Pre-CDM GS VER Verification Report

of “Blue Fire Bio wastewater treatment and biogas utilization project” in Thailand

GLC Report No: GS022, Rev. 06

Germanischer Lloyd Certification GmbH • Brooktorkai 18 • 20457 Hamburg • Germany
Handelsregister Hamburg, Abt. B., Nr. 52078

Verification Report

GLC Report No: GS022, Rev. 06

Organisational Unit Germanischer Lloyd Certification GmbH (GLC), Greenhouse Gas Services		
Client South Pole Carbon Asset Management Ltd.	**Client reference person** Mr Patrick Burgi	
Summary:		
GS VER Project ID:	GS778	
GS CDM Project ID:	GS662	
UNFCCC CDM Ref. No.:	4219	
Project Name:	Blue Fire Bio wastewater treatment and biogas utilization project (300147)_pre-CDM VER	
Project Country:	Thailand	
Sectoral Scope, Technical Area	CDM Sectoral Scope: 1 and 13, Technical Area: 1.1 and 13.1	
Applied Methodology (ies):	AMS III.H., version 13 AMS I.C., version 16 AMS I.D., version 15	
Project Size:	☐ Large Scale	☒ Small Scale
Number of verification:	Pre-CDM	
Dates of monitoring period (incl. both days)	2010-04-09 to 2011-04-08	
Project assessed by: Mr. Markus Weber Mr. Karunakar Avuram Dr. Ulrike E. A. Leroff Dr. Stephen P Etheridge Mr.Sithisakdi Apichatthanapath	**Assessment reviewed by:** Ms. Jian Shi Mr. Hang Zhou Mr. Jose-Emilio Moreno	**Work approved by:** Mr. Jose-Emilio Moreno
Date of this revision:	**Revision No.**	**Number of pages**
2012-06-04	Rev. 06	92

Mode of Distribution:

☒ No distribution without permission from the client or responsible organisational unit ☐ Limited distribution ☐ Unrestricted distribution

History of report revisions:

Rev.	Date	**Person** (short sign or name)	**Function**	**Action**
01	2012-05-11	KAV / UEAL / SPE / MWeb	Auditor / TE / TE / ATL	Draft report preparation
02	2012-05-18	Jis / JMor	TR / Review expert	Review with comments
03	2012-05-25	Hang	Review expert	Review with comments
04	2012-05-25	KAV	Auditor	Addressing TR comments
05	2012-05-26	Jis	TR	Review revised report
06	2012-06-04	JMor	Final reviewer / Approver	Final Review and approval

Abbreviations

BFB	Blue Fire Bio Co., Ltd.
BFR	Biogas Reactor
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH_4	Methane
CO_2e	Carbon dioxide equivalent
COD	Chemical Oxygen Demand
CL	Clarification Request
EB	UNFCCC's Executive Board
ER	Emission Reduction
ER Sheet	Emission Reduction calculation spread sheet
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GLC	Germanischer Lloyd Certification GmbH
GS	Gold Standard
MP	Monitoring Plan
MR	Monitoring Report
NA	Not Applicable
NCV	Net Calorific Value
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
SD	Sustainability Development
UASB	Up-flow Anaerobic Sludge Blanket
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reduction
VVM	Validation and Verification Manual

Table of Contents **Page**

1. INTRODUCTION 6
1.1 Objective 6
1.2 Scope 6
1.3 GHG Project Description 7

2. VERIFICATION TEAM 9

3. METHODOLOGY OF VERIFICATION 11
3.1 Verification Process 11
3.2 Desk review 11
3.3 On-site assessment 12
3.4 Resolution of Findings and Reporting 14
3.5 Technical Review 14

4. VERIFICATION FINDINGS 15

5. VERIFICATION REPORTING 15
5.1 Project implementation in accordance with the registered PDD 15
5.2 Compliance of the monitoring plan with the monitoring methodology 16
5.3 Compliance of the monitoring with the monitoring plan 17
5.4 Assessment of data and calculation of GHG Emission Reductions 56

6. VERIFICATION STATEMENT 61

7. REFERENCES 63

ANNEX A: Resolution of Corrective Action and Clarification Requests (Findings' List)..... 69

1. INTRODUCTION

South Pole Carbon Asset Management Ltd. has commissioned the Germanischer Lloyd Certification GmbH (GLC) to carry out the pre-CDM GS VER verification of the project "Blue Fire Bio wastewater treatment and biogas utilization project" (GS VER project ID: GS778 and UNFCCC CDM project reference number: 4219) with regard to the relevant requirements for GS and CDM project activities.

The project was validated and registered with UNFCCC on 2011-04-09. This is the pre-CDM VER verification of the project corresponding to a period of one year prior to the CDM registration which covers the period from 2010-04-09 to 2011-04-08.

The verification team of GLC has reviewed implementation of the project activity and the monitoring plan described in the registered PDD /1/. GHG data for the monitoring period covering from 2010-04-09 to 2011-04-08 was verified in detailed manner applying the set of requirements, audit practices and principles as required under the latest version of Validation and Verification Manual /3/ of the UNFCCC. Implementation of Sustainability monitoring plan was verified against the GS Passport /2/ and on the basis of Gold Standard criteria. Gold Standard criteria refer to requirements in Gold Standard Requirement, Gold Standard Toolkit and Gold Standard Toolkit Annexes of Version 2.0 /4/.

This report summarizes the findings and conclusions of this pre-CDM VER verification of the above mentioned registered 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. It includes the verification

- that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- that the monitoring report and other supporting documents provided are complete and verifiable and in accordance with applicable CDM and GS requirements;
- that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan of the revised PDD and the approved methodology;
- that the data is recorded and stored as per the monitoring methodology;
- that the SD indicators are monitored as per the Sustainability Monitoring Plan described in the GS Passport

1.2 Scope

The verification of this registered project is based on the validated registered PDD /1/, registered GS Passport /2/, monitoring report (MR) /5/, ER sheet /6/, supporting documents made available to the verifier

and information collected through performing interviews 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 /7/
- Guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 /8/ and subsequent decisions made by the Executive Board and COP/MOP
- Other relevant rules, including the host country legislation
- CDM Validation and Verification Manual /3/
- Gold Standard Requirements, version 2.0 /4/
- Registered PDD /1/
- GS Passport /2/
- Approved small scale CDM baseline and monitoring methodologies/9/; AMS III.H., version 13: "Methane Recovery in Wastewater Treatment", AMS I.C., version 16: "Thermal energy production with or without electricity" and AMS I.D., version 15: "Grid connected renewable electricity generation"

1.3 GHG Project Description

The project activity consists of installation of new biogas reactors for wastewater treatment with methane capture and utilisation for energy generation purposes at an existing starch manufacturing facility. The project activity avoids the release of methane into the atmosphere, which would have occurred due to the anaerobic digestion of the organic content in the open lagoon based wastewater treatment system. In addition, the biogas reactors produce sufficient quantities of biogas to fuel onsite gas engines to generate electricity and thermal oil boiler to produce heat energy at starch factory. Therefore, the displacement of electricity from the national grid which is generated by fossil fuel fired power plants to a large extent and replacement of heavy fuel oil in boiler lead to further reductions of greenhouse gases.

Technical Project Description:

The wastewater from the starch factory is collected in sedimentation tank and from the sedimentation tank the wastewater goes into pump sump. From the pump sump, it is pumped into acidification pond and from acidification pond to biogas reactor. In the biogas reactor (called BFR), wastewater flows upward through a sludge blanket composed of microorganisms that naturally form granules or particles of 0.5 to 2mm in diameter ("sludge granules"). When wastewater comes in contact with the granules, anaerobic decomposition of the organic material contained in the wastewater takes place, resulting in the generation of methane-rich biogas.

The biogas is collected through a dedicated pipeline network and stored in gas storage tanks (three covered lagoons) of total 50,000 m^3. The biogas is used as a fuel in gas engines of 1.128 MW_{el} (2x0.5 MW_{el} + 0.128 MW_{el}) capacity for electricity generation and in thermal oil boilers at starch factory (two boilers each of 4.070 MW_{th} capacity). An open flaring system is also provided in order to flare out the excess biogas, if any, into the atmosphere.

The BFR system comprises of three reactor tanks and the wastewater from the BFR tanks is sent to open lagoons for secondary treatment.

The key components of the project activity are given in table 1-1:

Table 1-1: Key components of the project

Component	Design Capacity /10/
BFR	BFR 1 and BFR 2: 3400 m^3/day each BFR3: 6800 m^3/day
Gas engines or Electricity generators	2 units of 0.5 MW_{el} each Engine model: $Z12V190Z_LD_K$-2A Engine Type: 4-stroke, Spark plug ignition, water cooled Gas engine Model: JED 128-200 1 unit of 0.128 MW_{el} Generator: 3-ph Brushless Synchronous Generator
Thermal oil Boilers	Two units of 4.070 MW_{th} SCHRRER Oil Circulating Boiler, Type *CIRCOTHERM*-CH 3.500
Open flaring system	500 m^3/hr

Involved Parties and Project Participants:

The following parties to the Kyoto Protocol and project participants are involved in this project activity (Table 1-2).

Table 1-2: Project Parties and project participants

Characteristic	Party	Project Participant
Host party	Thailand	Blue Fire Bio Co.,Ltd
Other involved party	Switzerland	South Pole Carbon Asset Management Ltd.

Project Location:

The details of the project location are given in table 1-3:

Table 1-3: Project Location

No.	Project Location
Host Country	Thailand
Region:	Nakhorn Ratchasima (Korat)
Project location address:	61 Moo 14, Hindad, Dan Khun Tot District
Latitude:	15.1303 N
Longitude:	101.5586 E

2. VERIFICATION TEAM

The appointment of the team takes into account the required scope and sector specific knowledge requirements for verifying the emission reduction achieved by the project activity in the relevant monitoring period for this verification.

The verification team consists of the following members:

Table 2-1: Verification team members, qualification and knowledge

	Name	Function [1]	Sectoral scope specific knowledge	Technical area specific knowledge	Local knowledge	Type of involvement						
						Desk review	On-site visit / interviews	Reporting	Supervision of work	Technical review	Expert input	Approval
☒ Mr. ☐ Ms.	Markus Weber	ATL	X	X		X			X			
☒ Mr. ☐ Ms.	Karunakar Avuram	A				X	X	X				
☐ Mr. ☒ Ms.	Ulrike E. A. Leroff	E	X	X	X	X	X				X	
☒ Mr. ☐ Ms.	Stephen P Etheridge	E	X	X	X	X					X	
☒ Mr. ☐ Ms.	Sithisakdi Apichatthanapath	E			X	X	X				X	
☐ Mr. ☒ Ms.	Jian Shi	TR	X							X		
☒ Mr. ☐ Ms.	Hang Zhou	R/E	X	X						X	X	

	Name	Function [1]	Sectoral scope specific knowledge	Technical area specific knowledge	Local knowledge	Type of involvement						
						Desk review	On-site visit / interviews	Reporting	Supervision of work	Technical review	Expert input	Approval
☒ Mr. ☐ Ms.	Jose-Emilio Moreno	R/E/ FA	X	X						X	X	X

1) ATL: Assessment Team Leader; A: Auditor, E: Expert; TR: Trainee Reviewer; R: Reviewer; FA: Final Approver

3. METHODOLOGY OF VERIFICATION

3.1 Verification Process

The verification process was carried out based on the guidelines described in the Validation and Verification Manual (VVM)/3/ and Gold Standard Requirements, version 2.0./4/. Standard auditing techniques have also been applied for the verification. The verification team performed first a desk review, followed by an on-site visit to review the project realisation. The findings raised during the verification are provided in Annex A. In case of lack of clarity or inconsistencies, related findings were raised. The next step was to close out the findings through direct communication with the PPs and finally prepare the verification report. This verification report and other supporting documents have then undergone a technical review by the "GLC GmbH" prior to the submission to the PP.

