{/KP/},
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 ^{/MA/}, and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,
- CDM Validation and Verification Standard ^{/VVS/},
- monitoring plan as given in the registered PDD ^{/PDD/},
- Approved CDM methodology.
- Gold Standard Version 2.2 ^{/GS/}
- Gold Standard Passport ^{/GSPP/}.

2. GHG PROJECT DESCRIPTION

2.1 Technical Project Description

The project activity is a fully integrated renewable energy power generation project with LFG collection system installed and operating.

The electricity generation capacity of the project is 8MW consisting of 8 units of 1.063MW gas engines exporting approx. 57,000MWh/y to the Thai national grid

The key parameters of the project are given in Table 2-1:

Table 2-1: Technical data of the project activity

Parameter / Item	Unit / Details	Value
Generator		
Type	Model	Jenbacher JGS320 engines
Electrical efficiency	%	40
Capacity	MW	1.063
No. of Genset		8
Flare		
Type	-	Enclosed Flare
Capacity	Nm ³ /h	2,000
Flare temperature	°C	500-1200
Methane combustion efficiency	%	>98
No. of Flares		3

2.2 Project Location

The details of the project location are given in Table 2-2:

Table 2-2: Project Location

No.	Project Location
Host Country	The Kingdom of Thailand
Region:	Nakhon Pathom Province
Project location address:	T. Sasimhum, A. Kamphaeng Saen, 73140
Latitude:	14° 3' 50.62" N

Longitude:	99°56'50.96" E
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2.3 Project Verification History

Essential events since the registration of the project are presented in the following Table 2-3.

Table 2-3: Status of previous Monitoring Periods

#	Item	Time	Status
1	1 st Monitoring period	2012-04-01 to 2013-09-30	Issuance Request

3. METHODOLOGY AND VERIFICATION SEQUENCE

3.1 Verification Steps

The verification consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Upload of Work Plan
- A desk review of the Monitoring Report^{/MR/} submitted by the client and additional supporting documents with the use of customised verification protocol^{/CPM/} according to the Validation and Verification Standard^{/VVS/}, and additional Gold Standard requirements
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

3.2 Contract review

To assure that

- the project falls within the scopes for which accreditation is held,
- the necessary competences to carry out the verification can be provided,
- Impartiality issues are clear and in line with the CDM and GS accreditation requirements

a contract review was carried out before the contract was signed.

3.3 Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities a verification team, consisting of one team leader and 2 additional team members, was appointed.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the Table 3-1 below.

Table 3-1: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Verification competence ⁵⁾	Host country Competence	On-site visit
☒ Mr. ☐ Ms.	Cheong, Chun Yuen (Robert)	TUV NORD Malaysia	TL	SA	☒	13.1	☒	☐	☒
☒ Mr. ☐ Ms.	Cheong, Chee Yin (Nicholas)	TUV NORD Malaysia	TM ^{A)}	LA	☒	13.1	☒	☐	☒
☒ Mr. ☐ Ms.	Vasasmith, Nattapon	TUV NORD Thailand	TM	A	☒	13.1	☒	☒	☒
☒ Mr. ☐ Ms.	Lubanga, David	TUV NORD CERT GmbH	TR ^{B)}	A	☒		☒	☐	-
☒ Mr. ☐ Ms.	Schubert, Jochen	TUV NORD CERT GmbH	TR/FA ^{B)}	SA	☒	13.1.1	☒	☐	-

¹⁾ TL: Team Leader; TM: Team Member^{A)}, TR: Technical review^{B)}; OT: Observer-Team^{B)}, OR: Observer-TR^{B)}; FA: Final approval^{B)}

^{A)} Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

^{B)} No team member: OT, TR, OR, FA

²⁾ GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ GHG auditor status (at least Assessor)

⁴⁾ Technical Area / TR Subcategory as per S01-VA000-F02 or S01-VA070-F01 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

All team members contributed to the review of documents, the assessment of the project activity and to the preparation of this report under the leadership of the team leader.

Technical experts contributed to the assessment of special aspects of the project activity, e.g. technical or host country aspects.

Statements of competence for the above mentioned team members are enclosed in annex 2 of this report.

3.4 Verification Planning

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Risk analysis and detailed audit testing planning

For the identification of potential reporting risks and the necessary detailed audit testing procedures for residual risk areas table A-1 is used. The structure and content of this table is given in Table 3-2 below.

Table 3-2: Table A-1; Identification of verification risk areas

Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing				
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including Forward Action Requests)
<i>The following potential risks were identified and divided and structured according to the possible areas of occurrence.</i>	<i>The potential risks of raw data generation have been identified in the course of the monitoring system implementation. The following measures were taken in order to minimize the corresponding risks.</i> <i>The following measures are implemented:</i>	<i>Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.</i>	<i>The additional verification testing performed is described. Testing may include:</i> - Sample cross checking of manual transfers of data - Recalculation - Spreadsheet 'walk throughs' to check links and equations - Inspection of calibration and maintenance records for key equipment - Check sampling analysis results <i>Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.</i>	<i>Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.</i>

The completed table A-1 is enclosed in Annex 1 (table A-1) to this report.

Project specific periodic verification checklist

In order to ensure transparency and consideration of all relevant assessment criteria, a project specific GS verification protocol has been developed. The protocol shows, in a transparent manner, criteria and requirements, means and results of the verification. The verification protocol serves the following purposes:

- It organises, details and clarifies the requirements a GS project is expected to meet for verification
- It ensures a transparent verification process where the verifying DOE documents how a particular requirement has been proved and the result of the verification.

The basic structure of this project specific verification protocol for the periodic verification is described in Table 3-3.

Table 3-3: Table A-2; Structure of the project specific periodic verification checklist

Table A-2: Periodic verification checklist				
Checklist Item	Reference	Verification Team Comments	Draft Conclusion	Final Conclusion
<i>The checklist items in Table A-2 are linked to the various requirements the monitoring of the project should meet. The checklist is organised in various sections as per the requirements of the topic and the individual project activity. It further includes guidance for the verification team.</i>	<i>Gives reference to the information source on which the assessment is based on.</i>	<i>The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the verification team and how the assessment was carried out. The reporting requirements of the VVS shall be covered in this section.</i>	<i>Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft verification stage.</i>	<i>In case of a corrective action or a clarification the final assessment at the final verification stage is given.</i>

The GS periodic verification checklist (verification protocol) is the backbone of the complete verification starting from the desk review until final assessment. Detailed assessments and findings are discussed within this checklist and not necessarily repeated in the main text of this report.

The completed verification protocol is enclosed in Annex 1 (table A-2) to this report.

3.5 Desk review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- the registered version of the PDD, additional Annexes and further attached documents, including the monitoring plan ^{/PDD/},
- the registered GS validation report ^{/VAL/},
- the last revision of the carbon and sustainability monitoring report ^{/MR/}, including the claimed emission reductions for the project
- documentation of previous verifications ^{/VER/}
- the emission reduction calculation spreadsheet ^{/XLS/} (if applicable).
- GS Passport ^{/GSP/}

Other supporting documents, such as publicly available information on the Gold standard website, on the UNFCCC website and background information were also reviewed.

3.6 On-site assessment

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. Changes to the key sustainable development indicators and the achievement and implementation of mitigation / compensation measures are other integral parts of the on-site assessment. The main tasks covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.
- Possibility of leakage was also checked.

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of Bangkok Greenpower Co., Ltd and Sindicatum Sustainable Resources (project consultant) including the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-4.

Table 3-4: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Projects & Operations Personnel Zenith Green Power Co., Ltd. 2. Consultant	- General aspects of the project - Technical equipment and operation - Changes since validation / previous verification - Monitoring and measurement equipment - Remaining issues from validation/ previous

Interviewed Persons / Entities	Interview topics
Sindicatum Sustainable Resources	- verification - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG emission reduction calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Gold Standard Requirements - GS monitoring parameters

The list of interviewees is included in chapter 7.4.

3.7 Draft verification reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification protocol is completed. This protocol together with a general project and procedural description of the verification and a detailed list of the verification findings form the draft verification report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

3.8 Resolution of CARs, CLs and FARs

Nonconformities raised during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation or previous verifications requiring actions by the project participants to be verified during verification have not been resolved.

The verification team uses the term Clarification Request (CL), which is issued if:

- information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the monitoring and reporting require attention and / or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification pl. refer to chapter 4.

3.9 Final reporting

Upon successful closure of all raised CARs and CLs the final verification report including a positive verification opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative verification opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

3.10 Technical review

Before submission of the final verification report a technical review of the whole verification procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the verification team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

3.11 Final approval

After successful technical review an overall (esp. procedural) assessment of the complete verification will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the verification team will submit the verification report including the verification opinion to the client via e-mail and to Gold Standard via the GS registry.

4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report^{/MR/}, the calculation spreadsheet^{/XLS/}, PDD^{/PDD/}, the Validation Report^{/VAL/} and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

Table 4-1: Summary of CAR, CL and FAR

Verification topic	No. of CAR	No. of CL	No. of FAR
A – Description of project activity	3	0	0
B – Implementation of project activity	1	0	0
C – Description of monitoring system	0	0	0
D – Data and parameters	8	0	0
E - Calculation of Emission Reductions	3	0	0
Sustainable Indicator	1	0	0
SUM	16	0	0

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the verification team. For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

Finding	A1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0: The UNFCCC registration date and reference is not stated at the cover page.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The UNFCCC registration date and reference are now stated on the cover page of the revised MR.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2 cover page is corrected to include UNFCCC registration date and reference number. CLOSED		

Finding	A1
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	A2
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section A. The followings are not stated in the MR: 1. GS version 2. Project icon 3. Scale 4. Type
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The information stated above has now been added to section A.6 of the revised MR.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 section A.5 has added the GS version, project icon, scale and type in accordance to GS toolkit. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	A3
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section A.5: According to the GS registration review, the crediting period is from 2012-04-01 to 2018-01-20 which is not stated clearly.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The GS crediting period in section A.5 of the revised MR has now been revised to make more clarity.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section A.5: The end date of the crediting period for GS is added as 2018-01-20. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	B1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Section B.2.4: The project activity has a post registration changes PRC-3462-001 approved by UNFCCC on 2013-02-08 was not stated.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The post registration changes PRC-3462-001 approved by UNFCCC on 2013-02-08 are now stated in section B.2.4 of the revised MR.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2 section B.2.4 is updated to include the PRC-3462-001 approved by UNFCCC EB on 2013-02-08. CLOSED		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding	D1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1, Section D.1: The following ex-ante parameters are not stated 1. NCV_{CH4} 2. η_{PJ} 3. $SPEC_{flare}$ 4. $\Phi_{default}$ 5. OX 6. F 7. $DOC_{f,default}$ 8. $MCF_{default}$ 9. DOC_j 10. k_i		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The item 1 to 2 and 4 to 10 are now stated in table 1 of Annex H. Data and Parameters not monitored of the revised MR. Moreover, the item 3, $SPEC_{flare}$ has been moved from section D.2 to section D.1 of the revised MR.		

Finding	D1
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section D.1: Refer the list of ex-ante parameters listed above are not included in Section D.1: - Parameters NCV_{CH_4}, η_{PJ}, $\Phi_{default}$, $F_{DOC_{f,default}}$, $MCF_{default}$, DOC_j and k_j are used for ex-ante calculation of the baseline emissions for $BE_{CH_4,SWDS,y}$. Therefore omitting as ex-ante parameter in Section D.1 is acceptable. CLOSED $SPEC_{flare}$ is removed as monitored parameter and added as ex-ante parameter in accordance to the registered GS PDD. CLOSED - Parameter OX is required for calculation of baseline emission of methane from the SWDS. Therefore removal is incorrect. OPEN
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	MR version 3.0 has now been revised according to DOE assessment stated above. The parameter OX has been included in section D.1 of the revised MR
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 3.0 Section D.1: Parameter OX is added back to section D.1 as ex-ante parameter since the data is required for the baseline emission of methane from SWDS. CLOSED.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D2
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Section D.2, parameter Management of SWDS: - The measured/calculated/default is incorrect. - The source of data is not stated - Value(s) of monitored parameter. Section B.2 Post registration changes is not applicable. - Monitoring equipment is incorrect
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Parameter "Management of SWDS" has now been revised according to findings stated above in section D.2 of the revised MR.

Finding	D2
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0, Section D.2, parameter Management of SWDS: 1. The measured/calculated/default is corrected to NA which is correct since cannot be measured or calculated and no default value available. 2. The source of data is added and according to the registered PDD. 3. Value(s) of monitored parameter the sentence is deleted since there is no value. 4. There is no monitoring equipment and corrected.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D3
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section D.2, Parameter EG _{EC,y} : The methodology number is incorrect.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The methodology number of parameter EG _{EC,y} has been corrected in section D.2 of the revised MR.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section D.2, Parameter EG _{EC,y} : The methodology number is corrected and in accordance to the applied methodology. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D4
Classification	☒ CAR ☐ CL ☐ FAR

Finding	D4
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Section D.2, Parameters $V_{t,wb}$ and $V_{t,db}$: 1. These 2 parameters measured the volume of LFG captured and combusted at the flares and gas engines. The source of data and monitoring equipment shall include the 3 measuring points. 2. The monitoring instruments for these 2 parameters consist of 2 components the V-cone flow meter and differential transmitters. Therefore, the information for the 2 components are required to be included in Annex E. 3. The validity date for instrument tag, FT 9261A is incorrect. 4. The date of calibration for the following temperature transmitters is incorrect. Tag: ETT9001, serial number: 090536658 Tag: ETT9005, serial number: 090543121 Tag: ETT9006, serial number: 090536683 Tag: ETT9007, serial number: 090543120 5. The certificate number for temperature transmitter Tag ETT9008, serial number: 100211940 is incorrect. 6. The certificate numbers for following pressure transmitters are incorrect. Tag: EPT9001, serial number: 02443480 Tag: EPT9002, serial number: 02443481 Tag: EPT9003, serial number: 02715553

Finding	D4
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The MR version 2.0, parameter $V_{t,db}$ has now been revised according to the findings above as follows; 1. The source of data and monitoring equipment have now revised to include the 3 measuring points i.e. total gas fed to power plant, gas fed to generator sets and gas fed to flares, in section D.2 of the revised MR. 2. The serial number of measuring instruments FT9261A, FT9261B, EFT9001 to EFT9008 and FT9393 to FT9593 have been revised to present both V-cone flow meter and differential pressure transmitter serial number as Annex E of the revised MR. 3. The validity date for instrument tag, FT9261A is now corrected. 4. The date of calibration for the following temperature transmitters have been revised in Annex E of the revised MR: Tag: ETT9001, serial number: 090536658 Tag: ETT9005, serial number: 090543121 Tag: ETT9006, serial number: 090536683 Tag: ETT9007, serial number: 090543120 5. The certificate number for temperature transmitter Tag ETT9008, serial number: 100211940 has now been corrected in Annex E of the revised MR. 6. The certificate number for following pressure transmitters have now been corrected in Annex E of the revised MR. Tag: EPT9001, serial number: 02443480 Tag: EPT9002, serial number: 02443481 Tag: EPT9003, serial number: 02715553 Furthermore, parameter $V_{t,wb}$ has now been moved from section D.2 to table 2 of Annex H. Data and Parameters not monitored of the revised MR.

Finding	D4
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0, Section D.2, Parameters $V_{t,wb}$ and $V_{t,db}$: Parameter $V_{t,wb}$ is no used since the gas is considered dry. 1. The source of data is incorrect and monitoring equipment is not included. OPEN 2. Serial numbers for measuring instruments FT9261A, FT9261B, EFT9001 to EFT9008 and FT9393 to FT9593 have been added in Annex E of the revised MR. CLOSED 3. The validity date for instrument tag, FT 9261A is corrected and according to the calibration report. CLOSED 4. The date of calibration for the temperature transmitters listed in the finding are corrected and in accordance to calibration report. CLOSED 5. The certificate number for temperature transmitter Tag ETT9008, serial number: 100211940 is corrected and according to the calibration report. CLOSED. 6. The certificate numbers for listed pressure transmitters in the finding are corrected according to the calibration reports. CLOSED
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	MR version 3.0, Parameter $V_{t,db}$ has been revised according to DOE assessment stated above. 1. The source of data has been corrected to include 3 monitoring points i.e. total gas collected, total gas fed to generator sets and gas fed to flares and monitoring equipment information, in section D.2 of the revised MR.
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 3.0 Section D.2, Parameter $V_{t,db}$: 1. The source of data is corrected as stated above respond and monitoring equipment information is corrected in reference to Annex E of the MR. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D5
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1, Section D.2, parameter $V_{i,t,db}$: 1. The date of calibration for gas analyser serial number 29690 is incorrect. 2. There is a delay in calibration for gas analyser serial number 29690, therefore MPE according to §238 VVS version 3.0 applies

Finding	D5
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The MR version 2.0 has now been revised according to the findings above as follows; 1. The date of calibration for gas analyser serial number 29690 has now been corrected regarding the calibration certificate no. C1301-1053. 2. According to §238 VVS version 05.0, clause (a) is applied for the delay in calibration of gas analyser serial number 29690. The maximum permissible errors specified by the manufacturer's specification is applied since the maximum error of the analyser is 0.8% (shown in the calibration report) which is smaller than the maximum permissible error of the analyser at 2.5% (according to the manufacturer's specifications). Therefore, a 2.5% error is subtracted from the measured values during 24/01/2013 23:59 – 25/01/2013 23:59 (UTC+07:00). A separate calculation spreadsheet is also provided for reference.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0, Section D.2, parameter $V_{i,t,db}$: 1. The calibration date for gas analyser serial number 29690 is corrected to according to the date in the calibration certificate. 2. The MPE of -2.5% is applied to the measured value from 2013-01-24 to 2013-01-25 in the ER spreadsheet. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D6
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section D.2: The following parameters are not included 1. $C_{H_2O,t,db,n}$ 2. $P_{H_2O,t,sat}$ 3. $V_{k,t,db}$ 4. $V_{k,t,wb}$ 5. $w_{C,i}$ 6. $\rho_{i,y}$
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The parameters stated above are now presented in table 2 of Annex H. Data and Parameters not monitored of the revised MR.