3.2 Desk review

From 2012-02-16 to 2012-02-24, GLC has conducted a desk review of all documents initially provided by the client and publicly available documents relevant for the verification. The main reviewed documents are listed below:

- Monitoring report /5/
- Emission reduction calculation spread sheet /6/
- The registered PDD /1/ and the corresponding validation report /11/
- The GS Passport /2/
- Pre-feasibility Assessment (PFA) document /12/

- The applied monitoring methodologies /9/
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board
- Other relevant documents referred in the monitoring report

3.3 On-site assessment

From 2012-02-27 to 2012-02-28, GLC's verification team carried out an on-site visit to the project site. The project activity was implemented by Blue Fire Bio Co.,Ltd. (BFB) at Chaodee Starch (2004) Co.,Ltd. located in Korat province of Thailand. The biogas plant (i.e. the project activity) was designed by Biogas Forerunner Co., Ltd. and is operated by BFB. BFB purchases effluent from Chaodee Starch, then treats the effluent and the biogas is sold back to the starch plant for drying of the starch with excess biogas being used for power generation. Therefore, BFB operates and maintains the biogas plant employing its own staff while Biogas Forerunner as the technology provider consults on the project and trains BFB staff.

The main tasks covered during the site visit include, but were not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and working 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 monitoring data was checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings and COD analysis at on-site laboratory
- Operational conditions pertaining to the GS eligibility criteria was checked
- Implementation of the sustainability development monitoring plan was checked

Representatives of Blue Fire Bio Co.,Ltd., Biogas Forerunner Co., Ltd., Chaodee Starch (2004) Co.,Ltd. and South Pole Carbon Asset Management Ltd as well as local villagers were interviewed. The main topics of the interviews are summarised in Table 3-1.

Table 3-1: Interviewed persons and interview topics

Interviewed persons	Interview Topic
Mr. Chanchai Chaodee, Managing Director of Chaodee Starch (2004) Co.,Ltd. Mr. Rathaphon Tatong, MD of Biogas Forerunner Co.,Ltd. Mr. Natthapol Thanomwong, Environmental Scientist, Biogas Forerunner Co.,Ltd. Mr. Wannasak Tangpairojwava, Plant Manager, BFB Mr. Rossarin Pomyayup, Head of Operations, BFB Ms. Kitiya Boonjantok, QMS and Admin in-charge, BFB Ms. Rungrut Sitthiwongsa, QC Supervisor, BFB Mr. Patrick Burgi, Managing Partner, South Pole Carbon Asset Management Ltd Ms. Suwipa Rukwongtrakool, Project Manager, South Pole Mr. Harshpreet Singh, CDM Expert, South Pole Ms. Ladaporn Khunikakorn, CDM Project Manager, South Pole <u>Local villagers</u> Mr. Prapas Poomkhogrugs, Nong Kari Noi village Ms. Runjuan Sinkhuntod, Nong Kari Noi village Mr. Sonpeth, Moo 2, Huabong sub-district Mr. Tiw Poonkhogrug, Moo 2, Huabong sub-district	• General aspects of the project • Technical equipment and operation • Monitoring and measurement equipment • 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 calculation • Procedural aspects of the verification • Maintenance • Environmental aspects and Sustainability development • Implementation of sustainability monitoring plan

3.4 Resolution of Findings and Reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification findings have been raised. In case any inconsistencies or lack of clarity were identified during the verification the team has raised a

Corrective Action Requests (CARs), 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 that will impair the estimate of emission reductions;

Clarification Request (CL), if:

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

All CARs and CLs raised have been sent to the client with the request to address the findings. After the findings have been answered by the client in an appropriate manner, the CARs and CLs have been closed out.

For a detailed list of all CARs and CLs raised in the course of the verification please refer Annex A. The general project and procedural description of the verification and a detailed list of the verification findings forms the draft verification report.

3.5 Technical Review

Before submission of the final verification report GLC has carried out a technical review of the whole verification procedure and the draft report between 2012-05-14 and 2012-06-04. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The reviewer is not part of the assessment team and thus not involved in the decision making process up to the technical review.

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

4. VERIFICATION FINDINGS

This section summarises the findings from the pre-CDM verification of the emission reductions reported for the "Blue Fire Bio wastewater treatment and biogas utilization project" for the period from 2010-04-09 to 2011-04-08. The findings of the verification are documented in more detail in the Findings List given in Annex A.

In each case where GLC had identified an issue that needed clarification or that represented a risk to the fulfilment of the project objectives, a CL or a CAR have been issued respectively. All raised CARs and CLs are documented in Annex A. The verification of "Blue Fire Bio wastewater treatment and biogas utilization project" has resulted in twelve (12) CARs and five (5) CLs. Upon successful closure of the raised CARs and CLs and based on the on-site findings and the reviewed project documentation; the verification team confirms that there are no remaining non-conformities.

The main changes between the first version of the monitoring report made available (version 1, dated 2012-01-31) and the final monitoring report (version 3 dated 2012-05-11) /5/ are summarized below:

- Gas engines capacity was updated in section 1.1
- Revision of baseline and project emissions in section 5
- Revision of summary of monitoring data in section 7.1
- Change in emission reduction value in section 7.2 due to correction of formula for calculating project emission from power consumption
- Corrections and revisions in Annex 1 (GS Monitoring Parameters)
- Emission reductions in section E.5 were updated

5. VERIFICATION REPORTING

5.1 Project implementation in accordance with the registered PDD

During the verification, an on-site visit was carried out. The onsite visit revealed that the project was implemented inline with the description provided in the registered PDD. The project activity consists of installation of biogas reactors for wastewater treatment and thereby to capture the methane rich biogas. The captured biogas is utilised in onsite gas engines of 2 x 500 kW_{el} gas engines (or gensets) and in existing thermal oil boiler at starch factory. Apart from the two gas engines 500 kW_{el} each, there is another gas engine of 128 kW_{el} which is used only as a testing engine. Therefore, the total installed capacity of gas engines is considered to be 1.128 MW_{el}. However, a CAR (refer to CAR 1) was raised as the total capacity of the gas engines mentioned in the version 1 of the MR was 3.128 MW_{el} where as the onsite visit revealed that the actual installed capacity of gas engines is 1.128 MW_{el}. In response to the CAR it was corrected and clarified the reason for the difference in capacity. The provided clarification was also inline with the description provided in section A.2 of the PDD which states, "*A first 1.128MWel biogas gensets will be installed in 2009, and the second one with a capacity up to 2 MWel is planned to be installed one year later*". The additional 2 MW_{el} was not installed as the biogas produced is not sufficient to meet the additional requirements.

The project was implemented in two phases; phase-1 consists of two biogas reactors (called BFR1 and BFR2) and phase-2 consists of one reactor (called BFR3). The secondary treatment system contains 15 open lagoons. Therefore, based on the onsite observations and reviewed project documentation, the verification team confirms that the realized technology, the project equipment, as well as the monitoring and metering equipment, have been implemented and operated as described in the approved revised PDD.

The emission reductions being claimed during the period 2010-04-09 to 2011-04-08 are 62% lower than the estimated emission reductions in the registered PDD, as given in the table below.

Parameter	As per PDD	Monitoring report
Emission Reductions (tCO_2e)	51,817	19,332
% Deviation (+/-)	0	(-) 62%

The reason for achieving lower emission reduction is that the estimated value of emission reduction in the registered PDD was based on the complete operation of 2 phases of the project activity. However, during this monitoring period, the operation of the biogas system for the 2nd phase was started only in October 2010. Besides, the installed capacity of gas engines is only 1.128 MW_{el} against 3.128 MW_{el} considered in the PDD. Reasons for the same are also explained in section 1.4 of the MR. The reduction in achieved emission reduction is reasonable and acceptable.

5.2 Compliance of the monitoring plan with the monitoring methodology

As per the applied small scale baseline and monitoring methodologies, AMS III.H., version 13, AMS I.C., version 16 and AMS I.D., version 15 /9/, the following parameters are required to be monitored:

- Flow of wastewater treated
- COD of wastewater before and after treatment
- The annual fossil fuel or electricity used to operate the facilities or power auxiliary equipment
- The amount of fossil fuel and electricity used by the project activity facility
- The amount of biogas recovered, fuelled and flared shall be monitored using continuous flow meters
- Methane content of biogas shall be monitored using continuous analyser or alternatively with periodical measurements at 95% confidence level
- Flare efficiency
- Amount of final sludge as dry matter generated by the wastewater treatment
- Amount of fossil fuel displaced
- Net electricity generated by the project activity

The registered monitoring plan sufficiently covers all the requirements of the monitoring methodologies and hence, the verification team confirms that the monitoring plan is in compliance with the applied monitoring methodologies.

5.3 Compliance of the monitoring with the monitoring plan

The parameters were monitored in accordance with the registered monitoring plan during the monitoring period. However, a deviation was taken with respect to 'the amount fossil fuel displacement' in thermal oil boiler. As per the monitoring plan of the registered PDD, the following parameters are required to be monitored in order to determine the fossil fuel displacement in boiler since the boiler is a retrofitted dual fired boiler:

- Fuel oil burnt in the hot oil boiler along with biogas (i.e. quantity of HFO burnt in the boiler)
- Flow of thermic fluid in the boiler

The fuel oil burnt in the boiler was monitored using flow meter during the monitoring period. However, due to unavailability of monitoring equipment to measure hot thermic fluid, the flow of thermic fluid in the boiler was not measured. Therefore, the following deviation was taken to estimate the parameter in a conservative manner.

Approach in PDD	**Deviated approach for the Monitoring Period and Explanation of Conservativeness**	**Assessment by verification team**
As per paragraph 15 of AMS I.C. (version 16), for steam/heat produced using fossil fuels, the baseline emissions are calculated by measuring net quantity of steam/heat supplied by the project activity and using CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant (i.e. of HFO in this case) and the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.	The project proponent uses a conservative approach, based on amount of heat required for starch drying, which in turn is estimated on heat requirements per tonne of starch based on historical data. The approach estimates the thermal energy delivered by the project activity based on historical fuel oil consumption and starch production for the given year. The deviated approach ensures that if any efficiency loss happens due to dual fired system and the energy of same is supplied by fuel oil, using the	The heat generated in the boiler is transferred to thermic fluid which is used for drying of starch in the starch plant. Therefore, the baseline emissions can also be calculated based on the amount of heat required. HFO is used as fuel in boiler in majority of the starch manufacturing plants in Thailand. Therefore, an average value of HFO consumption per ton of dry starch production has been established. The value has been checked by the verification team with the provided evidence. From the given source, it is found that the range of HFO consumption is from 25.9 Litres per ton to 39.4 Litres per ton and the

To determine net quantity of steam/heat supplied by the project activity, the parameters $Q_{HFO,y}$ (fuel oil burnt in the hot oil boiler along with biogas) and $Q_{oil,h}$ (Flow of the thermic fluid in the boiler) would be monitored.	given approach the loss is accounted in biogas usage, thereby estimating lower fuel oil replacement for baseline emission estimation. The conservativeness of approach is ensured comparing the total energy delivered by the fuels burnt in the project activity and thermal energy estimate based on historical fuel oil consumption values.	average value is 33.6 Litres per ton/13/. Prior to the implementation of the project activity, HFO was used as fuel in boilers. From the available fuel consumption and dry starch production details for the period from January 2006 to June 2007 (operation of phase-1 of the project activity was started in July 2007), the average specific fuel consumption is calculated to be 33.5 Litres per ton of dry starch. However, for calculation of the baseline emissions, minimum value of 25.9 Litres per ton (0.0259 litre / kg) has been considered. Therefore, it is confirmed that the deviated approach is appropriate and it results into conservative estimation of emission reduction. The approach has been transparently described in Annex 2 of the MR.

Following are the details of monitoring in accordance with the registered monitoring plan:

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$Q_{ww,y}$ Flow of wastewater treated in the year y (m^3)
Measuring frequency:	Continuously The parameter is measured continuously using flow meters.
Reporting frequency:	Daily The parameter is recorded by the operator or supervisor in log sheets/16/ on a daily basis. The log sheets are checked by the corresponding department manager and sent to the Office department. The Office department transfers the data into electronic format (excel files) and

<table>
<tr><td></td><td>stores.</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td><td>Yes, the measuring and reporting frequency of the parameter is inline with the registered monitoring plan.</td></tr>
<tr><td>Type of monitoring equipment:</td><td>From the onsite verification and from the project flow diagram it is confirmed that FM1 indicates the flow meter that measures the wastewater flow through BFR1, FM2 for BFR2 and FM5 for BFR3. However, it was noticed from the log sheet information that different flow meters were used for FM1 and FM2. Therefore, a CAR was raised (please refer to CAR 3) and in response to the CAR, the PP provided detailed information of the flow meters used for the measurement. The flow meter was replaced with another when a problem in the meter was observed. All the flow meters are of electromagnetic type. Details of the wastewater flow meters used are as below:

<u>FM1</u>
<table>
<tr><td>Make / Serial no.</td><td>Accuracy /14/</td><td>Period of use</td></tr>
<tr><td>YOKOGOWA / S5F804670</td><td>± 0.35%</td><td>2010-04-09 to 2010-09-09</td></tr>
<tr><td>ABB / 3K220000010927</td><td>± 0.1%</td><td>2010-09-10 to 2011-03-25</td></tr>
<tr><td>ABB / 3K220000010926</td><td>± 0.1%</td><td>On 2011-03-26</td></tr>
<tr><td>ABB / 3K220000022330</td><td>± 0.1%</td><td>2011-03-27 onwards</td></tr>
</table>
<u>FM2</u>
<table>
<tr><td>Make / Serial no.</td><td>Accuracy /14/</td><td>Period of use</td></tr>
<tr><td>YOKOGOWA / S5F804671</td><td>± 0.35%</td><td>2010-04-09 to 2010-09-09</td></tr>
<tr><td>ABB / 3K220000022330</td><td>± 0.1%</td><td>2010-09-10 to 2011-03-26</td></tr>
<tr><td>ABB / 3K220000010926</td><td>± 0.1%</td><td>2011-03-27 onwards</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>It is to be noted that the same meter (3K220000022330) which was used for FM2 from 2010-09-10 to 2011-03-26 is used for FM1 from 2011-03-27 onwards. Similarly, the meter (3K220000010926) which was used for FM1 on 2011-03-26 is used for FM2 from 2011-03-27 onwards.

<u>FM5</u>
<table><tr><td>Make</td><td>Euromag</td></tr><tr><td>Serial No.</td><td>ZAL0214</td></tr><tr><td>Accuracy</td><td>±0.2% /14/</td></tr></table></td></tr>
<tr><td>Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?</td><td>The accuracy of the monitoring equipment was defined neither in the monitoring plan nor in the applied methodology. However, GLC's Sectoral expert confirms that ±0.1% / 0.35% / 0.2% of accuracy represent good practice.</td></tr>
<tr><td>Calibration frequency /interval:</td><td>At least once in three years
<table><tr><td>Serial No.</td><td>Date of previous calibration /15/</td><td>Date of latest calibration /15/</td></tr><tr><td>3K220000 010927</td><td>2009-03-29</td><td>2011-01-01</td></tr><tr><td>3K220000 022330</td><td>2009-07-22</td><td>2011-01-01</td></tr><tr><td>3K220000 010926</td><td>2009-03-29</td><td>2010-12-31</td></tr><tr><td>S5F80467 0</td><td>2006-08-09</td><td></td></tr><tr><td>S5F80467 1</td><td>2006-08-09</td><td></td></tr><tr><td>ZAL0214</td><td>2010-02-26</td><td>2011-01-02</td></tr></table></td></tr>
<tr><td>Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency</td><td>As per the monitoring plan, the flow meters would be calibrated at least once in three years. Though the calibration interval of the flow meters is inline with the monitoring plan of the registered PDD, the YOKOGOWA meters were not calibrated properly. They were</td></tr>
</table>

represent good monitoring practise?	continued to be used for FM1 and FM2 till 2010-09-09. They were replaced with new meters on 2010-09-10. Therefore, the calibration of the old meters was not valid from 2010-04-09 to 2010-09-09. The PPs have applied the maximum permissible error of 0.35% for the measured values of wastewater flow for the corresponding period and the emission reduction has been calculated conservatively. The approach is considered to be appropriate.
Company performing the calibration:	The latest calibration of the meter was carried by Miracle International Technology Co., Ltd., Bangkok, Thailand./15/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports were verified by the verification team and they confirm the proper functioning of the meter.
Is (are) calibration(s) valid for the whole reporting period?	As mentioned above the YOKOGOWA meters which were not calibrated regularly were used for FM1 and FM2 till 2010-09-09. They were replaced with new meters on 2010-09-10. Therefore, the calibration of the old meters was not valid from 2010-04-09 to 2010-09-09. The PPs have applied the maximum permissible error of 0.35% for the measured values of wastewater flow for the corresponding period and the emission reduction has been calculated conservatively (please refer to CAR 3).
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the flow meters display the cumulative wastewater flow and the cumulative reading is recorded in the log sheet. The daily flow of wastewater is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/. An inconsistency in some of the values between the draft ER sheet and the log sheets was observed during the onsite verification. Therefore, a CAR was raised (please refer to CAR 2) to address the issue. The CAR was closed upon correcting the data in the revised MR and revised ER sheet. It is confirmed that all the data reported in the revised MR (version 2) and the

	corresponding ER sheet is correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$COD_{ww, untreated,y} = COD_{y, in, BFR}$ Chemical oxygen demand of the wastewater entering the wastewater treatment system in the year y (mg/l)
Measuring frequency:	Daily Samples of wastewater are collected from the pump sump which is at inlet of the BFR. Samples are collected for every 2 hours and the composite sample is analysed twice a day using Close Reflux Titrimetric method in the on-site laboratory to determine the COD. There are three BFRs. BFR1 and BFR2 represent phase-1 of the project activity and BFR3 represents phase-2 of the project activity. For BFR1 and BFR2, the wastewater is pumped from a common pump sump and therefore the inlet COD of both the BFR systems is same. For BFR3, the wastewater is pumped from a separate pump sump.
Reporting frequency:	Daily The COD values are recorded in the log sheet by the laboratory supervisor each time when the COD is determined. QC manager checks the COD values and sends to the Office department. The Office department transferes the data into electronic format (excel files) and stores.

Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. According to the monitoring plan, the COD of wastewater would be analysed using a Close Reflux Titrimetric method and the COD test results are logged in on a daily basis. Therefore, the monitoring practice complies with the monitoring plan and represents good practice.
Type of monitoring equipment:	NA The COD is determined using Close Reflux Titrimetric (CRT) method.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA The monitoring practice is inline with the description provided in the monitoring plan of the registered PDD. GLC's Sectoral expert confirms that CRT is an accepted standard method to determine the COD. The plant team has well documented procedure for COD determination/17/. The procedural document was reviewed during the site visit and the laboratory staff was interviewed. From the interviews it is conformed that the plant's team is competent and well aware of the COD procedures.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the laboratory log sheet

	information.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$COD_{ww,treated,y} = COD_{y,out,BFR}$ COD of water exiting the BFR treatment process (mg/l)
Measuring frequency:	Daily Wastewater samples are collected for every 2 hours from the outlet of BFR system and the composite sample is analysed twice a day using Close Reflux Titrimetric method in the on-site laboratory to determine the COD. Outlet COD of the three BFR systems is determined separately.
Reporting frequency:	Daily The COD values are recorded in the log sheet by the laboratory supervisor each time when the COD is determined. QC manager checks the COD values and sends to the Office department. The Office department transferes the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. According to the monitoring plan, the COD of wastewater would be analysed using a Close Reflux Titrimetric method and the COD test results are logged in on a daily basis. Therefore, the monitoring practice complies with the monitoring plan and represents good practice.
Type of monitoring equipment:	NA

	The COD is determined using Close Reflux Titrimetric (CRT) method.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA The monitoring practice is inline with the description provided in the monitoring plan of the registered PDD. GLC's Sectoral expert confirms that CRT is an accepted standard method to determine the COD. The plant team has well documented procedure for COD determination/17/. The procedural document was reviewed during the site visit and the laboratory staff was interviewed. From the interviews it is conformed that the plant's team is competent and well aware of the COD procedures.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the laboratory log sheet information.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is

	provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$COD_{out,lagoon,PJ,y}$ COD of water after the secondary treatment process, before being reused (mg / l)
Measuring frequency:	Daily Wastewater samples are collected for every 8 hours from the final lagoon and the composite sample is analysed once a day using Close Reflux Titrimetric method in the on-site laboratory to determine the COD. There are 15 open lagoons which are used for the secondary treatment of wastewater. The wastewater from the last lagoon is recycled to the starch factory and the samples are collected from the recycled wastewater.
Reporting frequency:	Daily The COD values are recorded in the log sheet by the laboratory supervisor each time when the COD is determined. QC manager checks the COD values and sends to the Office department. The Office department transferes the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. According to the monitoring plan, the COD of wastewater would be analysed using a Close Reflux Titrimetric method and the COD test results are logged in on a daily basis. Therefore, the monitoring practice complies with the monitoring plan and represents good practice.
Type of monitoring equipment:	NA The COD is determined using Close Reflux Titrimetric (CRT) method.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment	NA The monitoring practice is inline with the description provided in the monitoring plan of the registered PDD.