Finding	D6
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section D.2: The justifications for the listed parameters in the finding above were made in Annex H of revised MR. - Parameters $C_{H_2O,t,db,n}$ and $P_{H_2O,t,sat}$. The temperature of the biogas measured is below 60°C as shown in the records. Therefore the omitting of the monitoring is acceptable. - Since Option A of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 02.0.0) is applied since the gas measured is below 60°C, therefore omitting the monitoring of parameters $V_{k,t,db}$, $V_{k,t,wb}$, $w_{C,l}$ and $p_{i,y}$ is acceptable. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D7
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section D.2, Parameter $FC_{i,j,y}$: The monitoring equipment is not stated.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The monitoring equipment of parameter $FC_{i,j,y}$ has now been revised to “rulers” in section D.2 of the revised MR.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section D.2, Parameter $FC_{i,j,y}$: The monitoring equipment is added in the parameter table. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	D8
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0 Section D.2, Parameter $NCV_{i,y}$: Refer additional comments, the tool for Option B is not stated.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Additional comment of $NCV_{i,y}$ has been revised to refer to Option B of the “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” (version 02) for more clarity.

Finding	D8
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0, Section D.2, Parameter $NCV_{i,y}$: Correction has been made to the tool referred for Option B. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	E1
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1 ER spreadsheet: The summary report of 08-2013 to 09-2013 is not consistent with the data.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The summary report of ER spreadsheet has now revised on 08-2013 to 09-2013 to consistent with the data.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 1, ER spreadsheet: The summary report of 08-2013 and 09-2013 is corrected and consistent with the data. CLOSED.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	E2
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Section E.1: Calculations of baseline emissions: 1. The unit applied for the CH₄ density is incorrect. 2. The electricity exported and imported is not consistent with the invoices.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The MR version 2.0 has now been revised according to the findings above as follows; 1. The applied unit of CH₄ density in the revised MR and ER spreadsheet are now presented correctly as in section E of the revised MR and in ER spreadsheet. 2. The electricity exported and imported has now been corrected in accordance with the invoices.

Finding	E2
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section E.1: Calculation of baseline emissions. 1. The unit applied of CH₄ density is not corrected. OPEN 2. Electricity exported and imported corrected and consistent with the invoices. CLOSED
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	MR version 3.0 Section E.1 has been revised according to DOE assessment stated above. 1. The unit applied of CH₄ density has now been corrected according registered PDD.
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 3.0 Section E.1: 1. The unit for CH₄ density is corrected and in accordance to the registered PDD. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	E3
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Section E.5: The number of days for year 2012 is not stated.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The number of days in GS crediting period of the project for year 2012 is now stated in section E.5 of the revised MR.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0 Section E.5: Although the number of days for year 2012 is stated but the number of days for the year is incorrect. OPEN
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The number of days for year 2012 is now stated in section E.5 of the revised MR. The explanation text also added to clarify the different between estimated ex-ante calculation calculated by the number of days in the year and the number of months in the year.

Finding	E3
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 3.0 Section E.5: The number of days for year 2012 is corrected as 366 days. The comparison is in days and not months as compared to the GS registered PDD. The ex-ante CERs is higher based on the numbers days and therefore is correct for the comparison with ex-post since monitoring is in days and not months. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	SI1
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	MR version 1.0, Annex 5, Indicator 1: 1. Refer the air emission reduction calculation spreadsheet, the SO₂ and NO_x emission factor applied to determine the emission reductions are not according to the test results. 2. The reference for the baseline emission factor for SO₂ and NO_x is not stated.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The MR version 2.0 has now been revised according to the findings above as follows; 1. The SO₂ and NO_x emission factor applied in the calculation spreadsheet have now been corrected according to the test results. 2. The reference for the baseline emission factor for SO₂ and NO_x is now stated.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	MR version 2.0, Annex 5, Indicator 1: 1. The emission factors for SO₂ and NO_x are corrected and according to the test results. 2. The reference for the baseline emission factor for SO₂ and NO_x is added. CLOSED
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

5. SUMMARY OF VERIFICATION ASSESSMENTS

The following paragraphs include the summary of the final verification assessments after all CARs and CRs are closed out. For details of the assessments pl. refer to the discussion of the verification findings in chapter 4 and the verification protocol (Annex 1).

5.1 Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity.

Table 5-1: Project Parties and project participants

Characteristic	Party	Project Participant
Non-Annex 1	The Kingdom of Thailand	Bangkok Greenpower Co., Ltd
Annex 1	UK	Xentolar Holdings Limited Sindicatum Carbon Capital Limited

5.2 Implementation of the project

The onsite assessment was carried out on 2013-11-13 till 2013-11-14. On the basis of this site visit and the reviewed project documentation it can be confirmed that with regards to the realized technology, the project equipment, as well as the monitoring and metering equipment, the project has been implemented and operated as described in the registered GSPDD and GS Passport.

During the onsite assessment it could be observed that the project activity is to capture Landfill Gas (LFG) at the Bangkok Kamphaeng Saen East landfill and generate electricity for export to the Thai National Grid. The project activity was registered as a CDM project on 2011-01-21, registration reference 3462.

A post registration changes was submitted for a change of monitoring plan and approved by UNFCCC EB on 2013-02-08.

The project activity applies the renewable 7 years crediting period with the first crediting period from 2011-01-21 till 2018-01-20. The monitoring period for this reporting is from 2012-04-01 till 2013-09-30. The LFG recovery and flaring system was fully commissioned since 2010-06-25. The gas engines were commissioned on stages where the first engine was commissioned and started operation since 2010-05-18 and the last engine (engine number 8) was commissioned and operation started since 2012-01-27. Therefore the project activity was considered to be fully commissioned as from 2012-01-27.

The equipment installed for the project activity is as per Table 2-1 above. During the onsite assessment, the verification team has checked the gas engines and generators, flaring systems, gas collection systems and other peripheral equipment to confirm that the implementation of the project and the equipment specification were in accordance with the description in the registered GSPDD.

The electricity generated is exported to the Thai National Grid. The verification team has checked the invoices to confirm the exported electricity. The project activity also imports electricity from the Thai Grid during the non-operational hours. In the case of grid failure, a diesel engine genset will be used to start up the plant.

The monitoring equipment used to monitor the respective parameters stated in the MR was checked. It can be confirmed that all the equipment used are consistent with the registered GSPDD. The type and specification of the equipment were checked against the specification sheet to confirm the suitability and accurate of measuring the respective parameters. The following were equipment used for the respective measurements:

Parameter	Instrument Type	Manufacturer	Instrument Model	Instrument Range	Accuracy	Calibration Requirements
$V_{t,db}$ (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
$V_{t,db}$ (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-VS08IJF63N2 with Rosemount 3051 CD Differential Pressure Transmitter	250 - 2500 m. ³ /hr.	±0.5%	2 yearly
$V_{t,db}$ (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			
$V_{i,t,db}$	Infra Red Gas Analyser	Edinburgh Instruments Limited	Guardian Plus Infra-Red Gas Monitor	0 - 100%	$\pm 2.5\%$ Full Scale Deflection	Annually
T_t	Temperature Transmitter	Honeywell	STT830-171	- 58 to 500°C	(0.3+0.005ltl)°C	Annually
P_t	Absolute Pressure Transmitter	Rosemount	Model 3051TA	0 - 207 kPa	$\pm 0.075\%$ of span	Annually
$EG_{PY,y}$	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
$EG_{EC,y}$	Electric Meter	EDMI	EDMI-Mk6 (Genius)	-	Class 0.5S	Annually
TEG_m	Type N Thermocouple	Honeywell	STT830-173	0 - 1200°C	Accuracy Class II (allowable deviation $\pm(0.0075ltl)$)	Annually
		Uniflare	32-N-LTS-176-6.0-2I-TXLIN/EXI	0 - 1300°C	Accuracy Class II (allowable deviation $\pm(0.0075ltl)$)	Annually
$Flame_m$	UV Flame Detector	Honeywell	C7027A	-18 to 102°C	No requirement	No requirement

All parameters are continuously monitored, the data captured every minute and recorded in the SCADA system. The verification team has checked the SCADA system data archive to confirm the data applied are real-time.

During the monitoring period, there were no changes/replacements of the major equipment. The verification team had checked the operation and downtime records to confirm that there is no change or replacement of generating equipment. However, during the monitoring period, monitoring equipment was change / exchanged for calibration and due to faulty. The operation and downtime records were reviewed to confirm the changes. The verification team has checked the specification sheet to confirm the replaced equipment are the same as the ones being replaced. The replaced equipment has the same accuracy and monitoring range.

The calibrations for all monitoring meters/instrument were valid within the monitoring period. The calibration reports for all meters covering the reporting period were verified for the frequency and traceability to third party calibration laboratory. The calibration report for electricity meters which monitors the export and import of the electricity were verified for the frequency and traceability to the Provincial Electricity Authority (PEA) standard.

The summary of the calibration report is provided in Annex E of the MR. The verification team has checked the calibration certificates to ensure that validity of the calibration. The calibration is conducted according to international standard. During this monitoring period, all calibration for electricity meters, flow meters, pressure sensors, temperature sensors, thermocouples were within the validity period except

one methane analyser calibration was delayed. A finding was raised and a permissible error of the instrument accuracy was applied.

5.3 Project history

During the validation the validating DOE for GS and comments from the GS during review of the PDD and Passport, might have raised issues that could not be closed or resolved during the validation stage. For this purpose FARs might have been raised. No such issues were identified for this project.

Furthermore as this is the 1st GS periodic verification no issues from former verifications are to be considered.

Post registration changes applicable for this monitoring period have been observed during the monitoring period. Refer to Annex 3 attached to this verification report.

The below parameters are not monitored since the gaseous stream are measured at the temperature of below 60°C and Option B of the tool to calculate project emissions for usage of fossil fuel , therefore are not applicable to the project activity.

Parameter	Description	Verification Opinion
$C_{H_2O,t,db,n}$	Moisture content of the gaseous stream at normal conditions, in time interval t	The temperature of the gaseous stream (T_t) is below 60°C as showed in the raw data spreadsheet and is considered as dry gas. Therefore it is not applicable for this monitoring period and omitted from monitoring is considered acceptable. The omission will not affect the baseline and project emissions.
$P_{H_2O,t,sat}$	Saturation pressure of H_2O at temperature T_t in time interval t	Refer to above justification
$V_{t,wb}$	Volumetric flow of the gaseous stream in time interval t on a wet basis	Option A of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 02.0.0) is chosen to monitor the volumetric flow of the gaseous stream which is considered as dry based on the temperature is lower than 60°C measured by the temperature transmitter. Therefore, the omission for not monitoring this parameter for this monitoring period is considered acceptable. The omission has will not affect the baseline and project emissions.
$V_{i,t,wb}$	Volumetric fraction of greenhouse gas i in a time interval t on a wet basis	Option A of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 02.0.0) is chosen to monitor the volumetric flow of the gaseous stream which is considered as dry based on the temperature is lower than 60°C measured by the temperature transmitter.

		Therefore, the omission for not monitoring this parameter for this monitoring period is considered acceptable. The omission will not affect the baseline and project emissions.
$V_{k,t,wb}$	Volumetric fraction of gas k in the gaseous stream in time interval t on a wet basis	Refer above justification
$w_{C,i}$	Weighted average mass fraction of carbon in fuel type i in year y	Option B of the “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” (version 02) equation is applied to calculate emissions due to combustion of fossil fuel. This parameter is used in Option A equation to calculate emissions due to combustion of fossil fuel. Therefore, this parameter is not used and will not be monitored for the current monitoring period. The omission from monitoring will not affect the project emissions.
$\rho_{i,y}$	Weighted average density of fuel type i in year y	Refer to above $w_{C,i}$ justification

Refer to CAR D6 raised and closed out.

In addition, the ex-ante parameter, NCV_{CH_4} : Net calorific value of methane at reference conditions, is deleted from section B.6.2 since there is no heat generation by the project activity. The project activity has submitted a post registration changes during the 3rd CDM monitoring report. The change is to include a backup diesel generator to support the auxiliary needs whenever it is required (e.g. Grid failure and required to start plant) and the PDD version 9 dated 2012-07-02 was approved by UNFCCC EB on 2013-02-08.

5.4 Compliance with the monitoring plan

The monitoring system and all applied procedures are in compliance to the registered GS monitoring plan approved methodology ACM0001 version 13.0.0 and its relevant tools. Evidence was available to the verification team to check the compliance of the monitoring plan and GS monitoring matrix.

The reporting procedures reflect the requirements of the monitoring plan. All relevant data is stored during the whole monitoring period.

All records needed for monitoring are archived in line with the requirements of the registered GSPDD. Interview and document check during the onsite assessment confirmed that all data are properly filed in hard and soft copy.

The project proponent has kept data in hard copies and these data are available at the project site. Additionally, soft copies data are kept at an online server.

No significant lack of evidence and missing data were detected during the document check. The data of the monitored parameters are captured and recorded using SCADA system. The raw data from the SCADA system were checked against the

data applied in the emission reduction calculations. No manipulation of data could be found. It is the verification team opinion that the data are real measured data.

5.5 Compliance with the sustainability development Indicator

The SD indicators as per the GS matrix are monitored and reported appropriately and cross-verified by means of desk review of supporting documents, interviews with the PP and relevant stakeholders. The monitoring system and all applied procedures are in compliance to the sustainability monitoring plan in the GS Passport, registered GSPDD and the Gold Standard principles.

Sustainable Development Indicators are as below:

Indicator	Parameter	Value	Verification Opinion
Air Quality	SO ₂ reductions NO _x reductions Stack emissions below local/IEE requirements	0.346 tSO ₂ 21.78tNO _x SO ₂ – 0.7875ppm NO _x – 68.685ppm	The air quality tests are conducted by an accredited 3rd party. The test results are applied to calculate the SO₂ and NO_x emissions for the amount of electricity exported to the national grid. ^{/SI1/} The baseline emissions factors are applied to calculation the emissions for the same amount of electricity exported and when compared the emissions from the project activity are lower. In addition, stack emissions are lower than the host country requirements for SO₂ is 60ppm and NO_x is 200ppm. Thus, the emissions from the PA have improved the air quality as compared to the baseline emissions caused by combustion of mixed fossil fuel in the grid to generate power.
Other pollutants	Noise Level	Eq. sound level (24hr): 68.6 – 69/2 dBA Max. sound level: 82.1 – 84.dBA Nuisance Noise: 6.7 – 7.3dBA	The noise tests are conducted based on the host country requirements. ^{/SI2/} Based on the national noise level requirements, • sound level for 24 hour is 70dBA; • max sound level is 115dBA; • Nuisance Noise is 10dBA The gas engines are installed containers, therefore, the company has taken necessary precautions to ensure the noise level is kept below the national requirements. During the onsite visit, the local stakeholders ^{/IM04/} were interviewed and there were no complaints on noise created by the gas engines.

Indicator	Parameter	Value	Verification Opinion
Quality of Employment	a) Relevant health and safety precaution taken, and b) Training given to staff to develop skills	No. of trainings performed – 51	There are 51 trainings conducted out of which 18 are on health and safety. ^{/SI3/} During the onsite visit, the landfill operator ^{/IM03/} was interviewed and confirmed he has attended the health and safety training provided by the company.
Quantitative employment and income generation	Number of jobs created for the operation of the PA	16	The PA has created 16 permanent jobs and locals are employed to operate the PA. Thus, improve the local employment and income generation to the community. ^{/SI4/} The employees ^{/IM01/IM03/} and local stakeholders ^{/IM04/} are interviewed to confirm several of the operators are from the local communities. According to the landfill operator ^{/IM03/} , the company provides good benefits and he has been working since 2009 when the project started.
Technology transfer and technological self-reliance	Number of visitors from other organisations	211	The number of visitors to the project activity from the start of the project till end of this monitoring period was 211. ^{/SI5/} For this monitoring period, there are 137 visitors. Thus, the project activity has created interest to the public both from the host country and foreign to visit to learn about the technology in extracting LFG for electricity generation. The visitor attendance records were reviewed which shows the foreign visitors are from countries within the region, EU, USA and Africa.

For further details concerning the sustainability indicators please refer to Annex 1, section D.3 of this report.

However, refer to CAR SI1 raised and closed out.

5.6 Compliance with the monitoring methodology

The monitoring system is in compliance with the applied monitoring methodology (ACM0001 version 13.0.0).

5.7 Monitoring parameters

The monitoring parameters as per the GSPDD monitoring plan:

During the verification all relevant monitoring parameters as listed in chapter B.7.1 of the registered GSPDD have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy, and applied QA/QC measures. The results as well as the verification procedure are described parameter-wise in the project specific verification checklist.

All monitoring values provided in the monitoring plan were cross-checked against the monitored data. All relevant evidences were checked during the onsite assessment. All evidences are clearly identifiable and verified to be correct.

All necessary monitoring instruments are installed. The measuring devices were in good condition and found to be accurate and reliable. All required instruments are installed and operating procedures for the same have been implemented in an appropriate manner.

There were several findings raised with regards to the monitoring parameters (as provided in Chapter 4 of this report). After appropriate corrections were carried out by the project participant it can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.

Calibration records of all installed monitoring equipment were checked to confirm that all equipment covering this monitoring period were calibrated according the frequency as per the registered GSPDD and traceable to manufacturer requirement. The calibration records of all installed monitoring equipment were checked and found as valid within the monitoring period except a delay in calibration for 1 unit methane analyser.

Carbon data and parameters

During the verification all relevant monitoring parameters as listed in the GSPDD have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. The results as well as the verification procedure are described parameter-wise in the project specific verification checklist in Section D.2 of Annex I of this report.

After appropriate corrections were carried out by the project participant it can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.

Refer CAR D2, CAR D3, CAR D4, CAR D5, CAR D7 and CAR D8 raised and closed out.

5.8 Contribution to sustainable development

During the verification, the SD indicators were verified with regards to the appropriateness that will contribute to sustainable development.

It was evidenced that the project mainly contributes to:

- Air quality;
- Other pollutants;
- Quality of employment;
- Quantitative employment and income generation;
- Technology transfer and technological self-reliance.

For further details concerning the sustainability indicators please refer to Annex G of MR, section 5.5 above and assessment at Section D.3, Annex 1 of this report.

5.9 Monitoring report

A Gold Standard Monitoring Report along with relevant supporting documents was submitted to the verification team by the project participants. These documents form the basis for the verification opinion of TÜV NORD.

During the verification, mistakes and needs for clarification were identified. The PP has carried out the requested corrections so that it can be confirmed that the Monitoring report is complete and transparent and accordance with the registered GSPDD, GS Passport and relevant GS requirements.

Refer CAR A1, CAR A2, CAR A3 and CAR B1 were raised and closed out.

5.10 Sampling

5.10.1 Implementation of the sampling plan

No sampling was required to determine the monitored parameters. The relevant parameters are monitored in accordance to the approved revised PDD section B.7.1, applied methodology and relevant tools.

5.10.2 Sampling approaches during verification

During the course of the verification team has applied a sampling for the monitoring parameters $EG_{PJ,y}$, $V_{t,db}$, $V_{i,t,db}$, T_i , P_i and TEG_m since the data for these parameters are interlinked in the ER calculations.

The sampling considered for these parameters were due to the large bulk of data. The sampling selected was to provide a 90% confidence level with a margin error of 5%. The number of days for this monitoring period was 548 days therefore a sampling of 182 days was taken based on applied link <http://www.raosoft.com/samplesize.html>.

The data in the ER spreadsheet were cross-checked with the raw data to confirm the data applied in the ER calculations are considered correct.

The measured parameters, EL_{LFG} , Operation of the energy plant and $FC_{i,j,y}$ are 100% checked during onsite to confirm the correctness.

5.11 ER Calculation

During the verification mistakes in the ER calculation were identified. Corresponding CAR E1 and CAR E2 were raised. A revised ER calculation was prepared by the PP and presented to the verification team. All raised issues were addressed appropriately so that all corresponding CARs could be closed out. Thus it is confirmed that the ER calculation is overall correct.

Ex-ante Data Applied

The ex-ante data stated in section D.1 of MR are in accordance with section B.6.2 of the registered GSPDD.

1. GWP_{CH_4} : 21 for 1st commitment period and 25 for 2nd commitment period.
2. Thai grid emission factor: 0.5113tCO₂e/MWh.
3. $SPEC_{flare}$: Manufacturer's flare specifications for temperature and flow rate
4. OX: Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste).

Refer to CAR D1 finding raised and closed as regards to ex-ante parameter that are not included in section D.1 of MR.

Equations Applied:

The equations applied in the calculations are in accordance with the applied methodology ACM0001 version 13.0.0 and registered GSPDD. All equations are clearly visible in the MR and the ER calculation spreadsheet.

Baseline Emissions:

The equation used to determine the baseline emission stated in the monitoring report is consistent with the registered GSPDD where:

$$BE_y = BE_{CH_4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$$

Where:

BE_y = Baseline emission in year y (tCO₂e)

$BE_{CH_4,y}$ = Baseline emission of methane from the SWDS in year y (tCO₂e/yr)

$BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (tCO₂e/yr)

$BE_{HG,y}$ = Baseline emissions associated with heat generation in year y (tCO₂e/yr)

$BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (tCO₂e/yr)

The project activity has no heat generation and no natural gas used, therefore is) for these 2 baselines.

Baseline emissions of methane from SWDS is calculated using the below equation.

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

$$\text{Therefore, } BE_{CH_4,y} = 453,978 tCO_2e$$

Baseline emissions associated with electricity generation is represented with below equation:

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

$$\text{Therefore, } BE_{EC,y} = 47,967 tCO_2e$$

From the above baseline emissions equation,

$$\begin{aligned} BE_y &= BE_{CH_4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y} \\ &= 453,978 + 47,967 + 0 + 0 \\ &= 501,936 tCO_2e \end{aligned}$$

The GWP_{CH_4} applied in this monitoring period is 21 (for 2012-04-01 till 2012-12-31) and 25 (2013-01-01 till 2013-09-30). The value 25 applied is the revised value applicable for the 2nd commitment period.

The following documents were verified and checked to confirm that the BE_y is correctly calculated:

- Monthly export electricity invoices^{/EI1/}
- Raw Data^{/RD1/}

Based on the monitored data, the baseline emissions for the monitoring period are **501,936 tCO₂e**.

Project emission:

The project emissions generated in this project activity are:

1. Emission from the combusting diesel by diesel genset as backup electricity

The diesel consumed was checked and compared against the purchase receipts to confirm the value reported is correct. As there is no national value available, the PP has applied the IPCC 2006 default value from table 1.2 of Chapter 1 Volume 2 for NCV and IPCC table 1.4 of Chapter 1 Volume 2 for diesel emission factor. The applied values are as per the registered GSPDD.

2. Import of electricity from the grid

The electricity imported is based on the invoice for the amount of electricity imported. The grid emission factor applied is an ex-ante value while the transmission and distribution loss is reported by the Department Ministry of Energy, Thailand in the Annual Energy Statistic Report

Therefore, project emissions are calculated using below equation:

$$\begin{aligned} PE_y &= PE_{EC,y} + PE_{FC,j,y} \\ &= 7 + 9.81 \\ &= 16.81 \\ &= 17 tCO_2e \text{ (round to the next integral)} \end{aligned}$$

Based on the monitored data, the project emissions for the monitoring period are **17tCO₂e**.

Leakage:

According to the registered GSPDD and ACM0001 version 13.0.0, leakage is not considered.

Emission Reduction:

From the above values, the emission reduction achieved by the project activity in this reporting period is:

$$\begin{aligned} ER_y &= 501,936 - 17 - 0 \\ &= \mathbf{501,919tCO_2e} \end{aligned}$$

During the verification mistakes in the ER calculation were identified. Corresponding CAR E1 and CAR E2 were raised. A revised ER calculation was prepared by the PP and presented to the verification team. All raised issues were addressed appropriately so that all corresponding CARs could be closed out. Thus it is confirmed that the ER calculation is overall correct as reported in MR and ER spreadsheet.

Therefore the emissions reductions for this monitoring period are **501,919tCO₂e**.

5.12 Quality Management

Quality Management procedures for measurements, collection and compilation of data, data storage and archiving, calibration, maintenance and training of personnel in the framework of this GS/CDM project activity have been defined. ^{/QM1/} The procedures defined can be assessed as appropriate for the purpose. No significant deviations thereof have been observed during the verification.

The verification team had reviewed the GSCDM Monitoring and Quality Control Manual ^{/QM1/} which includes the training procedures.

The data recorder list was established and all monitored data are archived both in hard (daily data) and electronic form. The data will be kept for the whole crediting period and additional 2 years after the end of the crediting period.

The monitoring equipment calibration plan was established in accordance with the monitoring plan of the registered GSPDD. The calibration records covering the monitoring period were maintained.

Internal Audits were introduced and conducted. All the internal audit records are maintained onsite. ^{/O1/}

A management reviewed meeting has been conducted for the monitoring period. ^{/O2/}

The employee had been provided necessary and sufficient training ^{/SI3/}. According to the project proponent ^{/IM01/}, during the monitoring period, there were some new employees being employed and training was provided.

5.13 Comparison with ex-ante estimated emission reductions

The MR includes a comparison of the calculated actual emission reductions with the ex-ante calculated values in the registered GSPDD dated 2013-05-29 version 15.

Ex-ante ERs: 254,556 tCO_{2e} (100,595tCO_{2e}/a)

Ex-post ERs: 501,919 tCO_{2e}

Difference: 247,363 tCO_{2e}

The comparison is based on 548 days of the monitoring period.

The ex-ante calculated value was found to be lower than the ex-post value. The justification was provided in the MR. The reason of the higher emission reductions were due to:

1. Waste tipped increased by 5%;
2. Biogas Methane collected increased by 108%;
3. Gas engines operating hours increased by 9% from 19.7h/d to 21.5h/d;
4. GWP_{CH₄} value of 25 was applied from 2013-01-01 onwards which has increased the ex-post ERs by 7.9%.

The verification team has checked the operation performance where it can be confirmed the project activity has lesser down time and the gas engines were operating more efficient. ^{/OR1/}

The verification team has checked with the landfill operation agreement to confirm that there were more waste tipped at the landfill during the monitoring period. ^{/O3/}

The MR includes actual ER values achieved up to 31 December 2012 and actual values achieved from 1 January 2013 onwards as follows:

Table 5-2: Emission reductions before and after the end of 2012

	2012-04-01 until 2012-12-31 ¹⁾	2013-01-01 to 2013-09-30 ¹⁾	Sum
Emission reductions [tCO _{2e}]	246,904	255,015	501,919

¹⁾ Both days included

5.14 Overall Aspects of the Verification

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

Access was granted to all installations of the plant which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the project activity and the steps to claim emission reductions are not compliant with the GS requirements or any other scheme the monitoring is referring to.

5.15 Hints for next periodic Verification

No FARs raise for consideration in the next verification.

6 VERIFICATION AND CERTIFICATION STATEMENT

Xentolar Holdings Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project: “Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project”, with regard to the relevant requirements for GS project activities. The project reduces GHG emissions due to avoidance of methane emission from landfill which the gas is recovered and utilized for electricity generation. The generated electricity is exported to the Thailand National Grid to partly displace the electricity generated by fuel mixed grid. This verification covers the period from 2012-04-01 to 2013-09-30 (including both days).

In the course of the verification 16 Corrective Action Requests (CAR) were raised and successfully closed. Furthermore no not CLs and FARs are raised to improve the monitoring system in the future. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the registered PDD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design document.
- the monitoring plan is in accordance with the applied approved CDM methodology, i.e., ACM0001 ver. 13.0.0
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. The emission reductions are calculated in compliance with the monitoring plan and Gold Standard conservativeness principle. Furthermore all parameters listed in the sustainability monitoring plan are duly monitored and verified. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: 501,919 t CO₂e

Subang Jaya, 2014-01-15



Cheong, Chun Yuen (Robert)
TÜV NORD JI/CDM Certification Program
Verification Team Leader

Essen, 2014-01-15



Schubert, Jochen
TÜV NORD JI/CDM Certification Program
Final Approval

7 REFERENCES

Table 7-1: Documents provided by the project participant(s)

Reference	Document
Monitoring Report	
/MR/	GS1371 Monitoring Report version 1.0 dated 2013-11-01 GS1371 Monitoring Report version 2.0 dated 2013-11-26 GS1371 Monitoring Report Version 3.0 dated 2013-12-25 GS1371 Monitoring Report version 4.0 dated 2014-01-13
ER Spreadsheets	
/ER/	Emission reduction excel spread sheet version 1 dated 2013-10-25 Emission reduction excel spread sheet version 2 dated 2013-11-25 Emission reduction excel spread sheet version 3 dated 2013-12-17 Emission reduction excel spread sheet version 3 dated 2014-01-13
Calibration Reports	
/C1/	Calibration reports for total gas flow meter with associated differential pressure transmitter: FT9261A Verification certificate for SN:9061213/5058731, issued on 2011-12-01 FT9261B Verification certificate for SN:9061212/5058730 issued on 2011-07-29 Verification certificate for KT13050301399/0288695 issued on 2013-06-05 PT9261A Verification certificate for MIT Absolute Pressure Transmitter, SN:5466080 issued on 2011-06-14 and 2013-06-05 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466002 issued on 2012-06-11 PT9261B Verification certificate for MIT Absolute Pressure Transmitter, SN:5466089 issued on 2011-06-14 and 2013-06-05 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466003 issued on 2012-06-11 TT9261A Verification certificate for Temperature Transmitter, SN:80625355 issued on 2011-08-22 Verification certificate for Temperature Transmitter, SN:080638016 issued on 2012-07-31 Verification certificate for Temperature Transmitter, SN:080625360 issued on 2013-07-16 TT9261B

Reference	Document
	Verification certificate for Temperature Transmitter, SN:080625360 issued on 2011-08-09 Verification certificate for Temperature Transmitter, SN:100208514 issued on 2012-07-31 Verification certificate for Temperature Transmitter, SN:080625355 issued on 2013-07-16
/C2/	Calibration reports for Flare systems instruments FT9391 Verification certificate for MIT V Cone Flowmeter, SN:9061210/5058738 conducted on 2011-09-14 Verification certificate for MIT V Cone Flowmeter, SN:9062916/5058737 conducted on 2013-06-25 FT9491 Verification certificate for MIT V Cone Flowmeter, SN:9062916/5058745 conducted on 2011-06-21 Verification certificate for MIT V Cone Flowmeter, SN:10071510/5476731 conducted on 2013-04-19 FT9591 Verification certificate for MIT V Cone Flowmeter, SN:9061205/5058733 conducted on 2011-06-18 Verification certificate for MIT V Cone Flowmeter, SN:10071509/4959893 conducted on 2013-04-19 PT9391 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466010 conducted on 2011-06-14 and 2013-06-05 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466004 conducted on 2012-06-11 PT9491 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466007 conducted on 2011-06-14 and 2013-06-05 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466006 conducted on 2012-06-11 PT9591 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466015 conducted on 2011-06-14 and 2013-06-05 Verification certificate for MIT Absolute Pressure Transmitter, SN:5466083 conducted on 2012-06-11 TT9391 Verification certificate for Temperature Transmitter, SN:100208523 conducted on 2011-08-08 and 2013-07-16 Verification certificate for Temperature Transmitter, SN:080625347 conducted on 2012-07-31 TT9491 Verification certificate for Temperature Transmitter, SN:080625400 conducted on 2011-08-08 Verification certificate for Temperature Transmitter, SN:080625397 conducted on