represent good monitoring practise?	GLC's Sectoral expert confirms that CRT is an accepted standard method to determine the COD. The plant team has well documented procedure for COD determination/17/. The procedural document was reviewed during the site visit and the laboratory staff was interviewed. From the interviews it is conformed that the plant's team is competent and well aware of the COD procedures.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the laboratory log sheet information /16/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$COD_{ww,removed,PJ,BFR,y}$ Chemical Oxygen Demand removed by the treatment system of the project activity equipped without biogas recovery (BFR) in the year y (tonnes/m^3)
Measuring frequency:	The parameter is calculated based on the COD of wastewater exiting the BFR treatment process and the COD removal efficiency of the baseline system. Please refer to '$COD_{ww,treated,y} = COD_{y,out,BFR}$' COD removal efficiency of the baseline system is found be 89% from the registered PDD. The verification team checked the ER sheet calculations and it is confirmed that the calculation is correct.
Reporting frequency:	Please refer to '$COD_{ww,treated,y} = COD_{y,out,BFR}$'
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequency of the parameter is inline with the approved revised monitoring plan Please refer to '$COD_{ww,treated,y} = COD_{y,out,BFR}$'
Type of monitoring equipment:	NA
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA

Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the laboratory log sheet information.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$S_{y, final}$ Amount of final sludge as dry matter generated by the wastewater treatment in the year y (Tonnes)
Measuring frequency:	Measured when the sludge is removed There was no removal of sludge during the pre-CDM verification period.
Reporting frequency:	Not applicable for this verification period
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	NA
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA

Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	NA
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$BG_{combusted,y}$ Quantity of biogas combusted for gainful use (Nm^3)
Measuring frequency:	Continuously The parameter is calculated as the sum of Amount of biogas fired in boiler ($BG_{boiler, y}$) and Amount of biogas used for power generation in gas engine ($BG_{gas\ engine, y}$)
Reporting frequency:	Daily Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Is measuring and reporting frequency in accordance with the monitoring plan and	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$

monitoring methodology? (Yes / No)	
Type of monitoring equipment:	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Calibration frequency /interval:	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Company performing the calibration:	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
Is(are) calibration(s) valid for the whole reporting period?	Please refer to $BG_{boiler, y}$ and $BG_{gas\ engine, y}$
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place.

	Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$BG_{ToFlare, y}$ Total quantity of biogas flared (Nm^3)
Measuring frequency:	Continuously The parameter is monitored on a continuous basis using gas flow meter.
Reporting frequency:	Daily The parameter is recorded by the operator or supervisor in log sheets on a daily basis. The log sheets are checked by the corresponding department manager and sent to the Office department. The Office department transfers the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequency of the parameter is inline with the monitoring plan of the registered PDD.
Type of monitoring equipment:	<table><tr><td>Type of meter</td><td>Mass flow meter</td></tr><tr><td>Tag No.</td><td>GM 1</td></tr><tr><td>Serial No.</td><td>307520</td></tr><tr><td>Accuracy</td><td>± 2% /14/</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The accuracy of the monitoring equipment was not stated in the monitoring plan. However, GLC's technical expert confirms that ±2% of accuracy represents good practice.
Calibration frequency /interval:	At least once in three years The flow meter was calibrated on 2009-08-11 and on 2010-12-31 /15/

Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	The monitoring plan of the registered PDD states that the flow meter is calibrated at least once every three years. From the above mentioned calibration dates it is confirmed that the calibration interval is inline with the registered monitoring plan. Therefore, verification team is of the opinion that the calibration frequency represents good practice.
Company performing the calibration:	The latest calibration of the meter was carried by Miracle International Technology Co., Ltd., Bangkok, Thailand./15/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports were verified by the verification team and they confirm the proper functioning of the meters.
Is(are) calibration(s) valid for the whole reporting period?	Yes. The calibration is valid for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	EG_y Net electricity generated from the biogas collected in the anaerobic treatment facility and sent to the grid (MWh)
Measuring frequency:	Continuously The measurement of the parameter is carried out continuously using electricity meter maintained by PEA.
Reporting frequency:	Monthly The electricity meter is owned by the PEA. The parameter is monitored by PEA and monthly reports are sent to the PP.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequencies are as stated in the revised monitoring plan. It is confirmed based on verification site visit that a complete monitoring system is in place and the parameter is monitored as described in the monitoring plan. However, since the electricity export started only in December 2010 and the total electricity export to the grid during the monitoring period was a small quantity, it has been neglected in calculating the baseline emissions. The action is considered to be appropriate since it results in conservative emission reduction.
Type of monitoring equipment:	Type of meter: Electricity meter Serial No.: 206500546 (PEA No. 20963728) Accuracy: ± 0.2% /14/
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The monitoring plan of the PDD does not specify the accuracy of monitoring equipment. However, accuracy of ± 0.2% represents good monitoring practice. Furthermore, the meter is owned by the PEA.

Calibration frequency /interval:	The meter is not under the jurisdiction of PP. The meter is calibrated annually according to the internal regulations of PEA. However, the calibration details of the electricity meter are not relevant for this monitoring period since the electricity export has not been considered for emission reduction calculation.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	No data has been reported for the monitoring period
How were the values in the monitoring report verified?	NA
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$BG_{recovered, y}$ Amount of biogas recovered (Nm^3)
Measuring frequency:	Continuously The parameter is calculated as the sum of Amount of biogas fired in boiler ($BG_{boiler, y}$), Total quantity of biogas flared ($BG_{ToFlare, y}$) and Amount of biogas used for power generation in gas engine ($BG_{gas\ engine, y}$)

Reporting frequency:	Daily Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Type of monitoring equipment:	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Calibration frequency /interval:	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Company performing the calibration:	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
Is(are) calibration(s) valid for the whole reporting period?	Please refer to $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the chances of errors in recording the data are minimised.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from	Yes. The verification team, based on the document

monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

<table>
<tr><th></th><th colspan="3">Assessment/ Observation</th></tr>
<tr><td>Data / Parameter:
(as in monitoring plan of PDD):</td><td colspan="3">$BG_{boiler, y}$

Amount of biogas fired in boiler (Nm^3)</td></tr>
<tr><td>Measuring frequency:</td><td colspan="3">Continuously

The parameter is monitored on a continuous basis using gas flow meter.</td></tr>
<tr><td>Reporting frequency:</td><td colspan="3">Daily

The parameter is recorded by the operator or supervisor in log sheets on a daily basis. The log sheets are checked by the corresponding department manager and sent to the Office department. The Office department transfers the data into electronic format (excel files) and stores.</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td><td colspan="3">Yes, the measuring and reporting frequency of the parameter is inline with the monitoring plan of the registered PDD.</td></tr>
<tr><td>Type of monitoring equipment:</td><td colspan="3"><table><tr><td>Type of meter</td><td>Mass flow meter</td><td>Mass flow meter</td></tr><tr><td>Tag No.</td><td>GM2 (Boiler1)</td><td>GM3 (Boiler2)</td></tr><tr><td>Serial No.</td><td>307522</td><td>307521</td></tr><tr><td>Accuracy</td><td>±2 % /14/</td><td>±2 % /14/</td></tr></table></td></tr>
<tr><td>Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring</td><td colspan="3">The accuracy of the monitoring equipment was not stated in the monitoring plan. However, GLC's technical expert confirms that ±2% of accuracy represents good</td></tr>
</table>

<table>
<tr><td>equipment, does the monitoring equipment represent good monitoring practise?</td><td>practice.</td></tr>
<tr><td>Calibration frequency /interval:</td><td>At least once in three years
<table><tr><td></td><td>Date of previous calibration /15/</td><td>Date of latest calibration /15/</td></tr><tr><td>GM2</td><td>2009-08-11</td><td>2010-12-31</td></tr><tr><td>GM3</td><td>2009-08-11</td><td>2010-12-31</td></tr></table></td></tr>
<tr><td>Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?</td><td>The monitoring plan of the registered PDD states that the flow meter is calibrated at least once every three years.

From the above mentioned calibration dates it is confirmed that the calibration interval is inline with the registered monitoring plan. Therefore, verification team is of the opinion that the calibration frequency represents good practice.</td></tr>
<tr><td>Company performing the calibration:</td><td>The latest calibration of the meter was carried by Miracle International Technology Co., Ltd., Bangkok, Thailand./15/</td></tr>
<tr><td>Did calibration confirm proper functioning of monitoring equipment? (Yes / No):</td><td>Yes. The calibration reports were verified by the verification team and they confirm the proper functioning of the meters.</td></tr>
<tr><td>Is(are) calibration(s) valid for the whole reporting period?</td><td>Yes. The calibration is valid for the whole monitoring period.</td></tr>
<tr><td>If applicable, has the reported data been cross-checked with other available data?</td><td>The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.</td></tr>
<tr><td>How were the values in the monitoring</td><td>The reported values in the monitoring report and ER sheet were verified with the operator log sheet</td></tr>
</table>

report verified?	information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$BG_{gas\ engine,\ y}$ Amount of biogas used for power generation in gas engine (Nm^3)
Measuring frequency:	Continuously The parameter is monitored on a continuous basis using gas flow meter.
Reporting frequency:	Daily The gas flow meter display indicates cumulative gas flow. The parameter is recorded by the operator or supervisor in log sheets on a daily basis. The log sheets are checked by the corresponding department manager and sent to the Office department. The Office department transfers the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequency of the parameter is inline with the monitoring plan of the registered PDD.
Type of monitoring equipment:	Type of meter: Mass flow meter Tag No.: GM 4 Serial No.: 307523 / 307525

	<table><tr><td>Accuracy</td><td>± 2% /14/</td><td>± 2%</td></tr></table> From 2010-04-09 to 2011-02-24, the meter with serial number 307523 was used and from 2011-02-25 onwards the meter with serial number 307525 was used. Please refer to CAR 3 for details.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The accuracy of the monitoring equipment was not stated in the monitoring plan. However, GLC's technical expert confirms that ±2% of accuracy represents good practice.
Calibration frequency /interval:	At least once in three years <table><tr><td>Meter</td><td>Date of previous calibration /15/</td><td>Date of latest calibration /15/</td></tr><tr><td>307523</td><td>2009-08-11</td><td>2010-12-31</td></tr><tr><td>307525</td><td>2009-08-10</td><td>2010-12-31</td></tr></table>
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	The monitoring plan states that the flow meter is calibrated at least once in every three years. From the above mentioned calibration dates it is confirmed that the calibration interval is inline with the registered monitoring plan. Therefore, verification team is of the opinion that the calibration frequency represents good practice.
Company performing the calibration:	The latest calibration of the meter was carried by Miracle International Technology Co., Ltd., Bangkok, Thailand./15/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports were verified by the verification team and they confirms the proper functioning of the meter.
Is(are) calibration(s) valid for the whole reporting period?	Yes. The calibration is valid for the whole verification period.
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters

	display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/. Inconsistency in some of the values between the draft ER sheet and the log sheets was observed during the onsite verification. Therefore, a CAR was raised (please refer to CAR 2) to address the issue. The CAR was closed upon submitting the revised MR and revised ER sheet. It is confirmed that all the data reported in the revised MR (version 2) and the corresponding ER sheet is correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	W_{CH4} Methane content in biogas (%)
Measuring frequency:	The parameter is measured on a continuous basis using online gas analyser.
Reporting frequency:	Daily. The parameter is recorded by the operators 6 times a day and the values are logged into daily log sheet. The log sheets are checked by the department manager and

	sent to the Office department. The Office department transfers the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	It is specified in the monitoring plan of the registered PDD, "*Measurement shall be done using an online system. The volumetric fraction of methane will be measured with a continuous gas analyzer or alternatively with periodical measurements at a 95% confidence level*." From the onsite verification, it is confirmed that the monitoring practice is inline with the registered monitoring plan.
Type of monitoring equipment:	<table><tr><td>Type of meter</td><td>Gas Analyser</td></tr><tr><td>Serial No.</td><td>3.348750.9</td></tr><tr><td>Accuracy</td><td>± 1% /14/</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD does not specify the accuracy of the monitoring equipment. However, GLC's Sectoral expert confirms that ±1% of accuracy represents good practice. Besides, the accuracy of the instrument is periodically crosschecked with standard gas. Therefore, the accuracy of the equipment represents a good monitoring practice.
Calibration frequency /interval:	At least once a year The gas analyser was calibrated on 2009-08-19 /15/ by the equipment supplier. Though the gas analyser is calibrated on a weekly basis by using standard gas by the plant's team, it was not calibrated externally since 2009-08-19. Therefore, a CAR was raised since the calibration was not carried out within one year (please refer to CAR 4). In response to the CAR, the PPs have submitted supplier recommendations/26/ for calibration of gas analyser. The supplier recommends a monthly calibration by standard gas. The CAR was closed since the internal calibration of gas analyser is carried out once a week /15/.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD	According to the monitoring plan of the registered PDD, the gas analyser shall be periodically calibrated

does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	according to the manufacturer's recommendation. Therefore, a CAR was raised to provide the manufacturer recommendation of calibration frequency since the calibration frequency in the draft MR was mentioned as 3 years. Please refer to CAR 4. In response to CAR 4, the supplier's recommendation on calibration frequency was provided /26/. The supplier recommends to calibrate the analyser on a monthly basis using standard gas as per the calibration procedure described in the manual. It is confirmed based on the onsite observations and interview with the operating team that the gas analyser is calibrated on a weekly basis using standard gas as per the procedure described in the calibration manual. It is considered to be appropriate since the internal calibration complies with supplier recommendation. .
Company performing the calibration:	The initial calibration was carried out by the equipment supplier, ABB. Besides, the gas analyser was calibrated internally by the plant's team during the monitoring period.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	The initial calibration certificate provided by the equipment supplier and also the internal test reports/15/ based on the standard gas were checked during the onsite verification. Based on the calibration results, proper functioning of the gas analyser is confirmed.
Is(are) calibration(s) valid for the whole reporting period?	As mentioned above, the calibration is valid for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place.

	Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	T_{flare} Flame temperature of the flare (^{o} C)
Measuring frequency:	The temperature is measured using N type thermo couple on a continuous basis. The parameter is logged in data logger automatically. However, parameter was not recorded during the pre-CDM monitoring period. The parameter is used to determine the flare efficiency which in turn is used to determine the project emissions. Since the parameter was not monitored during the monitoring period, a flare efficiency of zero has been assumed. This approach is considered to be appropriate since it results in higher project emissions and lower emission reductions.
Reporting frequency:	Not applicable for the pre-CDM monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	The parameter was not monitored during the monitoring period. Therefore, the most conservative approach has been chosen in determining the emission reduction.
Type of monitoring equipment:	N type thermocouple with 2-Wire Programmable Transmitter /14/ Range: 0 – 1200 ^{o}C Transmitter Model: 5334B; Serial No. 070125977
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The accuracy of thermocouple is neither specified in the monitoring plan nor in the applied methodology. However, methodological "Tool to determine project emissions from flaring gases containing methane"/18/ recommends the use of N type thermocouple to measure the temperature of exhaust gas in the flare.

	Therefore, the type of thermocouple is inline with the requirement.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The parameter was not monitored during the monitoring period.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$FV_{RG,h}$ Biogas sent to flare (volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h) – Nm^3 / hr
Measuring frequency:	The purpose of monitoring this parameter is to record the hourly quantity of biogas sent to flare. However, hourly

	values were not recorded during the monitoring period. Therefore, this parameter has been considered same as that of BG $_{ToFlare, y}$ (Total quantity of biogas flared) and the flare efficiency has been assumed to be zero for the whole quantity of biogas flared. This approach results in conservative estimation of emission reduction.
Reporting frequency:	As described above under the parameter, BG $_{ToFlare, y}$, it is monitored on a continuous basis using a gas flow meter and reported on a daily basis. The parameter is recorded by the operator in log sheets on a daily basis. The log sheets are checked by the department manager and sent to the Office department. The Office department transfers the data into electronic format (excel files) and stores.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequency of the parameter is inline with the monitoring plan of the registered PDD.
Type of monitoring equipment:	<table><tr><td>Type of meter</td><td>Mass flow meter</td></tr><tr><td>Tag No.</td><td>GM 1</td></tr><tr><td>Serial No.</td><td>307520</td></tr><tr><td>Accuracy</td><td>± 2% /14/</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The accuracy of the monitoring equipment was not stated in the monitoring plan. However, GLC's technical expert confirms that ±2% of accuracy represents good practice.
Calibration frequency /interval:	At least once in three years The flow meter was calibrated on 2009-08-11 and on 2010-10-31 /15/
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	The monitoring plan of the registered PDD states that the flow meter is calibrated at least once every three years. From the above mentioned calibration dates it is confirmed that the calibration interval is inline with the registered monitoring plan. Therefore, verification team is

	of the opinion that the calibration frequency represents good practice.
Company performing the calibration:	The latest calibration of the meter was carried by Miracle International Technology Co., Ltd., Bangkok, Thailand./15/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports were verified by the verification team and they confirm the proper functioning of the meters.
Is(are) calibration(s) valid for the whole reporting period?	Yes. The calibration is valid for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	The data is also recorded in data logger automatically. During the site visit, the reported data was also crosschecked with data logger values and the data was found to be consistent. Besides, the gas flow meters display the cumulative flow and the cumulative reading is recorded in the log sheet. The daily gas flow is calculated as the difference of the two consecutive readings. Therefore, the data could easily be crosschecked for any errors.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$\eta_{flare\text{-}h}$ Flare efficiency of the open flare (%)
Measuring frequency:	The parameter is calculated based on the Flame temperature of the flare (T_{flare}) and Biogas sent to flare

	($FV_{RG,h}$). An open flare was installed for the project system. The flare efficiency is calculated according to the 'Tool to determine project emissions from flaring gases containing methane', EB28, Annex 13/18/ As the flame temperature of the flare was not recorded, the flare efficiency has been assumed to be zero for the current monitoring period.
Reporting frequency:	Not applicable for the monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	NA
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	NA

Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$T_{out.h}$ Temperature of thermic fluid leaving the boiler for starch drying (Deg C)
Measuring frequency:	The parameter was not recorded during the monitoring period. Therefore, a deviation was taken to determine the baseline emissions. The deviation has been explained in Annex 2 of the MR and assessed above in section 5.3.
Reporting frequency:	The parameter was not recorded during the monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	<table><tr><td>Type of equipment</td><td>Resistance thermometer</td></tr><tr><td>Model</td><td>PT 100</td></tr><tr><td>Accuracy</td><td>0.05%</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Monitoring plan does not specify the accuracy of thermometer. Though thermometer was provided, the parameters related to thermic fluid circulation were not recorded during the monitoring period. However, GLC's technical expert confirms that the accuracy of the thermometer is at good level.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency	NA

represent good monitoring practise?	
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The parameter was not recorded during the monitoring period
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$T_{in,h}$ Temperature of thermic fluid entering the boiler for starch drying (Deg C)
Measuring frequency:	The parameter was not recorded during the monitoring period. Therefore, a deviation was taken to determine the baseline emissions. The deviation has been explained in Annex 2 of the MR and assessed above in section 5.3.
Reporting frequency:	The parameter was not recorded during the monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	

Type of equipment	Resistance thermometer
Model	PT 100

	Accuracy 0.05%
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Monitoring plan does not specify the accuracy of thermometer. Though thermometer was provided, the parameters related to thermic fluid circulation were not recorded during the monitoring period. However, GLC's technical expert confirms that the accuracy of the thermometer is at good level.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The parameter was not recorded during the monitoring period
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$Q_{oil,h}$ Flow of the thermic fluid in the boiler (m^3/h)
Measuring frequency:	The parameter was not recorded during the monitoring period. Therefore, a deviation was taken to determine the baseline emissions. The deviation has been explained in

	Annex 2 of the MR and assessed above in section 5.3.
Reporting frequency:	The parameter was not recorded during the monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	The monitoring equipment was not installed
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The parameter was not recorded during the monitoring period
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA

<table>
<tr><th></th><th>Assessment/ Observation</th></tr>
<tr><td>Data / Parameter:
(as in monitoring plan of PDD):</td><td>$Q_{HFO, y}$

Fuel oil burnt in the hot oil boiler along with biogas (Tonnes)</td></tr>
<tr><td>Measuring frequency:</td><td>Continuously

The parameter is measured on a continuous basis using flow meter.</td></tr>
<tr><td>Reporting frequency:</td><td>Daily

The parameter is recorded by the boiler operators at the beginning and end of each shift in the log sheets. Aggregate data of the month is transfered into electronic files by the office of the starch factory. The data is then sent from the starch factory to the BFB office.</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td><td>Yes, the measuring and reporting frequency of the parameter is inline with the monitoring plan of the registered PDD.</td></tr>
<tr><td>Type of monitoring equipment:</td><td>For Boiler-1:

<table>
<tr><td>Type of meter</td><td>Oil meter</td></tr>
<tr><td>Model</td><td>VZO 20 FL</td></tr>
<tr><td>Accuracy</td><td>± 1% /14/</td></tr>
<tr><td>Serial No.</td><td>4643681</td></tr>
</table>

For Boiler-2:

<table>
<tr><td>Type of meter</td><td>Oil meter</td></tr>
<tr><td>Model</td><td>VZO 20 RC</td></tr>
<tr><td>Accuracy</td><td>± 1% /14/</td></tr>
<tr><td>Serial No.</td><td>4801239</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?</td><td>The accuracy of the monitoring equipment was not stated in the monitoring plan. However, GLC's technical expert confirms that ±1% of accuracy represents good practice.</td></tr>
<tr><td>Calibration frequency /interval:</td><td>The calibration frequency was not clearly defined

A CAR was raised since the calibration information was not provided in the draft MR. Please refer to CAR 5 in the enclosed Annex A. In response to the CAR, the required calibration information has been updated in the revised MR and the evidence documents on manufacturer recommendation and calibration reports/27/ have been provided.