Reference	Document
	2012-07-31 Verification certificate for Temperature Transmitter, SN:090536657 conducted on 2013-07-16 TT9591 Verification certificate for Temperature Transmitter, SN:090536657 conducted on 2011-08-08 Verification certificate for Temperature Transmitter, SN:080625432 conducted on 2012-07-31 Verification certificate for Temperature Transmitter, SN:080625400 conducted on 2013-07-16
/C3/	Calibration reports for Gas Engines Instruments EFT9001 Verification certificate for MIT V Cone Flowmeter, SN:9062903/5058756 conducted on 2011-06-13 Verification certificate for MIT V Cone Flowmeter, SN:10071503/5058744 conducted on 2012-10-01 EFT9002 Verification certificate for CNAS V Cone Flowmeter, SN:10071503/5058744 conducted on 2010-08-23 Verification certificate for MIT V Cone Flowmeter, SN:10071504/5476737 conducted on 2011-11-07 EFT9003 Verification certificate for MIT V Cone Flowmeter, SN:9062907/5058760 conducted on 2011-06-13 Verification certificate for MIT V Cone Flowmeter, SN:10071505/546725 conducted on 2013-04-19 EFT9004 Verification certificate for MIT V Cone Flowmeter, SN:9062913/5058766 conducted on 2011-06-13 Verification certificate for MIT V Cone Flowmeter, SN:10071506/5964086 conducted on 2013-04-19 EFT9005 Verification certificate for MIT V Cone Flowmeter, SN:1104-0160/02443474 conducted on 2011-07-14 Verification certificate for MIT V Cone Flowmeter, SN:9062907/5058760 conducted on 2013-06-24 EFT9006 Verification certificate for MIT V Cone Flowmeter, SN:1104-0159/02443472 conducted on 2011-07-20 Verification certificate for MIT V Cone Flowmeter, SN:9062903/5058756 conducted on 2013-06-24 EFT9007 Verification certificate for MIT V Cone Flowmeter, SN:9062901/5058746 conducted on 2011-06-13 Verification certificate for MIT V Cone Flowmeter, SN:10071502/5615483 conducted on 2013-04-19

Reference	Document
	EFT9008 Verification certificate for MIT V Cone Flowmeter, SN:9062914/5058767 conducted on 2011-09-13 Verification certificate for MIT V Cone Flowmeter, SN:9062901/5058746 conducted on 2013-06-24 EPT9001 Verification certificate for MIT Absolute Pressure Transmitter, SN:02443480 conducted on 2011-06-14 Verification certificate for MIT Absolute Pressure Transmitter, SN:02166916 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02443480 conducted on 2012-06-11 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300672 conducted on 2012-11-05 EPT9002 Verification certificate for MIT Absolute Pressure Transmitter, SN:02443481 conducted on 2011-06-14 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150750 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02443481 conducted on 2012-06-11 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300674 conducted on 2012-11-05 EPT9003 Verification certificate for MIT Absolute Pressure Transmitter, SN:02166915 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02715553 conducted on 2012-08-07 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150753 conducted on 2012-11-05 EPT9004 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300672 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150751 conducted on 2012-11-05 EPT9005 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150751 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300673 conducted on 2012-11-05 EPT9006 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300674 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150750 conducted on 2012-11-05 EPT9007 Verification certificate for MIT Absolute Pressure Transmitter, SN:02150753 conducted on 2011-11-10

Reference	Document
	Verification certificate for MIT Absolute Pressure Transmitter, SN:02166915 conducted on 2012-11-05 EPT9008 Verification certificate for MIT Absolute Pressure Transmitter, SN:02300673 conducted on 2011-11-10 Verification certificate for MIT Absolute Pressure Transmitter, SN:02166916 conducted on 2012-11-05 ETT9001 Verification certificate for Temperature Transmitter, SN:100208540 conducted on 2011-08-09 Verification certificate for Temperature Transmitter-SN:100208541 conducted on 2012-08-06 Verification certificate for Temperature Transmitter, SN:090536658 conducted on 2013-02-22 ETT9002 Verification certificate for Temperature Transmitter, SN:100208515 conducted on 2011-08-09 Verification certificate for Temperature Transmitter, SN:100211940 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:080638031 conducted on 2012-11-05 ETT9003 Verification certificate for Temperature Transmitter, SN:090536658 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:080638042 conducted on 2012-11-05 ETT9004 Verification certificate for Temperature Transmitter, SN:090543121 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:080638069 conducted on 2012-11-05 ETT9005 Verification certificate for Temperature Transmitter, SN:090536683 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:100208537 conducted on 2012-08-06 Verification certificate for Temperature Transmitter, SN:090543121 conducted on 2013-02-22 ETT9006 Verification certificate for Temperature Transmitter, SN:090543120 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:100208540 conducted on 2012-08-08 Verification certificate for Temperature Transmitter, SN:090536683 conducted on 2013-02-22 ETT9007 Verification certificate for Temperature Transmitter, SN:100208541 conducted on 2011-08-09

Reference	Document
	Verification certificate for Temperature Transmitter, SN:100208515 conducted on 2012-07-31 Verification certificate for Temperature Transmitter, SN:090543120 conducted on 2013-02-22 ETT9008 Verification certificate for Temperature Transmitter, SN:100208537 conducted on 2011-08-09 Verification certificate for Temperature Transmitter, SN:100098212 conducted on 2012-03-01 Verification certificate for Temperature Transmitter, SN:100211940 conducted on 2013-02-22
/C4/	Calibration reports for Methane analyser CH4 9261A Verification certificate for MIT Guardian Plus 97460, SN:31426 conducted on 2011-06-03 Verification certificate for MIT Guardian Plus 97460, SN:31421 conducted on 2011-09-02 Verification certificate for MIT Guardian Plus 97460, SN:29692 conducted on 2012-06-18 Verification certificate for Edinburgh Guardian Plus 97460, SN:29690 conducted on 2012-01-25 and 2013-01-25
/C5/	Calibration reports for flare thermocouples TTC9393A Verification certificate for TMC Thermocouple Transmitter, SN:22641 C/1 conducted on 2012-02-07 Verification certificate for TMC Thermocouple Transmitter, SN:080614298 conducted on 2012-03-22 Verification certificate for TMC Thermocouple Transmitter, SN:080614289 conducted on 2012-10-12 Verification certificate for TMC Thermocouple Transmitter, SN:080614373 conducted on 2013-07-16 TTC9393B Verification certificate for TMC Thermocouple Transmitter, SN:22641 C/3 conducted on 2012-02-07 Verification certificate for TMC Thermocouple Transmitter, SN:80614290 conducted on 2012-03-22 Verification certificate for TMC Thermocouple Transmitter, SN:090326009 conducted on 2012-10-05 Verification certificate for TMC Thermocouple Transmitter, SN:090326012 conducted on 2013-07-16 TTC9393C Verification certificate for TMC Thermocouple Transmitter, SN:090329527 conducted on 2011-08-09 Verification certificate for TMC Thermocouple Transmitter, SN:090326006 conducted on 2012-03-22 Verification certificate for TMC Thermocouple Transmitter, SN:090326007 conducted on 2012-10-12

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	Verification certificate for TMC Thermocouple Transmitter, SN:090326013 conducted on 2013-07-16 TTC9493A Verification certificate for TMC Thermocouple Transmitter, SN:080614379 conducted on 2011-09-07 Verification certificate for TMC Thermocouple Transmitter, SN:080614320 conducted on 2012-08-01 Verification certificate for TMC Thermocouple Transmitter, SN:080614290 conducted on 2013-02-21 TTC9493B Verification certificate for TMC Thermocouple Transmitter, SN:080614305 conducted on 2011-09-07 and 2012-08-01 Verification certificate for TMC Thermocouple Transmitter, SN:080614323 conducted on 2013-03-06 TTC9493C Verification certificate for TMC Thermocouple Transmitter, SN:080614306 conducted on 2011-09-07 Verification certificate for TMC Thermocouple Transmitter, SN:080614379 conducted on 2012-08-01 Verification certificate for TMC Thermocouple Transmitter, SN:080614298 conducted on 2013-02-21 TTC9593A Verification certificate for TMC Thermocouple Transmitter, SN:080614323 conducted on 2011-08-09 Verification certificate for TMC Thermocouple Transmitter, SN:090329527 conducted on 2012-08-02 Verification certificate for TMC Thermocouple Transmitter, SN:090326006 conducted on 2013-02-21 TTC9593B Verification certificate for TMC Thermocouple Transmitter, SN:080614321 conducted on 2011-08-09 Verification certificate for TMC Thermocouple Transmitter, SN:080614306 conducted on 2012-08-02 Verification certificate for TMC Thermocouple Transmitter, SN:090326010 conducted on 2013-03-06 TTC9593C Verification certificate for TMC Thermocouple Transmitter, SN:080614320 conducted on 2011-08-09 Verification certificate for TMC Thermocouple Transmitter, SN:080614297 conducted on 2012-08-02 Verification certificate for TMC Thermocouple Transmitter, SN:080614321 conducted on 2013-03-06
/C6/	Calibration reports for Electricity meters EPMP - Primary Verification certificate for BGP Export Meter SN:201005194 PEA15850695, conducted on 2011-07-12, 2012-07-04 and 2013-07-03 Verification certificate for PEA Export Meter (Temp), SN:205610065 PEA19936922,

Reference	Document
	conducted on 2011-08-08 Verification certificate for PEA Export Meter (Temp), SN:205610126 PEA19936983, conducted on 2012-09-10 EPMS - Secondary Verification certificate for BGP Export Meter SN:201007272 PEA15852773, conducted on 2011-07-13 and 2012-07-04 Verification certificate for PEA Export Meter (Temp) SN:205610065 PEA19936922, conducted on 2011-08-08 Verification certificate for PEA Meter (Temp) SN:205610126 PEA19936983, conducted on 2012-09-10 Verification certificate for BGP Export Meter SN:212607309 conducted on 2013-01-28 IPMP - Primary Verification certificate for BGP Import Meter SN: 201006718PEA15852219, conducted on 2011-07-12, 2012-07-04 and 2013-07-03 Verification certificate for PEA Import Meter (Temp) SN:205610067 PEA19936924, conducted on 2011-08-08 and 2012-08-09 IPMS - Secondary Verification certificate for BGP Import Meter SN:201005191 PEA15850692, conducted on 2011-07-13 and 2012-07-04 Verification certificate for PEA Import Meter (Temp) SN:205610067 PEA19936924, conducted on 2011-08-08 and 2012-08-09 Verification certificate for BGP Import Meter SN:210422526 conducted on 2012-10-01 and 2013-07-03
/C7/	Span gas specification – Certificate of Composition for Cylinder No. 580878 CH ₄ dated 2010-09-14 expiry on 2014-09-13
Equipment & Instruments Specifications	
/E1/	GE Jenbacher Gas engine
/E2/	Uniflare Type N Thermocouple Honeywell STT830-173 Transmitter
/E3/	Carbon Recycle Enclosed Flare system
/E4/	Flow meter: 1. Kingsway V-cone flow meter 2. Shanghai Kent V-cone flow meter 3. KVS Lamways V-cone flow meter 4. V-Cone flow factor and sizing
/E5/	Rosemount 3051 absolute Pressure transmitter
/E6/	Honeywell STT 171 Temperature transmitter

Reference	Document
/E7/	Guardian Methane Analyser Guardian Methane Analyser operating manual
/E8/	Electricity Meter
/E9/	Honeywell Ultraviolet flame detector C7027A
Electricity Invoices	
/EI1/	Electricity Selling Invoice for April 2012 - September 2013
/EI2/	Monthly Electricity Report issued by the PEA and invoice
Flare Work Statement	
/FWS1/	Flare 1, 2 & 3 work statement from 2012-04-01 to 2013-09-30
Maintenance & Downtime	
/MD1/	Gas Engine Maintenance and Downtime Records April 2012 to September 2013
/MD2/	Flare Maintenance and Downtime Records April 2012 to September 2013
/MD3/	Biogas Plant Maintenance and Downtime Records April 2012 to September 2013
/MD4/	Methane Gas Analyser Maintenance and Downtime Records April 2012 to September 2013
/MD5/	Flow Meter Maintenance and Downtime records April 2012 to September 2013
/MD6/	Flare Thermocouple Maintenance and Downtime records April 2012 to September 2013
Operation Records	
/OR1/	Gas Engines operational hours April 2012 to September 2013
/OR2/	Purchase of Diesel for standby diesel genset on 2012-07-11 to 2012-07-12
Others	
/O1/	Internal Audit Report dated 2012-11-07
/O2/	Management Review Meeting dated 2012-11-29

Reference	Document
/O3/	Waste Tipping Agreement no. 53/2547 dated 2004-07-20
/O4/	Landfill Layout Drawing
/O5/	Annual Report Thailand Energy Statistics 2012 (Preliminary) by DEDE Department Ministry of Energy, Thailand Preliminary Transmission Distribution Loss 2012
Preventive Maintenance Plan	
/PM1/	Preventive Maintenance Plan year 2012 and 2013
QA/QC Manual	
/QM1/	CDM GS Monitoring and Quality Control Manual version 9 dated 2013-10-30
Raw Data	
/RD1/	Raw data from the monitoring system April 2012 to September 2013
Training Records	
/TR/	Training Records for 2013
Sustainable Indicator	
/SI1/	2 nd Environmental Report for period 2012-12-11 and 2013-02-28 Air Emission calculation Emission Inventory of Electricity Generation in Thailand 2011
/SI2/	Final Report for Initial Environmental Examination dated 2009-11-19 Thailand Noise Level Standard 2540 Thailand Nuisance regulation 2548 and 2550
/SI3/	Sindicatum Corporate Responsibility Manual June 2013 Training records 2013 Employment Records April 2012 to September 2013
/SI4/	Staff List as at 2013-09-30
/SI5/	Visitor Records 2012-07-27 to 2012-09-26

Table 7-2: Background investigation and assessment documents

Reference	Document
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Reference	Document
/ACM1/	ACM0001 ver. 13.0.0, "Flaring or use of landfill gas"
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/CT/	Combined tool to identify the baseline scenario and demonstrate additionality" Version 05.0.0
/ESWDS/	Emissions from solid waste disposal sites version 06.0.1
/GLMP/	Guidelines: Completing the monitoring report form (EB 75, Annex 7)
/GS/	Gold Standard Version 2.2
/GSP/	GS1371 Passport for project title Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project version 13 dated 2013-08-29
/GSPDD/	GS1371 PDD for project title Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project version 15 dated 2013-05-29
/GST/	Gold Standard Toolkit version 2.2
/GSVR/	GS1371 Validation Report for project title Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project rev 06 dated 2013-08-30
/IPCC/	2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/KP/	Kyoto Protocol (1997)
/MA/	Decision 3/CMP. 1 (Marrakesh – Accords)
/PEF/	Project emissions from flaring Version 02.0.0
/PDD1/	1. Project Design Document for CDM project: " Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project " version 8, dated 2010-08-13
/PDD2/	Revised Project Design Document for CDM project: " Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project " version 9, dated 2012-07-02
/PRC/	Post Registration Changes Assessment Report dated 2012-08-07
/PS/	CDM Project Standard (Version 5.0)
/TEC/	Tool to calculate baseline, project and/or leakage emissions from electricity consumption version 01

Reference	Document
/TEF/	Tool to calculate the emission factor for an electricity system version 3.0.0
/TFF/	Tool to calculate project or leakage or CO ₂ emissions from fossil fuel combustion version 02
/TMF/	Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 02.0.0
/TW/	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 4
/VAL/	1. Validation Report for CDM project " Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project " version 1.2, dated 2011-01-18 2. Validation Opinion on PDD changes for CDM project " Bangkok Kamphaeng Saen East: Landfill Gas to Electricity Project " dated 2012-08-07
/VER/	Documents of previous verifications (Monitoring report, verification report, ER calculation sheet)
/VVS/	CDM Validation and Verification Standard (Version 05.0)

Table 7-3: Websites used

Reference	Link	Organisation
/dna-HP/	http://www.tgo.or.th/english/	DNA of Thailand
/dna-SP/	http://www.environment-agency.gov.uk/business/topics/pollution/129666.aspx	DNA of United Kingdom of Great Britain and Northern Ireland
/gs/	http://www.CDMgoldstandard.org/	CDM Gold Standard
/unfccc/	http://cdm.unfccc.int	UNFCCC
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications

Table 7-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	☐ Mr. ☒ Ms	Rachaneewan Pulnil	Bangkok Greenpower / CDM Manager

Reference	Mol ¹		Name	Organisation / Function
	V	☒ Mr. ☐ Ms.	Pongsthon Sangchai	Bangkok Greenpower / CDM Coordinator
/IM02/	V	☒ Mr. ☐ Ms.	Thanaset T	Sindicatum Sustainable Resources / Site Manager
	V	☒ Mr. ☐ Ms.	Jay Mariyappan	Sindicatum Sustainable Resources / Managing Director
	V	☐ Mr. ☒ Ms.	Michelle O'Hare	Sindicatum Sustainable Resources / Senior Vice President
/IM03/	V	☒ Mr. ☐ Ms.	Supon Sriprapun	Bangkok Greenpower / Landfill Operator
/IM04/	V	☒ Mr. ☐ Ms.	Sanit Saykaew	Chief of Sasimhum Sub-District Administration Organization
	V	☒ Mr. ☐ Ms.	Akekachai Runenusan	Head of Villager 21, Sasimhum Sub-District Administration Organization