The manufacturer recommends a calibration frequency of 10 years /27/.

<table><tr><td>Meter (Serial No.)</td><td>Date of calibration/15/</td></tr><tr><td>4643681</td><td>2006-10-13</td></tr><tr><td>4801239</td><td>2008-05-22</td></tr></table></td></tr>
<tr><td>Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?</td><td>The calibration frequency was not defined in the monitoring plan of the registered PDD. However, it was stated, "The meter used for fossil fuel measurement shall undergo regular maintenance".

From the above mentioned calibration details, it is confirmed that the calibration frequency is inline with the manufacturer recommendation.</td></tr>
<tr><td>Company performing the calibration:</td><td>The calibration of the meter was carried by "Aqua Metro"./15/</td></tr>
<tr><td>Did calibration confirm proper functioning of monitoring equipment? (Yes / No):</td><td>Yes. The calibration reports were verified by the verification team and they confirm the proper functioning of the meters.</td></tr>
<tr><td>Is(are) calibration(s) valid for the whole reporting period?</td><td>Yes. The calibration is valid for the whole monitoring period.</td></tr>
<tr><td>If applicable, has the reported data been</td><td>In response to a CAR (please refer to CAR 5 in Annex</td></tr>
</table>

cross-checked with other available data?	A), fuel purchase records have been provided to the verification team. The reported data has been crosschecked with fuel purchase records /19/ and the data has been found appropriate.
How were the values in the monitoring report verified?	The reported values in the monitoring report and ER sheet were verified with the operator log sheet information /16/ and the data was found to be correct.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The verification team, based on the document review and onsite verification, confirms that the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and necessary QA/QC procedures are in place. Further description of the monitoring management is provided at the end of the section 5.3

Thus GLC confirms that

- the monitoring complies with the monitoring plan of the registered PDD.
- all parameters that are baseline, project and leakage emission parameters are monitored as described in the monitoring plan.
- the frequency of monitoring, the accuracy of the measurement equipments and the calibration frequency are in line with the monitoring plan.

Monitoring management and Quality assurance:

All the roles and responsibilities for monitoring and reporting have been clearly defined. The organisation chart, QA/QC procedures and Roles & Responsibilities provided in the MR were checked during the verification site visit and found to be correct.

It was learnt that regular training programmes on safety, operation and maintenance of the wastewater treatment plant are conducted on-site /20/. The verification team interviewed the plant's operating team (i.e. staff of wastewater treatment plant) during the on-site assessment. The plant's team was found to be competent enough for effective monitoring of the data.

The monitoring procedures/21/ were verified during the site visit. It was understood from the monitoring procedures and the interview with the operating team that the data is collected by the trained operators or supervisors and recorded in the log sheets. The log sheets are submitted to the corresponding department manager on a daily basis. The department manager checks the data and sends to Office department. The 'Office department' transfers the data into electronic files (excel sheets) and stores. The data is stored both

in hard format (log sheets) and in soft format (Excel files). Both formats of data i.e. the excel sheets and the operator log sheets were made available to the verification team for verifying the data reported in the MR and ER sheet. It is confirmed the data reported in the MR (version 3) and the corresponding ER sheet is correct.

Monthly reports are prepared by the Office department based on the log sheet information. The plant manager checks the monthly reports and sends them to the project consultant (South Pole). Wastewater flow, biogas flow, methane content and flare temperature are also recorded in data logger automatically though it is not part of CDM requirement.

Besides, for the parameters such as wastewater flow, biogas flow, electricity generation and oil flow, cumulative value is displayed on the meter screen. The operators record the cumulative reading in the log sheets. Therefore, any error in noting the reading in the log sheet would easily be identified by the department manager or Office department. It reduces scope of errors and facilitates improved accuracy level of data. Furthermore, all the measuring equipments possess good level of accuracy.

Hence, the verification team is of the opinion that the monitoring management system and QA/QC procedures reflect good practice.

5.4 Assessment of data and calculation of GHG Emission Reductions

The document review and the site visit revealed that a complete set of data for the specified monitoring period is available. The correctness of information provided in the monitoring report has been verified by crosschecks with other sources such as log books, calibration reports, test reports, equipment specifications etc. Default values (validated ex-ante parameters) are used as mentioned in the registered PDD. All the parameters required to calculate the baseline and project emissions are monitored as described in section 5.3 above.

GLC's verification team has raised CARs and CLs wherever corrective actions and clarifications, respectively, required in the reported data that was submitted in the form of monitoring report and emission reduction calculation sheet. Enclosed Annex A may please be referred for CARs and CLs in detail.

The formulae described in the applied methodologies and the PDD are used to calculate the baseline and project emissions. The emission reductions are calculated as the difference of baseline emissions and project emissions as there are no leakage emissions associated with the project activity. The emission reduction on account of methane avoidance has been calculated using both approaches; COD approach and MD (or biogas) approach as recommended by the methodology, AMS III.H. version 13. Since the emission reduction by COD approach is very conservative compared to the emission reduction by MD approach, the emission reduction by COD approach is only considered for claiming the emission reduction. The calculation has been provided in detailed and transparent manner in a separate emission reduction calculation spread sheet (ER sheet). It is confirmed that the value of achieved emission reduction during the monitoring period has been consistently mentioned in the final version of the MR and ER sheet.

By checking publicly available sources it was verified that the applied emission factors, IPCC default values/22/ and other reference values were applied correctly.

6. SUSTAINABILITY MONITORING CHECK

The following sustainability parameters are monitored as per the GS sustainability monitoring plan provided in the GS Passport /2/. The GS monitored parameters during the pre-CDM verification period are described in Annex 1 of the monitoring report. The verification team has verified all the parameters with appropriate means of verification.

	Assessment/ Observation
No	1
Indicator	Air quality: Odour
Chosen parameter	Biogas consumption
Monitoring approach	Reduction in emissions that result in odour has been demonstrated by monitoring biogas consumption for gas engines, boilers and flaring. $BG_{gas\ engine,\ y}$ (Amount of biogas used for power generation in gas engine), $BG_{boiler,\ y}$ (Amount of biogas fired in boiler) and $BG_{ToFlare,\ y}$ (Total quantity of biogas flared) were monitored during the monitoring period. These parameters were monitored on a continuous basis using flow meters and reported daily as part of CDM monitoring plan requirements. The description of monitoring has been provided in section 5.3 of the report. Therefore, it is of the opinion of GLC's verification team that by capturing the methane rich biogas and utilising it for energy generation or combusting in a flaring system significantly improves air quality. A bio-scrubber was also provided to remove H_2S from the gas stream that goes to gas engines. The scrubber further helps in improving the air quality by removing H_2S from the gas.
Is monitoring approach inline with the sustainability monitoring plan of GS Passport? (Yes/ No)	Yes, the monitoring approach is inline with the GS monitoring plan of the GS Passport.
Type of monitoring equipment	For type of monitoring equipment used to monitor the parameter, accuracy and calibration details of the monitoring equipment, please refer to section 5.3.
How were the values or parameters reported in the monitoring report verified?	The monitoring system was verified by means of physical inspection during the onsite verification and the reported values in the monitoring report and ER sheet were verified by means of daily log sheets /16/.

	The reported values were found to be correct. The verification team, therefore, confirms that the project activity has resulted in improving the air quality.

	Assessment/ Observation
No	2
Indicator	Quality of employment
Chosen parameter	Training records
Monitoring approach	Monitoring of this parameter has been demonstrated by developing annual training plan and providing training to the operating staff of BFB. The following trainings were organised to the operating staff during the monitoring period: • Basic ISO 9001 • Safety and Emergence Plan for Biogas leak • Organisation Structure and Human Resource Management • Efficiency of biogas system • Checking quality of biogas system by monitored parameters • Operation and Control of biogas system Apart from these, several other trainings specific safety issues such as electric short circuit, explosion of boiler, fire accidents, etc. have also been conducted.
Is monitoring approach inline with the sustainability monitoring plan of GS Passport? (Yes/ No)	Yes, the monitoring approach is inline with the sustainability monitoring plan of the GS Passport.
How were the values or parameters reported in the monitoring report verified?	The verification checked the training plan and the training documents during the site visit /20/. The verification team also interviewed the operating staff to confirm the information provided. From the document review and onsite interviews, the verification team conforms that sufficient training was provided to the employees to improve the quality and the plant's team was found to be competent.

	Assessment/ Observation
No	3
Indicator	Quantitative employment and income generation
Chosen parameter	Number of employed staffs and the level of income generation
Monitoring approach	The parameter is monitored through the number of employees recruited and the income generation by means of HR records. The number of employees and the level of income generation are recorded in monthly salary payment records. Importance was given to local community in recruiting the employees. The total number of employees recruited by the end of the monitoring period is 26. Out of 26 employees, 24 are from the nearby area (same or near by province).
Is monitoring approach inline with the sustainability monitoring plan of GS Passport? (Yes/ No)	Yes, the monitoring approach is inline with the monitoring plan of the GS Passport.
How were the values or parameters reported in the monitoring report verified?	The parameter was verified from the employment records and salary payment records /23/. The verification team also interviewed the staff to confirm the information provided. Therefore, from the document review and onsite interviews, it is confirmed that the project activity contributed positively to the quantitative employment and income generation.

	Assessment/ Observation
No	4
Indicator	Project eligibility criteria
Chosen parameter	Biogas utilisation (%)
Monitoring approach	The parameter is calculated as the ratio of total biogas consumption in gas engines ($BG_{gas\ engine,\ y}$)

	and in thermal oil boilers ($BG_{boiler, y}$) to the total biogas generation. Total biogas is again calculated as the sum of $BG_{gas\ engine, y}$, $BG_{boiler, y}$ and $BG_{ToFlare,y}$. The parameters have been reported as part of the CDM monitoring. Please refer to section 5.3 for detailed assessment of the parameters.
Is monitoring approach inline with the sustainability monitoring plan of GS Passport? (Yes/ No)	Yes, the monitoring approach is inline with the sustainability monitoring plan of the GS Passport. This parameter is monitored to ensure that the project activity meets the eligibility criteria of Gold Standard i.e. at least 65% of the total biogas recovered is utilised for energy generation purposes.
How were the values or parameters reported in the monitoring report verified?	The monitoring system was verified by means of physical inspection during the onsite verification and the reported values in the monitoring report and ER sheet were verified by means of daily log sheets /16/. The reported values were found to be correct. It is confirmed that the biogas utilisation during the monitoring period was over 99% which meets the GS eligibility criteria.

Therefore, it is confirmed that sustainability monitoring plan has been implemented inline with the monitoring plan description of GS Passport for the project activity. The verification team is of the opinion that the project activity contributed positively to the sustainability development during the pre-CDM monitoring period.

7. VERIFICATION STATEMENT

Germanischer Lloyd Certification GmbH (GLC) has performed the pre-CDM verification of the project: "**Blue Fire Bio wastewater treatment and biogas utilization project**", with regard to the relevant requirements for GS-CDM project activity. The project reduces GHG emissions due to capturing of methane from wastewater treatment through anaerobic reactor technology and utilising it as a fuel in onsite electricity generators and thermal oil boilers.

The project was registered as a CDM project activity with UNFCCC on 2011-04-09. This verification covers the pre-CDM monitoring period of one year from 2010-04-09 to 2011-04-08 (including both days).

Blue Fire Bio Co.,Ltd is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is GLC's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. GLC does not express any opinion on the selected baseline scenario or on the validated and registered PDD.

GLC conducted the verification on the basis of the monitoring methodologies (AMS III.H., version 13, AMS I.C., version 16 and AMS I.D., version 15), the registered PDD, the GS Passport and the monitoring report of "version 3 dated 2012-05-11". The verification included:

i) Checking whether the design of the project is implemented and installed as planned and described in the registered PDD

ii) Checking whether the provisions of the monitoring methodology and the monitoring plan in the PDD were consistently and appropriately applied

iii) Checking if the sustainability parameters were monitored as per the sustainability monitoring plan of the GS Passport

iv) The collection of evidence supporting the reported data

v) Checking whether the installed monitoring equipment are calibrated appropriately

GLC's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. GLC planned and performed the verification by obtaining evidence and other information and explanations that GLC considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

The GHG emission reductions were correctly calculated on the basis of the approved monitoring methodologies of "AMS III.H.", version 13, "AMS I.C.", version 16 and "AMS I.D.", version 15 and the monitoring plan of the project activity.

In GLC's opinion, the GHG emission reductions for the "Blue Fire Bio wastewater treatment and biogas utilization project" project as reported in the Monitoring Report issued on 2012-05-11 are calculated in a conservative and appropriate manner.

In GLC's opinion, the project contributes to the sustainable development of local community by improving air quality, improving quality of employees and creating additional employment during the monitoring period.

Germanischer Lloyd Certification GmbH herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions in 2010:	10,613	t CO_2e
Emission reductions in 2011:	8,719	t CO_2e
Total emission reductions during pre-CDM monitoring period	**19,332**	**t CO_2e**

<Hamburg>, 2012-06-04

Markus Weber

Verification Team Leader

8. REFERENCES

Reference	Document
/1/	Registered Project Design Document for CDM project: "Blue Fire Bio wastewater treatment and biogas utilization project" version 02.6, dated 2010-11-18
/2/	Gold Standard Passport for "Blue Fire Bio wastewater treatment and biogas utilization project"
/3/	CDM EB: Clean Development Mechanism Validation and Verification Manual, Version 01.2
/4/	GS: Gold Standard Requirements, Version 2.0 GS: Gold Standard Toolkit, Version 2.0 GS: Annexes to Gold Standard Toolkit, Version 2.0
/5/	Draft Monitoring Report (webhosted) of "Blue Fire Bio wastewater treatment and biogas utilization project", Version 1 dated 2012-01-31 Final MR of "Blue Fire Bio wastewater treatment and biogas utilization project", Version 3 dated 2012-05-11
/6/	Draft Emission reduction calculation spreadsheet, "BFB_ERs Sheet_120130.xlsx" Final Emission reduction calculation spreadsheet, "BFB_ERs Sheet_sr_120511.xls"
/7/	UNFCCC: Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)
/8/	UNFCCC: Decision 3/CMP. 1 (Marrakesh – Accords)
/9/	CDM-EB: Approved CDM small-scale baseline and monitoring methodologies

Reference	Document
	AMS III.H, Version 13: "Methane Recovery in Wastewater Treatment" AMS I.C., Version 16: "Thermal energy production with or without electricity" AMS I.D, Version 15: "Grid connected renewable electricity generation"
/10/	Technical specifications of key components of project activity • Technical proposal for technical specifications of BFR system • Technical Specifications of Oil Circulating Boiler, Type Circotherm-CH.3500 • Specifications of Gas engine, Model: JED 128-200 • Technical Data of the Gas engine, Model: Z12V190ZLD$_K$-2A • Specifications of flaring system
/11/	TUV Rheinland: Validation report of "Blue Fire Bio wastewater treatment and biogas utilization project" (report no. 01 997 9105052004), dated 2010-12-08
/12/	GS: Prefeasibility Assessment on the Retroactive Registration Request: Blue Fire Bio wastewater treatment and biogas utilisation project, Thailand (GS662), Date of feedback: 2009-09-11
/13/	Chaodee Starch (2004) Co.,Ltd.: Starch Production and Heavy Fuel Oil consumption, dated 2012-04-09
/14/	Specifications of monitoring equipment ABB: Data sheet of Water Master Electromagnetic Flowmeter Yokogawa Electric Corporation: General Specifications of Magnetic Flowmeter EUROMAG International: Specifications of Electromagnetic Flowmeter with Sensor MUT 1000 EL

Reference	Document
	ABB: Data sheet of EasyLine EL3000 Series Continuous Gas Analyser, Model EL3020 Fluid Components of International LLC: Installation and Operation Guide for ST51 Mass Flow meter (Specifications of gas flow meter) W. Dhavepatana Co., Ltd.: Thermocouple type N with Transmitter Model 5334B, S/N 070125977 dated 2011-01-10 PR Electronics: 2-Wire Programmable Transmitter, 5334B Aqua metro: Specifications of oil flow meter, Model: VZO 20 FL
/15/	Calibration Reports 1. Wastewater flow meter (FM1), Serial No. 3K220000010927 ABB: Certificate of Calibration, Certificate number: 09/1/4/209426 (Date of calibration: 2009-03-29) Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-298 (Date of calibration: 2011-01-01) 2. Wastewater flow meter (FM1), Serial No. 3K220000010926 ABB: Certificate of Calibration, Certificate number: 09/1/4/209425 (Date of calibration: 2009-03-29) Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-301 (Date of calibration: 2010-12-31) 3. Wastewater flow meter (FM1), Serial No. SF804670 YOKOGAWA: Test Certificate, dated 2006-08-09 4. Wastewater flow meter (FM2), Serial No. 3K220000022330 ABB: Certificate of Calibration, Certificate number: 09/1/10/211436 (Date of calibration: 2009-07-22) Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-299 (Date of calibration: 2011-01-01)

Reference	Document
	5. Wastewater flow meter (FM1), Serial No. SF804671 YOKOGAWA: Test Certificate, dated 2006-08-09 6. Wastewater flow meter (FM5), Serial No. ZAL 0214 EUROMAG International: Calibration Report of the Electromagnetic Flow Meter, Date: 2010-02-26 Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-302 (Date of calibration: 2011-01-02) 7. Gas flow meter to Flare (GM1), Serial No. 307520 Fluid Components International LLC: Calibration Certificate, Calibration date: 2009-08-11 Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-306 (Date of calibration: 2010-12-31) 8. Gas flow meter to Boiler 1 (GM2), Serial No. 307522 Fluid Components International LLC: Calibration Certificate, Calibration date: 2009-08-11 Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-307 (Date of calibration: 2010-12-31) 9. Gas flow meter to Boiler 2 (GM3), Serial No. 307521 Fluid Components International LLC: Calibration Certificate, Calibration date: 2009-08-11 Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-309 (Date of calibration: 2010-12-31) 10. Gas flow meter to Gas engines (GM4), Serial No. 307523 Fluid Components International LLC: Calibration Certificate, Calibration date: 2009-08-11 Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-304 (Date of calibration: 2010-12-31) 11. Gas flow meter to Gas engines (GM4), Serial No. 307525 Fluid Components International LLC: Calibration Certificate, Calibration date: 2009-08-10

Reference	Document
	Miracle International Co., Ltd.: Calibration Certificate, Certificate No. L1012-305 (Date of calibration: 2010-12-31) 12. Gas analyser, Serial No. 3.348750.9: ABB: Analyzer Data Sheet ((ABB make, EL 3020 model)), Date of production: 2009-08-19 BFB: Internal weekly test reports of gas analyser (test reports using standard gas) Thai Industrial Gases Public Company Limited: Certificate of Analysis of Special Gases Mixture, Certificate no. 2913/09 (Certificate date: 2009-10-05; Expiry date: 2013-10-04) 13. Oil flow meter, Serial No. 4643681 Aqua Metro: Test Certificate, date of calibration: 2006-10-13 14. Oil flow meter, Serial No. 4801239 Aqua Metro: Test Certificate, date of calibration: 2008-05-22
/16/	BFB: Daily log sheet records of • COD analysis of wastewater at inlet and outlets of BFR and from final lagoon • Wastewater flow through BFR system • Biogas consumption for boilers • Biogas consumption in electricity generators • Biogas consumption for flare • Methane concentration in biogas
/17/	COD analysis procedures through Close Reflux Titrimetric method
/18/	CDM-EB: Methodological “Tool to determine project emissions from flaring gases containing methane” (EB 28, Annex 13)
/19/	Chaodee Starch (2004) Co.,Ltd.: Fuel purchase records from April 2010 to April 2011

Reference	Document
/20/	BFB: Annual training plan for 2010 and 2011 BFB: Training records of Biogas operation, Quality control and Safety
/21/	BFB: Monitoring procedures BFB: Correction procedures for broken or changed meter
/22/	IPCC: 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/23/	HR records – List of employees and Monthly salary
/24/	CDM-EB: General Guidelines to CDM SSC methodologies, version 17 (EB 61, Annex 21)
/25/	CDM-EB: Guidelines for Assessing Compliance with the Calibration Frequency Requirements, version 01 (EB 52, Annex 60)
/26/	Petro-Instruments Corp., Ltd.: Calibration recommendation for CH_4 gas analyser, dated 2012-04-19
/27/	SCHERRER: Calibration recommendation for Oil meter, dated 2012-03-01
/28/	BFB: Operation start of biogas reactor (Confirmation letter for operation start of BFR 1 and BFR 2, dated 2012-04-17) Biogas Forerunner Co., Ltd.: Operation start of biogas reactor (Confirmation letter for operation start of BFR 3, dated 2012-04-17)
/29/	Germanischer Lloyd Certification GmbH CDM procedures

ANNEX A: RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS (FINDINGS' LIST)

Resolution of Corrective Action and Clarification Requests including list of Forward Action Requests