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)

ANNEX

- A1:** Verification Protocol
- A2:** Statements of Competence of
involved Personnel

ANNEX 1: VERIFICATION PROTOCOL

Table A-1: GHG calculation procedures and management control testing / detailed audit testing of residual risk areas and random testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
Raw data generation				
• Installation of measuring equipment • Dysfunction of installed equipment • Maloperation by operational personnel • Downtimes of equipment • Exchange of equipment • Change of measurement equipment characteristic • Insufficient accuracy • Change of technology	• Installation of modern and state of the art equipment • Process control automation • Internal data review • Regular visual inspections of installed equipment • Only skilled and trained personnel operates the relevant equipment • Daily raw data checks • Immediate exchange of dysfunctional equipment • Stand-by duty is	• Inadequate installation / operation of the monitoring equipment • Inadequate exchange of equipment • Change of personnel • Undetected measurement errors • Inappropriateness of Management system procedures w.r.t. monitoring plan requirements (e.g. substitute value strategies) • Non-application of management system procedures • Insufficient accuracy • Inappropriate QA/QC	• Site – visit • Check of equipment • Check of technical data sheets • Check of suppliers information / guarantees • Check of calibration records, if applicable • Check of maintenance records • Counter-check of raw data and commercial data • Check of CDM management system • Check of CDM related procedures	• See Table A-2

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
Accuracy of values supplied by Third Parties	- organized - Training - Internal audit procedures - Internal check of QA/QC measures of involved Third Parties	measures of Third Parties	- Application of CDM management system procedures - Check of trainings - Check of responsibilities - Check of QA/QC documentation / evidences of involved Third Parties	
Raw data collection and data aggregation				
- Wrong data transfer from raw data to daily and monthly aggregated reporting forms - IT Systems - Spread sheet programming - Manual data transmission - Data protection - Responsibilities	- Cross-check of data - Plausibility checks of various parameters. - Appropriate archiving system - Clear allocation of responsibilities - Application of CDM Management system procedures - Usage of standard software solutions	- Unintended usage of old data that has been revised - Incomplete documentation - Ex-post corrections of records - Ambiguous sources of information - Non-application of management system procedures - Manual data transfer mistakes	- Check of data aggregation steps - Counter-calculation - Data integrity checks by means of graphical data analysis and calculation of specific performance figures - Check of management system certification - Check of data archiving system	See Table A-2



Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
	(Spreadsheets) - Limited access to IT systems - Data protection procedures	- Unintended change of spread sheet programming or data base entries - Problems caused by updating/upgrading or change of applied software	Check of application of Management system procedures	
Other calculation parameters				
Emission factors, oxidation factors, coefficients	The values and data sources applied are defined in the PDD and monitoring plan	- Unintended or intended Modification of calculation parameters - Wrong application of values - Misinterpretations of the applied methodology and/ or the PDD - Missing update of applicable regulatory framework (e.g. IPCC values)	- Update-check of regulatory framework - Countercheck of the applied MP in the MR against the methodology and the PDD	See Table A-2
Calculation Methods				

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
- Applied formulae - Miscalculation - Mistakes in spread-sheet calculation	- Advanced calculation and reporting tools - A CDM coordinator is in charge of the CDM related calculations - Usage of tested / counterchecked Excel spreadsheets - Involvement of external consultants	The danger of miscalculation can only be minimized.	- Countercheck on the basis of own calculation. - Spread sheet walk-through. - Plausibility checks - Check of plots	See Table A-2
Monitoring reporting				
- Data transfer to the author of the monitoring report - Data transfer to the monitoring report - Unintended use of outdated versions	- An experienced CDM consultant is responsible for monitoring reporting. - CDM QMS procedures are defined	- The danger of data transfer mistakes can only be minimized - Inappropriate application of QMS procedures	- Counter check with evidences provided. - Audit of procedure application	See Table A-2

Table A-2: (Project specific) Periodic Verification Checklist

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
A. Description of the project activity				
A.1. Purpose and general description of the project activity <i>Check if section A.1 of the MR includes the following:</i> - Purpose of the PA and the measures taken to reduce GHG emissions - Brief description of the installed technology and equipment - Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods etc.) - Total emission reductions achieved in this monitoring period	/MR/ /GSPDD/ /ER1/	The verification team has checked section A.1 of the MR and confirms that the information provided is complete and correct with regards to the following: ☒ Purpose of the PA and the measures taken to reduce GHG emissions ☒ Brief description of the installed technology and equipment ☒ Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods etc) ☒ Total emission reductions achieved in this monitoring period In this context no findings have been identified:	OK	OK
A.2. Location of project activity <i>Check if section A.2 of the MR reflects correctly the following:</i> - Host Party(ies) - Region / State / Province etc. - City / Town / Community etc. - Physical / geographical location (e.g. Latitude	/MR/ /GSPDD/ /onsite/	The verification team has checked section A.2 of the MR and confirms by means of comparison with the information given in the PDD and information gathered during the site visit that the information provided is complete and correct with regards to the following: ☒ Host Party(ies) ☒ Region / State / Province ☒ City / Town / Community ☒ Physical / Geographical location	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>and Longitude)</i>		In this context no findings have been identified:		
A.3. Parties and Project Participants <i>Check if the MR includes all PPs:</i> - All PPs as displayed on the GS website	/MR/ /gs/	The verification team has checked section A.3 of the MR as well as the UNFCCC website and confirms that: ☒ all PPs as displayed on the project related UNFCCC website are correctly listed ☒ the table as per the template MR has been correctly filled In this context no findings have been identified:	OK	OK
A.4. Reference of applied methodology <i>Check if section A.4 of the MR correctly describes / includes the following:</i> - Reference to the applicable version of the methodology - Reference to the applicable version(s) of relevant methodological tools	/MR/ /GSPDD/ /unfccc/	The verification team has checked section A.4 of the MR and confirms by means of comparison with the information given in the PDD and displayed on the UNFCCC website that the information provided is complete and correct with regards to the following: ☒ Number, title and version of the applicable CDM Methodology ☒ Name and version of applicable CDM methodological tools ☒ Relevant EB decisions In this context no findings have been identified:	OK	OK
A.5. Crediting period of project activity <i>Check if the MR correctly includes the following:</i> - Start date of the crediting period. - Length and type of the crediting period	/MR/ /gs/	The verification team has checked section A.5 of the MR and confirms by means of comparison with the information displayed on the GS website that the information provided is complete and correct with regards to the following: ☐ Start date of the crediting period. ☒ Type and length of the crediting period	CAR-A3	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		In this context the following findings have been identified: Refer to CAR A3 raised		
A.6. Publication of the Verification Work Plan and monitoring report		The verification workplan has been uploaded to the Registry on 2013-10-28 The monitoring report has been uploaded to the Registry on 2013-10-25	OK	OK
A.7. Compliance of the Monitoring Report	/MR/ /GST/ /GSP/ /gs/	The verification team has checked all sections of the MR and confirms by means of comparison with the MR template that: ☐ the standardized MR template has been used In this context the following findings have been identified: Refer to CAR A1 and CAR A2 raised	CAR A1 CAR A2	OK OK
B. Implementation of project activity				
B.1. Description of implemented registered project activity <i>Check if the MR correctly describes / includes the following:</i> - Implementation status of the PA - Detailed description of installed technology(ies) / technical processes and equipment applied	/MR/ /GSPDD/ /PS/	The verification team has checked section B.1 of the MR and confirms by means of comparison with the information given in the PDD, the project standard and information gathered during the site visit that: ☒ the description of the implementation status of the PA is in line with the applicable provisions of the project standard ☒ an appropriate description of the installed technology(ies), technical process and equipment incl. diagrams, where applicable, has been included In this context no findings have been identified	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
B.1.1. Initial project implementation <i>Assess whether the project has been implemented and operated as per the registered PDD and are all physical features of the project in place?</i> <i>Further focus on the potential phase wise implementation and check the reporting on the corresponding status and starting dates accordingly.</i> <i>Check if the project is still in compliance with the applicability conditions of the methodology.</i>	/MR/ /IM01/ /GSPDD/ /ACM1/ /onsite/	<i>Description:</i> The project activity is to recover Landfill Gas (LFG) for electricity generation for export to the Thai National Grid. Excessive and/or unused LFG will be flared <i>Verifier's action:</i> During the onsite assessment, physical inspection has been conducted to confirm the installation of the equipment and installed capacity is consistent with the GSPDD registered. The electricity invoices were reviewed to confirm the project activity is selling electricity to the grid which will partly displace the mixed fuel baseline of the grid. Through the onsite observation and document review, the project is fully implemented. <i>Conclusion:</i> It is concluded that the project is implemented according to the GS registered PDD and applied methodology.	OK	OK
B.1.2. Technical equipment changes <i>Check if relevant technical equipment of the project activity has been exchanged or modified during the monitoring period. Further ensure that consistent notations of key equipment (meters etc.) in PDD, MR and calculation spreadsheet are applied.</i> <i>Consider e.g. interviews with operational personnel, QMS records, maintenance records, instrument</i>	/MR/ /GSPDD/ /OR1/ /MD1 – MD6	<i>Description:</i> There are no changes or modification to the main generation equipment and flares during the monitoring period except there were exchange of monitoring instruments due to faulty or calibration and downtime for gas engines and flaring system reporting in Annex F of MR. The list of monitoring instruments exchanged are in Annex E of the MR. <i>Verifier's action:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>specifications.</i> <i>In case of changes, check whether the project is still in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation.</i>		The operation records and maintenance & downtime records were reviewed to confirm the exchanged of the monitoring instruments. The operation records and the instruments specifications were reviewed during onsite to confirm the exchanged monitoring instruments have the same specification. <i>Conclusion:</i> It is concluded that there are no technical equipment changes which lead to changes of the registered GSPDD.		
B.1.3. Operation of the project activity <i>Check if relevant operation modes of the project activity have been exchanged or modified during the monitoring period.</i> <i>Consider e.g. interviews with operational personnel, operation log sheets, data management system records.</i> <i>In case of changes, check whether the project is still in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation</i>	/MR/ /GSPDD/ /QA1/ /RD1/ /OR1/ /EI1/ /EI2/ /onsite/	<i>Description:</i> No operation modes have been exchanged or modified during the monitoring period. <i>Verifier's action:</i> The Quality Manual was reviewed to confirm the operation of the project activity is as the registered GSPDD. The operation data and electricity sales invoices were reviewed to confirm the project activity is to recover LFG for electricity generation. <i>Conclusion:</i> It is concluded that the operation of the project activity is accordance to the registered GSPDD.	OK	OK
B.1.4. Incidents <i>Identify if there have been any significant incidents, deviant operation modes and / or downtimes of the</i>	/MR/ /MD1 – MD6/	<i>Description:</i> The downtimes and incidents of the project activity is recorded in Annex F of the MR.	OK	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>equipment?</i> <i>Consider e.g. interviews with operational personnel, operational log sheets, analysis of performance data.</i>		<i>Verifier's action:</i> The incidents recorded in the MR were compared against the maintenance and downtime records to confirm there are correctly indicated. <i>Conclusion:</i> It is concluded that the incidents happen in this monitoring period are properly recorded.		
B.1.5. Legislation Find out – esp. in the context of methodological requirements - whether relevant legislation with effect on the project activity in the host country has been changed. Assess, in case of changes, whether consequences for the PA with regard to relevant GS requirements have been accounted for. In case of changes data sources shall be referenced.	/MR/	<i>Description:</i> There is no available legislation for LFG recovery in Thailand. <i>Verifier's action:</i> Through the local knowledge of the verification team, it can be confirmed that there is still no legislation available for LFG capturing and utilising. <i>Conclusion:</i> It is concluded that the project activity had met all relevant legislation.	OK	OK
B.1.6. Open issues from GS validation <i>Check (esp. in case of 1st periodic verification) whether there are any open issues indicated in the validation report (e.g. FAR)?</i>	/GSVAL/	☒ There were no open issues addressed in the validation report ☐ All open issues from the validation have been appropriately addressed. ☐ The following issues related to the validation have not yet been appropriately addressed:	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
B.1.7. Open issues from previous verification <i>Check in case of further periodic verifications whether there are any open issues indicated in previous verification reports (FAR).</i>	/GSVER/	☒ There were no open issues addressed in the previous verification report ☐ All open issues from the previous verification have been appropriately addressed. ☐ The following issues related to the previous verification have not yet been appropriately addressed:	OK	OK
C. Description of monitoring system				
C.1. Monitoring Plan – PDD Compliance <i>Check if the monitoring plan is in accordance with the monitoring plan contained in the registered PDD (or any accepted revised MP).</i> <i>Please check esp. if</i> - all parameters stated in the MP of the registered PDD have been monitored and updated as applicable - the monitoring equipment has been controlled and calibrated as per the MP - the monitoring results are consistently recorded as per the approved frequency - QA/QC procedures have been applied in accordance with the MP	/MR/ /GSPDD/	By means of comparison of the MR with the registered GSPDD the verification team has checked whether the MP is in compliance with the registered GSPDD. The outcome is as follows: ☒ The MP is completely in accordance with the last registered/approved version of the PDD / MP. In this context no findings have been identified:	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.																				
C.2. Monitoring Plan – Meth Compliance <i>Check if the monitoring plan is in accordance with the applied methodology.</i> <i>In case the methodology references applicable tools it has to be ensured that the MP is also compliant with those tools.</i> <i>Also please specify if monitoring aspects have been identified that are not specified in the methodology but may enhance the level of accuracy and completeness of the monitoring plan – this esp. applies for SSC PAs.</i>	/MR/ /GSPDD/ /AM1/ /ESWDS/ /PEF/ /TEC/ /TEF/ /TMF/ /TFF/ /TWF/	By means of comparison of the MR with the applied CDM methodology and related tools the verification team has checked whether the MP is in compliance with the MP related requirements of the applied methodology. The outcome is as follows: <table><tr><td>☒</td><td colspan="2">The MP is completely in accordance with the approved methodology applied by the GS project (approved version of the GSPDD)</td></tr><tr><td>☒</td><td colspan="2">The MP is completely in accordance with the applied tools which the methodology references. A breakdown of the referenced tools is as follows:</td></tr><tr><td rowspan="3">1</td><td>Title (of the tool)</td><td>Tool to calculate baseline, project and/or leakage emissions from electricity consumption</td></tr><tr><td>Version</td><td>01</td></tr><tr><td>MP compliance</td><td>☒ full compliance ☐ findings have been raised ☐ N/A (for MP)</td></tr><tr><td rowspan="3">2</td><td>Title (of the tool)</td><td>Tool to calculate the emission factor for an electricity system</td></tr><tr><td>Version</td><td>3.0.0</td></tr><tr><td>MP compliance</td><td>☒ full compliance ☐ findings have been raised</td></tr></table>	☒	The MP is completely in accordance with the approved methodology applied by the GS project (approved version of the GSPDD)		☒	The MP is completely in accordance with the applied tools which the methodology references. A breakdown of the referenced tools is as follows:		1	Title (of the tool)	Tool to calculate baseline, project and/or leakage emissions from electricity consumption	Version	01	MP compliance	☒ full compliance ☐ findings have been raised ☐ N/A (for MP)	2	Title (of the tool)	Tool to calculate the emission factor for an electricity system	Version	3.0.0	MP compliance	☒ full compliance ☐ findings have been raised	OK	OK
☒	The MP is completely in accordance with the approved methodology applied by the GS project (approved version of the GSPDD)																							
☒	The MP is completely in accordance with the applied tools which the methodology references. A breakdown of the referenced tools is as follows:																							
1	Title (of the tool)	Tool to calculate baseline, project and/or leakage emissions from electricity consumption																						
	Version	01																						
	MP compliance	☒ full compliance ☐ findings have been raised ☐ N/A (for MP)																						
2	Title (of the tool)	Tool to calculate the emission factor for an electricity system																						
	Version	3.0.0																						
	MP compliance	☒ full compliance ☐ findings have been raised																						

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)			Draft Concl.	Final Concl.
					☐ N/A (for MP)	
				3	Title (of the tool)	
					Tool to calculate project or leakage or CO ₂ emissions from fossil fuel combustion	
					Version	
					02	
					MP compliance	
					☒ full compliance	
					☐ findings have been raised	
					☐ N/A (for MP)	
				4	Title (of the tool)	
					Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site	
					Version	
					4	
					MP compliance	
					☒ full compliance	
					☐ findings have been raised	
					☐ N/A (for MP)	
				5	Title (of the tool)	
					Emissions from solid waste disposal sites	
					Version	
					06.0.1	
					MP compliance	
					☒ full compliance	
					☐ findings have been raised	
					☐ N/A (for MP)	

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)				Draft Concl.	Final Concl.
		6	Title (of the tool)	Project emissions from flaring			
			Version	2			
			MP compliance	☒ full compliance ☐ findings have been raised ☐ N/A (for MP)			
		7	Title (of the tool)	Tool to determine the mass flow of a greenhouse gas in a gaseous stream			
			Version	02.0.0			
			MP compliance	☒ full compliance ☐ findings have been raised ☐ N/A (for MP)			
		In this context no findings have been identified:					
C.3. Management System <i>Check if the GHG data monitoring system can be assessed as appropriate.</i> <i>In case reference is made to a (certified) company quality management system, check if all CDM related monitoring procedures have been fully integrated in the project participant's quality management system.</i> <i>In case of a stand-alone system, check how the GHG management system has been implemented and</i>	/MR/ /QA1/	<i>Description:</i> The management system is documented in the CDM Monitoring and Quality Control Manual. <i>Verifier's action:</i> The CDM Monitoring and Quality Control Manual were reviewed to confirm the all CDM related monitoring procedures have in included in the manual. The quality manual include the monitoring procedures, operation and maintenance procedures, recording and reporting				OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>effectiveness is ensured.</i>		procedures and CDM Emission reduction calculation procedures. <i>Conclusion:</i> It is concluded that the management system has been to ensure the effectiveness of monitoring the project activity.		
C.4. Roles and Responsibilities <i>Check if all roles and positions of each person in the GHG data management process are clearly defined and implemented as stated in the monitoring plan. Please consider the complete data trail from raw data generation to submission of the final data.</i> <i>Identify, if relevant personnel w.r.t. monitoring has been exchanged?</i> <i>If so, have appropriate training measures been carried out.</i> <i>In case of changes, assure that the implemented monitoring procedures have not been affected.</i>	/MR/ /QA1/ /IM01/	<i>Description:</i> The role and responsibilities are included in section C of the MR. <i>Verifier's action:</i> The roles and responsibilities are compared with the quality manual and interview conducted to confirm their roles and responsibilities. Training records of employee were reviewed to confirm that all relevant personnel has been appropriately trained to operate the project activity. <i>Conclusion:</i> It is concluded that all roles and positions of each person in the GHG data management process has been clearly defined and trained.	OK	OK
C.5. Emergency procedures for the monitoring system <i>Check, as appropriate, whether relevant emergency procedures for the monitoring system have been included in the MR and assess whether these procedures have been implemented, when required</i>	/MR/ /GSPDD/ /QA1/	<i>Description:</i> The emergency procedure is included in the CDM Monitoring and Quality Control Manual. <i>Verifier's action:</i> The quality manual was reviewed and compared against the registered GSPDD. The procedures documented in the manual	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		has outline the steps should be taken in case of emergency. The procedure stated in the MR is consistent with the registered GSPDD. The emergency procedure has includes methodology to determine the data in the event of monitoring equipment failure. <i>Conclusion:</i> It is concluded that the emergency procedure for the monitoring system is implemented.		
C.6. Data archive and data protection Check whether all records of monitoring parameters are archived according to the monitoring plan. Assess further whether appropriate measures have been taken in order to avoid unintended or intended manipulation or loss of the measured data.	/MR/ /QA1/ /GSPDD/ /IM01/	<i>Description:</i> The data documents are archived electronically and hard copies. <i>Verifier's action:</i> The electronic and hard copies documents of the first and second monitoring period where checked to confirm they are archived and are available. The server was checked to confirm all data since the first monitoring period is available and only accessible by authorised personnel. Backup copies in hard drives are available as a secondary protection which can prevent loss of measured data. All data are downloaded directly from the SCADA system. Therefore it is very unlikely that the data can be manipulated. <i>Conclusion:</i> It is concluded that all records and monitoring parameters are	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		achived according to the monitoring plan.		
D. Data and parameters				
D.1. Data and Parameters fixed ex ante				
a) Compliance with registered PDD <i>Check whether the value applied is in compliance with the registered PDD.</i>	/MR/ /GSPDD/	<i>Description:</i> The ex-ante values applied in the MR is not consistent with the registered GSPDD. <i>Verifier's action:</i> The MR was compared against the registered GS PDD. <i>Conclusion:</i> Refer to CAR D1 raised	CAR D1	OK
b) Compliance with the applied methodology <i>Check whether the value applied is in compliance with the applied methodology or any other tool.</i>	/MR/ /ACM1/ /ESWDS/ /PEF/ /TEC/ /TEF/ /TFF/ /TMF/ /TW/	<i>Description:</i> The ex-ante values applied in the MR is not consistent with the methodology and applied tools <i>Verifier's action:</i> The parameters were compared with the applied methodology and relevant tools. <i>Conclusion:</i> Refer to CAR D1 raised.	CAR D1	OK
D.2. Data and Parameters monitored				

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
D.2.1. Management of SWDS		Description: Management of the SWDS		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /ACM1/ /GSPDD/ /O3/ /O4/	<i>Description:</i> This parameter is monitored by means of regulatory requirements related to LFG projects in Thailand through public information and government announcement on national regulation. During this monitoring period, no regulations were available to regulate requirements related to LFG projects. <i>Verifier's action:</i> Through the local competent of the verification team, it can be confirmed that there were no regulations announced by the Thai government which relates to LFG projects. The approval to operate and managed the SWDS has not changed and has been extended in lieu of the increased in waste tipped. The landfill site layout drawing was reviewed and there are no changes since started in 2004. <i>Conclusion:</i> Refer to CAR D2 raised.	CAR D2	OK
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies</i>	/MR/ /GSPDD/ /QM1/ /O3/	<i>Description:</i> No monitoring equipment is involved to monitor this parameter. <i>Verifier's action:</i> The landfill site layout drawings and waste tipping agreement	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/O4/	was reviewed for the continuity to operate the site. Through the local competent of the verification team, it can be confirmed that there were no regulations announced by the Thai government which relates to LFG projects A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded that the parameter is monitored is accordance to the registered GSPDD.		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /GSPDD/	☐ Correct ☒ Not correct (initial assessment) <i>Description:</i> The monitoring of this parameter is based on the landfill site layout and waste tipping agreement to continue to operate the site. <i>Verifier's action:</i> The landfill waste tipping agreement was reviewed to confirm the extension to operate the site. <i>Conclusion:</i> Refer to CAR D2 raised	CAR D2	OK
D.2.2. Op_{i,h}		Description: Operation of the equipment that consumes the LFG in hour <i>h</i>.		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i>	/MR/ /ACM1/ /GSPDD/	<i>Description:</i> The parameter is monitored continuously based on the data from the following parameters:	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/OR1/ /RD1/ /ER/	1. Flare temperature 2. Flame detection at the flare 3. Electricity generated by each gas engines. <i>Verifier's action:</i> The raw data that captured the operation of the PA was reviewed to cross checked following. 1. Flare system for temperature and gas flow 2. Flame detection at the flare 3. Gas engines gas flow meters and run hour meters 4. Electricity export meters and invoices. The data applied in the ER spreadsheet were reviewed. <i>Conclusion:</i> The parameter is monitored according to the registered GSPDD and applied methodology.		
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures</i>	/MR/ /GSPDD/ /C1/ /C2/ /C3/ /C5/ /C6/	<i>Description:</i> The measurements for the gas flow to the flare systems and gas engines are continuous. The flame detectors detect the flame continuously whenever the flare is in operation. Therefore inaccuracy is low. A summary of the calibration record is provide in Annex E of MR. <i>Verifier's action:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/QA1/	The respective instruments that measured the gas flow, temperatures, run hour meters and electricity generated are maintained and calibrated according to the calibration plan and manufacturer recommendation. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded the monitoring of the parameter is in accordance with the registered GSPDD and applied methodology.		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /RD1/ /OR1/ /GSPDD/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The equipment of the PA that consumed LFG were measured by gas flow meters, temperature transmitters, thermocouples, flame detectors, electricity meters and engine run hour meters. Therefore inaccuracy is low. <i>Verifier's action:</i> The data captured by the SCADA were reviewed to confirm the respective equipment that consumed LFG are in operations. The data captured are correct for the monitoring period. <i>Conclusion:</i> It is concluded that the parameter is correctly monitored and in accordance to the registered GSPDD	OK	OK
D.2.3. EG_{PJ,y}		Description: Amount of electricity generated using LFG by the project activity in year y		

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /PDD/ /ACM1/ /E1/ /E2/ /ER/	<i>Description:</i> The electricity generated using the LFG is measured continuously by electricity meters and fed to the Thai National grid. There are two electricity meters installed, one primary main meter owned by PEA (Provincial Electricity Authority) and one secondary backup meter owned by the project owner. <i>Verifier's action:</i> The exported electricity reports issued by PEA is cross checked with invoices and against the ER spreadsheet to confirm the data applied for the ER calculations are correct. <i>Conclusion:</i> It is concluded that the measurement for this parameter is according to the registered GSPDD and applied methodology.	OK	OK
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by</i>	/MR/ /QM1/ /E8/ /C6/ /RD1/ /TR/ /GSPDD/	<i>Description:</i> The parameter is measured by calibrated electricity meters according to the Thailand standard. Therefore inaccuracy is low. There were several exchanges of the electricity meters for calibration purposes and / or due to malfunction. A summary of the calibration record is provide in Annex E of MR. The accuracy of the electricity meters are Class 0.5s. <i>Verifier's action:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>competent personnel.</i>		The calibration records and certificates were reviewed and confirmed calibration conducted by PEA and valid for the monitoring period. The meter specification was reviewed to confirm the accuracy. The specifications of the exchanged meters were checked to ensure is the same as the installed meter. Training records were reviewed and operators were interviewed to confirm they have received appropriate training to carry out their task. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded the parameter is measured in accordance to the registered PDD and the applied methodology.		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /E1/ /E2/ /GSPDD/ /ER/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The amount of electricity exported to the Thai National Grid is continuously monitored by one Primary electricity meter and one Secondary electricity meter. <i>Verifier's action:</i> The data applied in the ER spreadsheet were cross checked with the electricity invoices, monthly electricity reports and are correct.. <i>Conclusion:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		It is concluded that the parameter is correctly monitored and according to registered GSPDD.		
D.2.4.EG_{EC,V} (The same parameter as EC _{PJ,V} different nomenclature for ACM0001version 13.0.0 and “Tool to calculate baseline, project and/or leakage emission from electricity consumption” version 01)		Description: Amount of electricity consumed by the project activity in year y		
a) Measurement / Determination method Describe how the monitoring parameter was measured / determined. Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.	/MR/ /PDD/ /ACM1/ /ER/	Description: The amount of electricity consumed by the project activity is imported from the Thai grid is continuously measured by 2 electricity meters. Two electricity meters installed one is the main primary meter owned by PEA (Provincial Electricity Authority) and one secondary backup meter owned by the project owner. Verifier's action: The imported electricity invoices issued by PEA is cross checked against the ER spreadsheet to confirm the data applied for the ER calculations are correct. Conclusion: It is concluded that the measuring and determination method for this parameter is according to the registered PDD. However, refer to CAR D3 raised	CAR-D3	OK
b) Accuracy and QA/QC Procedure In case of measured (or estimated) values, check	/MR/ /QM1/	Description: The parameter is measured by calibrated electricity meters	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/E8/ /C6/ /ER/ /TR/ /ACM1/	according to the Thailand standard. Therefore inaccuracy is low. There were several exchanges of the electricity meters for calibration purposes and / or due to malfunction. A summary list of the calibration record is provided in Annex E of the MR. The accuracy of the electricity meters are Class 0.5s. <i>Verifier's action:</i> The calibration records and certificates were reviewed and confirmed calibration conducted by PEA and valid for the monitoring period. The meter specification was reviewed to confirm the accuracy. The specifications of the exchanged meters were checked to ensure is the same as the installed meter. Training records were reviewed and operators were interviewed to confirm they have received appropriate training to carry out their task. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded the parameter is measured in accordance to the registered PDD and the applied methodology.		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or</i>	/MR/ /ER/ /GSPDD/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The amount of electricity exported to the Thai National Grid is	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		continuously monitored by one Primary electricity meter and one Secondary electricity meter. <i>Verifier's action:</i> The data applied in the ER spreadsheet were cross checked with the electricity invoices and are correct The monthly electricity reports issued by the PEA were reviewed to confirm the electricity amount imported for correctness. <i>Conclusion:</i> It is concluded that the parameter is correctly monitored and according to registered GSPDD.		
D.2.5. $V_{t,db}$		Description: Volumetric flow of the gaseous stream in time interval t on a dry basis		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /GSPDD/ /ACM1/ /RD1/ /ER/ /QM1/	<i>Description:</i> The parameter is measured continuous by V-cone gas flow meter fitted with differential pressure transmitter and with pressure and temperature sensors fitted to capture the data for the normalised flow rate. The volumetric flow rate of the LFG consists of following data from: 1. Total LFG captured ($LFG_{total,y}$) 2. LFG combusted by gas engines ($LFG_{electricity,y}$) 3. LFG combusted at the flare systems ($LFG_{flare,y}$) The total LFG captured ($LFG_{total,y}$) is compared with the summation of LFG combusted by the gas engine ($LFG_{electricity,y}$)	GAR-D4	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		plus LFG flare ($LFG_{\text{flare},y}$) and the lower value of the either the total LFG or the summation of LFG engines plus LFG flares will be applied for ER calculation. A “Mass Balance” method is applied to determine the conservative data to be applied for ER calculations. The data are captured on every one minute basis and recorded at the SCADA system. The data are aggregated monthly and yearly. <i>Verifier’s action:</i> The data in ER spreadsheet was checked with the raw data to confirm the lower values after comparing was applied in the ER calculation as a conservative approach. The mass balance calculation method applied in the raw data calculation was checked against the method documented in the GSCDM Monitoring Manual and is correct. The data in the SCADA system was checked during onsite to confirm it is captured every minute. <i>Conclusion:</i> The parameter is monitored according to the registered GSPDD and applied methodology. Refer to CAR D4 raised		
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance</i>	/MR/ /QM1/ /C1-C3/	<i>Description:</i> The flow meters, differential pressure transmitters, pressure and temperature sensors are calibrated based on the manufacturer requirements.	CAR-D4	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/E4-E6/	A summary of the calibration record is provided in Annex E of MR. The accuracy of the measuring instruments are listed in Annex D of MR. <i>Verifier's action:</i> The calibration record of each instrument was checked to confirm the validity period as specified by the manufacturer. The calibration certificates were reviewed to confirm the date of the calibration conducted as stated in Annex E of MR. The specifications of several changes of the instruments due to calibration were checked to confirm there are the same. The instruments specifications were reviewed to confirm the accuracy as listed in Annex D of MR. A GSCDM Monitoring is implemented. Training records were reviewed and interviewed with the operators were conducted to confirm they have received appropriate training to carry out their task. <i>Conclusion:</i> It is concluded the accuracy of the measurements are met. However refer to CAR D4 raised		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or</i>	/MR/ /GSPDD/ /ER/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data for the total amount of LFG captured and combusted	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/RD1/ /QM1/	by the flares and gas engines are measured by flow meters with pressure and temperature functions to read as normalised flow rate. According to the GSCDM monitoring manual, a “Mass Balance” method is applied to determine the conservative data to be applied for ER calculations. That is the total LFG ($LFG_{total,y}$) captured is compared with the summation of LFG utilized in the gas engine ($LFG_{electricity,y}$) and LFG flare ($LFG_{flare,y}$) and the lower value of the either the monitored total LFG or the summation of LFG engines and LFG flares will be applied to calculate the emission reduction. <i>Verifier’s action:</i> The mass balance calculation method applied in the raw data calculation was checked against the method documented in the GSCDM Monitoring Manual and is correct. The data in the ER spreadsheet was cross-checked with the raw data spreadsheet that the data applied in the ER calculation for correctness and in accordance to the mass balance approach for conservativeness. <i>Conclusion:</i> It is concluded that the value in the monitoring report is correct and applied conservatively.		
D.2.6. $V_{i,t,db}$		Description: Volumetric fraction of greenhouse gas i in a time interval t on a dry basis		
a) Measurement / Determination method <i>Describe how the monitoring parameter was</i>	/MR/ /GSPDD/	<i>Description:</i> The volumetric fraction for this parameter is the measurement of	CAR-D5	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/ACM1/ /ER/ /RD1/ /TMF/ /E7/ /C4/	the methane concentration or fraction continuously by an online gas analyser. The average methane fraction for this monitoring period is 48%. The monitored data is captured every minute by the SCADA system. The measurement is the methane fraction is on dry basis since the temperature of the LFG is less than 60°C. This is in accordance to Option A of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”. During this monitoring period, there is a delay in calibration for methane analyser serial no. 29690 and MPE is applied for the period 2013-01-24 to 2013-01-25. <i>Verifier’s action:</i> The raw data was reviewed to confirm the methane fraction is measured continuously and recorded in the SCADA. The average volumetric fraction for this monitoring period is 48%. The data in the ER spreadsheet is cross-checked with the raw data for correctness. The ER spreadsheet is checked that MPE of -2.5% is applied for the period when the delay in calibration. The MPE applied is the instrument accuracy error since no error was found during calibration, therefore in accordance to §238 (a) of VVS version 05.0. The LFG is confirmed to be dry gas as the average temperature of the LFG during the monitoring period is less than 60°C. Please refer to T_t - Temperature of gaseous stream on the assessment.		

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<i>Conclusion:</i> The parameter is monitored according to the registered GSPDD and applied methodology However, refer to CAR D5 raised		
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /ER/ /C4/ /E7/ /RD1/ /GSPDD/ /QM1/ /TR/	<i>Description:</i> The gas analyser is calibrated based on the manufacturer requirements. A summary of the calibration conducted is provided in Annex E of the MR. The accuracy of the gas analyser is $\pm 2.5\%$ <i>Verifier's action:</i> The gas analyser operating manual was reviewed to confirm the calibration requirement is annually. The gas analyser specification sheet was reviewed to confirm the accuracy. The calibration certification of those installed equipment were reviewed to confirm the validity. A GSCDM Monitoring Manual is implemented. Training records were reviewed and plant operators interviewed with the operators. <i>Conclusion:</i> The parameter is monitored according to the registered GSPDD.	CAR D5	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		However refer to CAR D5 raised.		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /RD1/ /ER/ /GSPDD/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is measured continuously by an on-line analyser and therefore inaccuracy is low. <i>Verifier's action:</i> The raw data were check to confirm the consistency of the data in the ER spreadsheet. <i>Conclusion:</i> It is concluded that the parameter is monitored according to the registered GSPDD.	OK	OK
D.2.7. T_t		Description: Temperature of the gaseous stream in time interval t		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan</i>	/MR/ /GSPDD/ /ACM1/ /RD1/ /ER/	<i>Description:</i> The temperature of the gaseous stream is the landfill gas and measured continuously using temperature sensors/transmitters. The data is captured every minute and recorded by the SCADA. For operation purposes, there are 2 pipelines installed to collect the LFG extracted from the landfill and each has a temperature sensor/transmitter installed. There are 3 flares systems and 8 gas engines and each has a temperature sensors/transmitters installed to measure the LFG temperature.	OK	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>and the applied methodology.</i>		The temperature data was captured every minute for determination of the normalised LFG flow rate <i>Verifier's action:</i> The data in the ER spreadsheet was cross checked with the raw data spreadsheet for consistency of the data applied in ER calculation. The data in the SCADA was checked to confirm it was captured every minute. The temperature data was reviewed to confirm it is below 60°C and therefore consider as dry gas. <i>Conclusion:</i> It is concluded that the measurement of this parameter is according to the registered GSPDD and applied methodology.		

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /QM1/ /ER/ /E6/ /C1-C3/ /GSPDD/ /ACM1/	<i>Description:</i> The parameter is measured by calibrated temperature sensors/transmitters, therefore inaccuracy is low. A summary of the calibration record is provided in Annex E of the MR. The accuracy of the transmitter is $0.3+0.005[T]^{\circ}\text{C}$. <i>Verifier's action:</i> The calibration reports were reviewed to ensure the validity. The instrument specification was reviewed to confirm the accuracy of the equipment. A GSCDM Monitoring Manual was implemented. Training records were reviewed and operators interviewed. <i>Conclusion:</i> It is concluded the parameter is monitored in accordance to the registered GSPDD and applied methodology.	OK	OK
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i>	/MR/ /RD1/ /ER/ /GSPDD/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is measured continuously by temperature sensor/transmitter and therefore inaccuracy is low. <i>Verifier's action:</i> The raw data were checked to confirm the consistency of the data in the ER spreadsheet for correctness.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		<i>Conclusion:</i> It is concluded that the parameter is monitored according to the registered GSPDD.		
D.2.8. P_t		Description: Pressure of the gaseous stream in time interval t		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /GSPDD/ /ACM1/ /RD1/ /ER/	<i>Description:</i> The pressure of the gaseous stream is the landfill gas and measured continuously using absolute pressure sensors/transmitters. The data is captured every minute and recorded by the SCADA. For operation purposes, there are 2 pipelines installed to collect the LFG extracted from the landfill and each has an absolute pressure sensor/transmitter installed. There are 3 flares systems and 8 gas engines and each has an absolute pressure sensors/transmitters installed to measure the LFG pressure. The pressure data was captured every minute for determination of the normalised LFG flow rate <i>Verifier's action:</i> The data in the ER spreadsheet was cross checked with the raw data spreadsheet for consistency of the data applied in ER calculation. The data in the SCADA was checked to confirm it was captured every minute.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<i>Conclusion:</i> It is concluded that the measurement of this parameter is according to the registered GSPDD and applied methodology.		
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /QM1/ /C1-C3/ /E5/ /RD1/ /ER/ /GSPDD/	<i>Description:</i> The parameter is measured by calibrated absolute pressure sensors/transmitters, therefore inaccuracy is low. A summary of the calibration record is provided in Annex E of the MR. The accuracy of the pressure sensor/transmitter is 0.075% of span. <i>Verifier's action:</i> The calibration reports were reviewed to ensure the validity. The instrument specification was reviewed to confirm the accuracy of the equipment. A GSCDM Monitoring Manual was implemented. Training records were reviewed and operators interviewed. <i>Conclusion:</i> It is concluded the parameter is monitored in accordance to the registered GSPDD and applied methodology.	OK	OK
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or</i>	/MR/ /RD1/ /ER/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is measured continuously by absolute pressure	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/GSPDD/	sensor/transmitter and therefore inaccuracy is low. <i>Verifier's action:</i> The raw data were check to confirm the consistency of the data in the ER spreadsheet for correctness. <i>Conclusion:</i> It is concluded that the parameter is monitored according to the registered GSPDD.		
D.2.9. TEG_m		Description: Temperature in the exhaust gas of the enclosed flare in minute <i>m</i>		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /ACM1/ /ER/ /GSPDD/	<i>Description:</i> The temperature of the flare systems exhaust is measured continuously by a Type N Thermocouple and recorded every minute by the SCADA. There are 3 thermocouples installed at each flare stack. <i>Verifier's action:</i> The data in the ER spreadsheet was cross checked with the raw data spreadsheet for consistency of the data applied in ER calculation. The data in the SCADA was checked to confirm it was captured every minute. <i>Conclusion:</i> It is concluded that the measurement of this parameter is according to the registered GSPDD and applied methodology.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /QM1/ /C5/ /E2/ /TR/ /GSPDD/	<i>Description:</i> The parameter is measured by calibrated thermocouple therefore inaccuracy is low. A summary of the calibration record is provided in Annex E of the MR. The accuracy of the thermocouple is Accuracy Class II allowable deviation $\pm(0.0075[T])$ <i>Verifier's action:</i> The calibration reports were reviewed to ensure the validity. The instrument specification was reviewed to confirm the accuracy of the equipment. A GSCDM Monitoring Manual was implemented. Training records were reviewed and operators interviewed. <i>Conclusion:</i> It is concluded the parameter is monitored in accordance to the registered GSPDD and applied methodology.	OK	OK
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should</i>	/MR/ /RD1/ /ER/ /GSPDD/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is measured continuously by calibrated thermocouple and therefore inaccuracy is low. <i>Verifier's action:</i> The raw data were check to confirm the consistency of the data	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		in the ER spreadsheet for correctness. <i>Conclusion:</i> It is concluded that the parameter is monitored according to the registered GSPDD.		
D.2.10. Flame_m		Description: Flame detection of flare in the minute <i>m</i>		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /RD1/ /QM1/	<i>Description:</i> The parameter is monitored by a flame detector installed at each enclosed flare system continuously and recorded by the SCADA every minute by a true or false indicator. When the flare operation achieved the manufacturer's specification the SCADA will record a TRUE indicator and a FALSE indicator if the manufacturer's specification is not met. For the flare efficiency monitoring method, refer to the GSCDM monitoring manual to determine whether the flare achieved the 0% or 50% or 90% efficiency. . <i>Verifier's action:</i> The raw data records were reviewed to confirm the flame is detection is every minute to indicate whether the flare is in operation or not.. The GSCDM monitoring manual was reviewed to check on the method of determining the flare efficiency. <i>Conclusion:</i> By means of document review, the parameter is monitored in accordance to the registered GSPDD and applied methodology.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /E9/ /QM1/ /RD1/ /GSPDD/ /ACM1/	<i>Description:</i> A flame detector is used to monitor this parameter. No calibration is conducted since the measurement has no data. Periodic maintenance is required to ensure the detector is in good operating conditions. <i>Verifier's action:</i> The records from the SCADA were reviewed to ensure the data is captured every minute with a TRU or FALSE indicator. The specification is reviewed and there is no accuracy error stated. Therefore no calibration was carried out. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> By means of document review, the parameter is monitored according to the registered GSPDD and applied methodology		
c) Correctness <i>Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details</i>	/MR/ /RD1/ /GSPDD/ /QM1/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is captured every minute by a flame detector to indicate whether the flare is in operation and data recorded in the SCADA. <i>Verifier's action:</i> The raw data was reviewed to check on the TRUE and FALSE indicator to show whether the flare is in operation and meet the manufacturer's specification and measurement conditions	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>and descriptions of the CARs raised.</i>		specified in the GSCDM monitoring manual. <i>Conclusion:</i> By means of document reviewed, it can be concluded the parameter is monitored according to the registered GSPDD.		
D.2.11. Maintenance_v		Description: Maintenance events completed in year y		
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/MR/ /MD1/ /MD5/ /GSPDD/ /ACM1/ /FWS1/ /PM1/	<i>Description:</i> The parameter monitors the maintenance events of the flare thermocouples and gas engines. Each time when there is a manual shutdown occurs, he starts and ends time and reasons for shutdown is recorded. <i>Verifier's action:</i> The maintenance and downtime records were reviewed to check on the time, date and type of maintenance has conducted. The records include any changes to instruments and parts. The preventive maintenance plan is reviewed. <i>Conclusion:</i> The parameter is monitored according to the registered GSPDD and applied methodology.	OK	OK
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies</i>	/MR/ /MD1/ /MD5/ /QM1/	<i>Description:</i> There is no instrument used to measure this parameter. Any shut down for maintenance, the data will be captured by SCADA.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs. Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.	/GSPDD/ /ACM1/ /PM1/ /FWS1/	Verifier's action: The maintenance and shutdown records were reviewed on the date, time and reasons on the shutdown for maintenance. A GSCDM monitoring manual is implemented. Conclusion: By means of document review, the parameter is monitored according to the registered GSPDD and applied methodology.		
c) Correctness Determine whether the value given in the sustainability monitoring report is correct or determined in a conservative manner. In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.	/MR/ /MD1/ /MD5/ /GSPDD/ /ACM1/ /PM1/ /FWS1/	☒ Correct ☐ Not correct (initial assessment) Description: The maintenance and shutdown records are recorded each time an event happened. Therefore inaccuracy is low. Verifier's action: There is no value for the monitoring of this parameter, therefore the records are considered as correct. Conclusion: The parameter is monitored in accordance to the registered GSPDD and applied methodology.	OK	OK
D.2.12. FC_{i,j,y}		Description: Quantity of fuel type i combusted in process j during the year y		
a) Measurement / Determination method (VVS, §§ 233, 236) Describe how the monitoring parameter was	/MR/ /OR2/ /ER/	Description: The fuel consumed was measured using a ruler to determine the mass or volume. The purchase receipts for the fuel purchased were used to cross-check the quantity consumed.	CAR-D7	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/GSPDD/ /ACM1/	The fuel used is diesel. <i>Verifier's action:</i> The purchase diesel receipts were reviewed to confirm the fuel consumed during the period when the diesel genset was used. The value applied in the ER spreadsheet was cross checked with the purchase receipts. <i>Conclusion:</i> It is concluded that the measurement is in accordance with the registered GSPDD and applied methodology. Refer to CAR D7 raised		
b) Accuracy and QA/QC Procedure (VVS, §§ 237-243) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.</i>	/MR/ /OR2/ /ER/ /QM1/	<i>Description:</i> The diesel consumed is based on purchase receipts. No instrument was used to measure this parameter, therefore no calibration conducted. <i>Verifier's action:</i> The diesel purchase receipt was reviewed to confirm the amount of diesel consumed during this monitoring period is applied correctly in the ER spreadsheet. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded the monitoring of this parameter is according to the registered GSPDD.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
c) Correctness (VVS, §§ 233, 236) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /OR2/ /ER/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The amount of diesel consumed was based on the diesel purchase receipts for the period of using the diesel genset. <i>Verifier's action:</i> The diesel purchase receipts were reviewed to confirm the value applied in the ER spreadsheet for correctness. <i>Conclusion:</i> It is concluded that the value in the monitoring report and ER calculation is correct.	OK	OK
D.2.13. NCV_{i,y}		Description: Weighted average net calorific value of fuel type i in year y		
a) Measurement / Determination method (VVS, §§ 233, 236) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the</i>	/MR/ /IPCC/ /GSPDD/ /ER/	<i>Description:</i> The type of fuel used during this monitoring period is diesel. The net calorific value applied is the default value from 2006 IPCC guidelines. <i>Verifier's action:</i> The data in the ER spreadsheet was cross-checked with 2006 IPCC guidelines table 1.2 of Chapter 2 Vol. 2 to confirm the data applied is the 95% confidence interval value. <i>Conclusion:</i> It is concluded that the measurement method for this parameter is according to the registered GSPDD and applied methodology.	CAR-D8	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>		Refer to CAR D8 raised		
b) Accuracy and QA/QC Procedure (VVS, §§ 237-243) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.</i>	/MR/ /IPCC/ /ER/ /GSPDD/	<i>Description:</i> There is no measurement involved in this parameter. The value applied is according to the 2006 IPCC guidelines vol. 2, chapter 1 table 1.2. <i>Verifier's action:</i> The applied data in the ER spreadsheet was cross with the 2006 IPCC guidelines and is correct. A GSCDM monitoring manual is implemented <i>Conclusion:</i> It is concluded that monitoring of this parameter is according to the registered GSPDD.	OK	OK
c) Correctness (VVS, §§ 233, 236) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should</i>	/MR/ /GSPDD/ /IPCC/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The value for this parameter is according to the 2006 IPCC guidelines. <i>Verifier's action:</i> The 2006 IPCC guidelines vol. 2, chapter 1 table 1.2 was reviewed to confirm the value applied for correctness.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		<i>Conclusion:</i> It is concluded that monitoring of this parameter is according to the registered GSPDD		
D.2.14. EF_{CO₂,i,y}		Description: Weighted average CO₂ emission factor of fuel type i in year		
a) Measurement / Determination method (VVS, §§ 233, 236) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/MR/ /IPCC/ /ER/ /GSPDD/ /ACM1/	<i>Description:</i> The type of fossil fuel consumed during this monitoring period is diesel. The average CO₂ emission factor is according to the default value of IPCC 2006 guidelines vol. 2 Chapter 1, table 1.4. <i>Verifier's action:</i> The verification team has checked the 2006 IPCC guidelines to confirm the value applied in the ER spreadsheet is correct. <i>Conclusion:</i> It is concluded that the measurement method for this parameter is according to the registered GSPDD and applied methodology.	OK	OK
b) Accuracy and QA/QC Procedure (VVS, §§ 237-243) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for</i>	/MR/ /IPCC/ /QM1/ /ER/	<i>Description:</i> There is no measurement involved in this parameter. The value applied is according to the 2006 IPCC guidelines vol. 2, chapter 1 table 1.4.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.</i>	/GSPDD/	<i>Verifier's action:</i> The applied data in the ER spreadsheet was cross with the 2006 IPCC guidelines and is correct. A GSCDM monitoring manual is implemented <i>Conclusion:</i> It is concluded that monitoring of this parameter is according to the registered GSPDD.		
c) Correctness (VVS, §§ 233, 236) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /GSPDD/ /IPCC/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The value for this parameter is according to the 2006 IPCC guidelines. <i>Verifier's action:</i> The 2006 IPCC guidelines vol. 2, chapter 1 table 1.4 was reviewed to confirm the value applied for correctness. <i>Conclusion:</i> It is concluded that monitoring of this parameter is according to the registered GSPDD	OK	OK
D.2.15. $TDL_{i,y}$ and $TDL_{k,y}$		Description: Average technical transmission and distribution losses for providing electricity to source j or k in year y		
a) Measurement / Determination method <i>Describe how the monitoring parameter was</i>	/MR/ /GSPDD/	<i>Description:</i> The data for this parameter is the average transmission and	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>measured / determined.</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan and the applied methodology.</i>	/ER/ /O5/	distribution loss of the Thai National Grid is obtained from the annual Electricity Report issued by the Department Ministry of Energy of Thailand. <i>Verifier's action:</i> The data in the ER spreadsheet was cross checked with the annual report to confirm is applied correctly <i>Conclusion:</i> It is concluded that the monitoring of this parameter is accordance with the registered GSPDD.		
b) Accuracy and QA/QC Procedure <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out by competent personnel.</i>	/MR/ /O5/ /QM1/	<i>Description:</i> The data of this parameter is based on report issued by Department Ministry of Energy, Thailand. No measurement instrument is involved. <i>Verifier's action:</i> The verification team has reviewed the Annual Report Thailand Energy Statistics 2012 (Preliminary) issued by the Department Ministry of Energy, Thailand to confirm the value applied is according to the annual report. A GSCDM monitoring manual is implemented. <i>Conclusion:</i> It is concluded that the monitoring of this parameter is accurate.	OK	OK
c) Correctness <i>Determine whether the value given in the</i>	/MR/ /O5/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i>	OK	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/ER/	The data of this parameter is based on report issued by the Department Ministry of Energy, Thailand. <i>Verifier's action:</i> The data applied in the ER spreadsheet is cross-checked with the annual report for correctness. <i>Conclusion:</i> It is concluded that the value in the monitoring report is correct.		
D.3. Parameters monitored for Sustainability				
D.3.1. Air Quality				
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Assess whether the measurement / determination method is in line with the registered passport, applied toolkit and PDD. .</i>	/MR/ /GSP/ /GST/ /SI1/ /IM04/	<i>Description:</i> The chosen parameters to be monitored are: 1. SO₂ reduction 2. NO_x reduction 3. Stake emissions generated by the gas engines. The emissions are tested annually by external 3rd party. <i>Verifier's action:</i> The amount of electricity generated during this monitoring period by the 8 gas engines were checked against the amount exported to the grid. The country specific report on SO₂ and NO_x emissions were reviewed on the value applied is the calculation is the average for year 2001 to 2006 which is most recent public data available.	CAR-S1	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		The stack emissions results were reviewed and it derived from the test report conducted by an external 3rd party. The final calculation was checked for correctness. Local stakeholders were interviewed during onsite visit. <i>Conclusion:</i> Although the parameter is monitored in accordance to the GSP and Annex I toolkit, however refer to CAR SI1 raised.		
b) Correctness and Scoring <i>Determine whether the monitoring method value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered passport detailed assessment of the conservativeness of the approach used should be given.</i> <i>Score in accordance to Toolkit Annex I</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /GSP/ /GST/ /SI1/	☐ Correct ☒ Not correct (initial assessment) <i>Description:</i> The values are not determined according to the test results conducted by the external 3rd party report. <i>Verifier's action:</i> The calculation sheet was reviewed and data compared with the test report, emissions inventory report and default data applied. <i>Conclusion:</i> The test results and default data applied are correct and in accordance to the GSP and toolkit requirements. However, the following was raised and do not affect the correctness of the data reported. Refer to CAR SI1 raised. <i>Score:</i> With annual test is conducted and results are lower than the	CAR SI1	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		host country baseline, the verification team concluded on a score of positive impact (+) as per the Toolkit Annex I.		
D.3.2. Other Pollutants				
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Assess whether the measurement / determination method is in line with the registered passport, applied toolkit and PDD. .</i>	/MR/ /GSPDD/ /GSP/ /SI2/ /IM04/	<i>Description:</i> The parameter chosen to monitor is the noise levels. The noise level tests will be conducted annually in accordance to the national requirements of the host country, Thailand. <i>Verifier's action:</i> The noise test reports were reviewed that the tests is conducted by external 3 rd party. The test results were compared with the local authority requirements and there are lower. The local stakeholders were interviewed during the onsite visit. <i>Conclusion:</i> The measurement of this parameter is in accordance to the GSP and Annex I toolkit.	OK	OK
b) Correctness and Scoring <i>Determine whether the monitoring method value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered passport detailed assessment of the conservativeness of the approach</i>	/MR/ /GSP/ /GST/ /SI2/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is based on the annual test report by an external 3 rd party. <i>Verifier's action:</i> The test reports were reviewed and the test results are compared with the host country requirements and found to be	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>used should be given.</i> <i>Score in accordance to Toolkit Annex I</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		lower. <i>Conclusion:</i> It can be concluded, the test results are lower than the national requirement of the host country, Thailand <i>Score:</i> Comparing the test results which are lower than the baseline, the verification team concluded on a score of positive impact (+) as per the Toolkit Annex I.		
D.3.3. Quality of Employment				
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Assess whether the measurement / determination method is in line with the registered passport, applied toolkit and PDD. .</i>	/MR/ /GSP/ /GST/ /SI3/ /IM03/	<i>Description:</i> The chosen parameters to monitor are: 1. Relevant health and safety precautions taken and 2. Training given to staff to developing skills. <i>Verifier's action:</i> The corporate responsibility manual was reviewed that states the health and safety precautions that the employees need to observed. Employees were interviewed during onsite visit to check on relevant health and safety training provided. Training records were reviewed to check on and verify the number of trainings conducted and provided to the employees as regards to health and safety. <i>Conclusion:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		The measurement of this parameter is in accordance to the GSP and Annex I toolkit.		
b) Correctness and Scoring <i>Determine whether the monitoring method value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered passport detailed assessment of the conservativeness of the approach used should be given.</i> <i>Score in accordance to Toolkit Annex I</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /GSP/ /GST/ /SI3/ /IM01/ /IM02/ /IM03/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The data is sourced from the health and safety training records. <i>Verifier's action:</i> The training records and training matrix were reviewed which shows 51 trainings were conducted during the monitoring period. Employees were interviewed during the on site visit. <i>Conclusion:</i> It can be concluded health and safety training are provided to all new and existing employees regularly. <i>Score:</i> There were 51 health and safety and other trainings provided either attended externally or internally during the monitoring period, the verification team concluded on a score of positive impact (+) as per the Toolkit Annex I.	OK	OK
D.3.4. Quantitative employment and income generation				
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Assess whether the measurement / determination</i>	/MR/ /GSP/ /GST/ /SI4/	<i>Description:</i> The parameter chosen to monitor is the number of jobs created for the operation of the PA. <i>Verifier's action:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>method is in line with the registered passport, applied toolkit and PDD. .</i>	/IM03/ /IM04/	The employment records were reviewed which shows there were 16 permanent staffs employed by the project company as compared to the baseline of 0. Local stakeholders and employees interview during onsite on employment of local community. <i>Conclusion:</i> The measurement of this parameter is in accordance to the GSP and Annex I toolkit.		
b) Correctness and Scoring <i>Determine whether the monitoring method value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered passport detailed assessment of the conservativeness of the approach used should be given.</i> <i>Score in accordance to Toolkit Annex I</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /GSP/ /SI4/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The method of measurement is by mean of number of jobs created as compared to the baseline before the project starts. <i>Verifier's action:</i> The employment records were reviewed to check on the jobs created from the time the project starts until the end of this monitoring period. There were 16 employees with jobs such as management, supervisors, operators, engineers and technicians. The employees were interviewed during the onsite visit. <i>Conclusion:</i> It can be concluded, the staff employed for the permanent jobs are from the communities located nearby to the project. <i>Score:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		There were 16 permanent jobs are created that benefit the local community and the verification team concluded on a score of positive impact (+) as per the Toolkit Annex I.		
D.3.5. Technology transfer and technological self-reliance				
a) Measurement / Determination method <i>Describe how the monitoring parameter was measured / determined.</i> <i>Assess whether the measurement / determination method is in line with the registered passport, applied toolkit and PDD. .</i>	/MR/ /GSP/ /GST/ /SI5/	<i>Description:</i> The chosen parameter to be monitored is the number of visitors from other organisations. <i>Verifier's action:</i> During the onsite, the lists of visitors and organisations were reviewed. The visitors are from various organisations both locally and foreign. <i>Conclusion:</i> The parameter is monitored in accordance to the GSP and Annex I toolkit.	OK	OK
b) Correctness and Scoring <i>Determine whether the monitoring method value given in the sustainability monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered passport detailed assessment of the conservativeness of the approach used should be given.</i>	/MR/ /GSP/ /GST/ /SI5/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The method of measurement is by mean of number of visitors visit the project activity as from the date the project starts operation until the end of this monitoring period. <i>Verifier's action:</i> The visitors records and attendance lists were reviewed to	OK	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>Score in accordance to Toolkit Annex I</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		check on the number of visitors and type of organisations visiting the project activity from the time the project starts until the end of this monitoring period. There were 137 visitors for this monitoring period is from universities, local authorities, foreign landfill management companies, local and foreign power generations companies and foreign government authorities. <i>Conclusion:</i> It can be concluded, the project activity technology and technological self-reliance has created interest to both locally and foreign visitors <i>Score:</i> The number of visitors visiting the project activity were 137 for this monitoring period, the verification team concluded on a score of positive impact (+) as per the Toolkit Annex I.		
D.4. Sampling				



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
a) Implementation of sampling plan <i>Check whether the PP has applied a sampling approach to determine the monitored values (as per section D.2 above).</i> <i>If this is the case, please provide an assessment whether the PPs have correctly and sufficiently described the implemented sampling plan including</i> <i>a) Description of the implemented sampling design</i> <i>b) Collected data</i> <i>c) Analysis of collected data</i> <i>d) Demonstration on whether the required confidence/precision has been met.</i>	/MR/ /ER/	☒ No sampling approach has been used by the PP to determine the monitored parameters OR. ☐ A sampling approach has been taken for the following monitored parameter: Parameter: Name_of Parameter Description: Verifier's action: Conclusion:	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Sampling during verification <i>In case the VT has applied a sampling approach in the course of the verification the approach shall be described for each parameter.</i>	/MR/ /ER/	☐ No sampling approach has been used by the VT to verify the monitored parameters OR. ☒ A sampling approach has been applied by the VT for the following monitored parameter: Parameters: EG_{PJ,y}, V_{t,db}, V_{i,t,db}, T_i, P_i and TEG_m <i>Description:</i> Refer to section 5.9.2 for further explanation for the sampling of these parameters. <i>Conclusion:</i> It can be concluded the sampling conducted was to ensure a 90% confidence interval and margin error of 5%.	OK	OK
E. Calculation of Emission reductions				
E.1. Traceability <i>Assess if the calculation is fully traceable. In case of complex calculations an Excel calculation spreadsheet shall be used. All applied formulae must be visible.</i>	/MR/ /ER/ /RD1/	<i>Description:</i> The calculation provided is fully traceable to the raw data excel sheet. <i>Verifier's action:</i> The verification team has verified the Emission Reduction excel sheet. The values provided in the ER excel sheet is traceable to the raw data excel sheet. All formulas to determine the emission reduction could be reviewed and deemed correct. <i>Conclusion:</i> Refer to CAR E1 and CAR E2 raised	~~CAR E1~~ ~~CAR E2~~	OK OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
E.2. Parameter consistency <i>Assess whether all internal and external parameters and data used for calculation are applied consistently in the monitoring report and the calculation spreadsheet?</i> <i>Consider only the correct data exchange between the monitoring report and the calculation spreadsheet (if any). Further ensure the consistency of notations for all parameters in the PDD, MR and calculation spreadsheet.</i>	/MR/ /ER/ /GSPDD/ /ACM1/	<i>Description:</i> The internal and external parameters and data used are provided in the monitoring report and the excel spread sheet. <i>Verifier's action:</i> The excel spread sheet and the MR were reviewed. <i>Conclusion:</i> Refer to CAR E2 raised	CAR E2	OK
E.3. Correctness of calculation <i>Check if the applied formulae and methods for calculating baseline emissions, project emissions and leakage are in accordance with the monitoring plan and / or the approved methodology.</i> <i>Assess whether the provided calculations are complete and reflect all requirements of the monitoring plan.</i> <i>Check especially that no standard or old values have been used for calculation where calculations based on up-to-date data is required.</i>	/MR/ /GSPDD/ /ER/ /ACM1/	<i>Description:</i> The formula applied to calculate the emissions is accordance with the registered GSPDD and applied methodology. <i>Verifier's action:</i> The excel spread sheet was checked to confirm the equations applied to calculate the emissions are consistent with the registered GSPDD and the applied methodology No old values were applied in the excel sheets. All values were check to confirm no standard value where it requires up-to-date data were applied. The MR and ER were check against with the applied methodology to confirm all the equations applied are correct. <i>Conclusion:</i>	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		It is concluded that the emission reductions are correctly calculated.		
E.4. Emission reductions table <i>Check if the MR includes a summary table of the emission reductions calculation specifying separately</i> - Total baseline emissions - Total project emissions: - Total leakage - Total emission reductions. <i>Assess whether the values are correct or need to be revised as a consequence of issues identified above.</i>	/MR/ /ER/	☒ The MR includes in section E.4 a summary table of the emission reductions calculation. ☒ The summary table specified the total baseline, project and leakage emissions as well as the total emission reductions separately. ☒ The values as specified in the ER summary table are correct; no issues have been identified during the verification which require changes in the ER calculation. ☐ During the verification issues with impact on the ER calculation have been identified. Thus subject to the closure of above listed findings the summary table in E.4 needs to be revised. In this context no additional findings have been identified:	OK	OK
E.5. Comparison with ex-ante determined emission reductions <i>Check if the MR includes a comparison of actual values of the monitoring period with the estimations in the registered PDD.</i> <i>Check further whether in case of an increase an appropriate explanation is included in the MR.</i> <i>Assess in case of a significant increase whether this is due to technical or organisational changes within or outside the control of the PP and – if this is case –</i>	/MR/ /GSPDD/ /O6/ /OR1/ /unfccc/	<i>Description:</i> The ER of this monitoring period has been identified to be more than the estimated ER is the registered GSPDD. This was mainly due to the change of GWP value for methane as of 2013-01-01 to 25, increased in waste tipping and higher electricity generated. <i>Verifier's action:</i> The verification team has reviewed EB69 meeting report that states the default GWP for methane is change from 21 to 25 as from the 2 nd commitment period and based on the IPCC working group 1 4 th assessment report.	OK	OK



Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>whether the PRC have been considered appropriately.</i>		The waste tipping records were checked to confirm the increase in waste entering the landfill during the monitoring period. The operating hours of the gas engines were reviewed to confirm the increase in electricity generation when compared to previous monitoring period. The MR has been checked to confirm the comparison and justification has been included. <i>Conclusion:</i> It is concluded that appropriate explanation has been included in the MR to explain the increase of ER.		

ANNEX 2: STATEMENTS OF COMPETENCE OF INVOLVED PERSONNEL

		
Statement of Competence Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program		
Mr. Robert Cheong		
SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification)	2015-04-01
VCS / ISO 14064-2	Senior Assessor (Validation, Verification)	2015-04-01
Authorization status for technical areas within sectoral scopes:		
CODE	TECHNICAL AREA	
1.2	Renewable Energies	
2.1	Electricity Distribution	
3.1	Energy Demand	
13.1	Waste Handling and Disposal	
128 – Rev. 3, Date: 2012-04-02		
128_S01-F003_2012-04-02_rev3.doc		

		
Statement of Competence Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program		
Mr. Nicholas Chee Yin Cheong		
SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification)	2015-05-11
VCS / ISO 14064-2	Lead Assessor	2015-05-11
Authorization status for technical areas within sectoral scopes:		
CODE	TECHNICAL AREA	
1.2	Renewable Energies	
13.1	Waste Handling and Disposal	
156 – Rev. 3, Date: 2012-05-12		
156_S01-F003_2012-05-12_rev3.doc		

		
Statement of Competence Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program		
Mr. Vasasmith Nattapon		
SCHEME	STATUS	VALID UNTIL
CDM	Assessor (Validation, Verification)	2014-11-01
VCS	Assessor	2014-11-01
Authorization status for technical areas within sectoral scopes:		
CODE	TECHNICAL AREA	
13.1	Waste handling and disposal	
160 – Rev. 2, Date: 2011-12-07		
160_S01-F003_2011-12-07_rev2.doc		



Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Mr. David Lubanga

SCHEME	STATUS	VALID UNTIL
CDM	Assessor	2015-08-09
VCS / ISO 14064-2	Assessor	2015-08-09

251 - Rev. 1, Date: 2012-08-10

251_S01-F003_2012-08-10_rev1.doc

S01-F003 rev2 / 2012-04-05



Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Mr. Dr. Jochen Schubert

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2014-05-11
VCS	Senior Assessor (Validation, Verification) Technical Reviewer	2014-05-11

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA	TR INCLUDE SUB-AREAS
1.2	Renewable Energies	1.2.1 Hydro 1.2.2 Wind 1.2.3 Geothermal 1.2.4 Solar 1.2.5 Tidal
13.1	Waste handling and disposal	13.1.1 Waste management 13.1.2 Waste water management

056 – Rev. 2, Date: 2011-07-29

056_S01-F003_2011-07-29_rev2

S01-F003 rev6 / 2010-04-19