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	**Date** *(yyyy-mm-dd)*	**Project Participants Response** *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	**Date** *(yyyy-mm-dd)*	**GLC Assessment** *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	**Date** *(yyyy-mm-dd)*
CAR 1 During the onsite verification, the installed capacity of the gas engines was observed to be different compared to the capacity mentioned in section 1.1 of the monitoring report (MR) and also in the project design document (PDD).	2012-03-09	The installed capacity of the gas engines is corrected to 1.128 MW_{el} in section 1.1 of the revised monitoring report.	2012-03-23	Not OK. The response does not address the CAR sufficiently. The reason for the difference of capacity between the registered PDD and the name plate of the gas engines is not clear. Besides, the verification team observed the operation of two gas engines with a capacity of 500 kW_{el} each. Another small engine was also observed during the site visit. However, the verification team was informed that it was only a test engine and not used for normal operation. Therefore, the updated capacity does not match with the actual capacity observed.	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
CAR 1 continues…		PP has confirmed the installed capacity of power generation system of 1.128 MW_{el}. Although 0.128 MW gas engine is not used for normal operation during the monitoring period, it is considered as a backup system for the project operation which the validation team agreed to include it in the project boundary of the project activity. Therefore, the installed capacity of gas engines during the monitoring period is corrected to be consistent in section 1.1 of the revised MR.	2012-04-24	OK. It is understood from the revised monitoring report and the validation report that it was planned to install gas engines of total capacity 3.128 MWe in two phases; 1.128 MWe in the first phase and additional 2 MW in the second phase. However, since the biogas generation is lower than the expected, the second phase was not implemented. It is considered to be appropriate to include the gas engine of 0.128 MWe in the project boundary. The revised capacity of the gas engines is correct in the MR and therefore, the CAR is closed.	2012-05-10
CAR 2 The reported parameters in the emission reduction calculation spread sheet (ER sheet) were	2012-03-09	The reported parameters, which inconsistencies are observed during the onsite verification, are corrected in the ER sheet according to the values recorded in the operation log	2012-03-23	OK. The revised ER sheet has been submitted to the verification team. The following information has been revised in the ER sheet and it is confirmed that the revised	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
verified with the operator log sheet values during the onsite verification. The following observations are made: • An inconsistency of FM1 value was found on 2010-04-10 • Inconsistency of FM5 value was found between log sheet and ER sheet on 2011-04-06 and 2011-04-07. • Inconsistencies of GM4 values from 5th to 8th January 2011 • Inconsistencies of GM3 values from 30th January to 2nd February 2011. A value of 68888 Nm^3 has been reported in ER sheet which is very high compared to the		sheets.		information is correct. • FM1 value on 2010-04-10 • FM5 values on 2011-04-06 and 2011-04-07 • GM4 values from 5th to 8th January 2011 • GM3 values from 30th January to 2nd February 2011 Therefore, the CAR is closed.	

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
rest of the days.					
CAR 3 It was noticed while checking the log sheets during the onsite verification that the cumulative flow readings have been reset in between during the monitoring period for FM1, FM2, GM2 and GM4. When the plant's operating team was interviewed, it was revealed that there had been breakdown of meters and therefore the meter readings had to be reset. However, it was not clear if the meter was replaced with another or the same meter was repaired and used. No information has been provided in the MR in this regard. No evidence document or	2012-03-09	The details for meters changed are provided in section 4.2 of the revised MR as follows; <u>FM1</u> Meter / Serial no. — Period of use YOKOGOWA / S5F804670 — 09/04/2010 - 09/09/2010 ABB / 3K220000010927 — 10/09/2010 - 25/03/2011 ABB / 3K220000010926 — 26/03/2011 - 26/03/2011 ABB / 3K220000022330 — 27/03/2011 onwards	2012-04-24	OK. The information regarding the replacement of meters and the serial numbers of the meters have been transparently described in section 4.2 of the MR. Required evidence documents have been provided to the verification team. YOKOGOWA meters were in use for FM1 and FM2 till 2010-09-09 for which the calibration was not valid. Therefore, PPs have applied maximum permissible error of 0.35% to the measured values of flow and the emission reductions have been calculated conservatively. It is confirmed that the revised information in the MR and the calculation in the ER sheet are	2012-05-10

<table>
<tr><th>Description of Finding
(CAR, CL, FAR)
Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)</th><th>Date
(yyyy-mm-dd)</th><th>Project Participants Response
This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence</th><th>Date
(yyyy-mm-dd)</th><th>GLC Assessment
The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.</th><th>Date
(yyyy-mm-dd)</th></tr>
<tr><td>maintenance record was provided to the verification team.

Furthermore, the wastewater flow meters on site, FM1 and FM5, were found to be having different serial numbers from the MR.

A clear description in the MR with the required evidence documents needs to be provided.</td><td></td><td><u>FM2</u>
<table><tr><td>Meter / Serial no.</td><td>Period of use</td></tr><tr><td>YOKOGOWA / S5F804671</td><td>09/04/2010 - 09/09/2010</td></tr><tr><td>ABB / 3K220000022330</td><td>10/09/2010 - 26/03/2011</td></tr><tr><td>ABB / 3K220000010926</td><td>27/03/2011 onwards</td></tr></table>
<u>GM2</u>

There was no change of the meter used as tag no. GM2 during the monitoring period. However, the meter was removed for period of 18/05/2010 - 15/06/2010 for repairing which the meter was installed back to the same place.</td><td></td><td>appropriate.

Therefore, the CAR is closed.</td><td></td></tr>
</table>

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		GM4 Meter / Serial no. | Period of use FCI / 307523 | 09/04/2010 - 24/02/2011 FCI / 307525 | 25/02/2011 onwards Regarding the procedure for the change of meter, the document is provided to the verification team. In case there is meter not working and need to be fixed properly, the existing value first will be recorded as well as the details of meter, such as its manufacturer, model, and serial no., by the operator before removal. Regarding the different serial no. of FM1 and FM5 on site and in the submitted MR, the project has			

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		informed that there were changes of meters again. However, these changes took place after the monitoring period. As the latest calibration information of YOKOGOWA meters for FM1 and FM2 is not available, maximum permissible error of the meters is applied in the ER calculation conservatively.			
CAR 4 The calibration frequency of the methane analyser has been mentioned as 3 years in the MR in section 4.2. It has been further stated that the 'gas analyser shall be periodically calibrated according to the manufacturer's recommendation'. The monitoring plan of the registered PDD also states, 'gas analyser shall be	2012-03-09	It is recommended to verify the calibration once a year as per the data sheet of the equipment. Link to the data sheet: http://www05.abb.com/global/scot/scot205.nsf/veritydisplay/7b9eb5e9db6b05f3c1257960004217c8/$file/10-24-410-09-EN.pdf	2012-03-23	Not OK. From the given link, the recommended calibration frequency has been verified. It is confirmed that the recommended calibration frequency for gas analyser model EL 3020 by the instrument manufacturer (ABB) is 'once a year'. From the provided evidence documents and as stated in the	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
periodically calibrated according to the manufacturer's recommendation'. It is not clear what the manufacturer's recommendation of calibration frequency is. The evidence document of manufacturer's recommendation shall be provided to the verification team.				MR, the gas analyser was calibrated on 2009-08-19. Since the monitoring period is from 2010-04-09 to 2011-04-08, validity of the calibration is not applicable for the whole monitoring period. It was not justified how the calibration delay was taken into account.	
CAR 4 continues…		Regarding the calibration detail of the gas analyser, the supplier for the equipment has recommended the calibration frequency should be done once a month by choosing one of two following methods; 1. Calibration by user by using Standard Gas. Calibration procedure will be followed the manual. 2. Contact technician for the	2012-04-24	A specific recommendation provided by the instrument supplier was submitted to the verification team. The supplier recommends to calibrate the analyser on a monthly basis using standard gas as per the calibration procedure described in the manual. It is confirmed based on the onsite observations and interview with the operating team that the gas analyser is calibrated	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		calibration of equipment. Since the project conducted the calibration themselves by using the standard gas and followed the calibration procedure in the manual, there was no calibration delay occurred during the monitoring period. The internal calibration record is provided to the verification team. The following documents regarding the gas analyzer are provided to the verification team. - Official letter by supplier recommends the calibration frequency of equipment - Calibration procedure - Certificate of standard gas used during the monitoring period		on a weekly basis using standard gas as per the standard procedure described in the calibration manual. It is considered to be appropriate since the internal calibration complies with supplier recommendation. Therefore, the CAR is closed.	

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	**Date** *(yyyy-mm-dd)*	**Project Participants Response** *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	**Date** *(yyyy-mm-dd)*	**GLC Assessment** *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	**Date** *(yyyy-mm-dd)*
CAR 5 Calibration details of fuel oil (FO) meter have not been provided in section 4.2 of the MR. Log sheet information of FO consumption was checked during the onsite verification. The reported values in the ER sheet were found to be consistent with the log sheet values. However, the monitoring plan of the registered PDD also states, '*actual fuel usage records are used along with fuel purchase record to cross check*'. The fuel purchase records have not yet been provided to the verification team.	2012-03-09	The calibration details of fuel oil meter have been requested to supplier/manufacturer which the information will be submitted to the verification team. The fuel purchase record is provided to the verification team.	2012-03-23	Not OK. Fuel purchase information has been provided to the verification team. The fuel purchased during the monitoring period was 945,000 Litres and the fuel consumption as per the monitoring report an ER sheet is 933,309 Litres. The fuel consumption is considered to be appropriate since both the values are close to each other. However, the calibration information of the FO meter is still pending.	2012-04-02
CAR 5 continues…		PP has provided the information regarding the calibration of the FO	2012-04-24	OK. The calibration information of oil flow meters has been provided in the revised MR and the	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		meter to the verification team. The letter from the manufacturer to the starch factory shows that the calibration of the meter is valid for 10 years which the calibration date of the FO meters of the boiler 1 and 2 are on 13th October 2006 and 22nd May 2008, respectively. Therefore, the calibration of the meters is valid in line with the frequency recommended by the manufacturer.		corresponding calibration reports have been provided to the verification team. From the provided recommendation letter by the manufacturer and the calibration reports, it is confirmed that the calibration frequency of the fuel oil meters is appropriate. The CAR is closed.	
CAR 6 In section 5.4 of the MR, emission reduction formula has been mentioned as *Ex-ante* instead of for *Ex-post* determination of emission reductions.	2012-03-09	The definition for emission reduction formula is corrected in section 5.4 of the MR in terms of ex-post determination.	2012-03-23	OK. The formula has been corrected to Ex-post in the revised MR. Therefore, the CAR is closed.	2012-04-02
CAR 7 No description has been provided in section 7.3 of the MR for the	2012-03-09	The description for the difference between the actual emission	2012-03-23	OK. The explanation for the difference of achieved emission reduction compared to the estimated value has been	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
difference of emission reduction from the estimated value in the PDD.		reductions during the monitoring period compared to those estimated in the registered PDD is provided in section 7.3 of the revised MR. The difference is mainly due to completion of 2nd phase of biogas system in October 2010 and beginning of exports from gas engine only in Jan 2011. Due to this delay, the overall emission reductions in the monitoring period are lower.		provided in section 7.3 of the revised MR. It is understood that the phase-2 of the project activity was completed only in October 2010 while the estimated value in the PDD was based on the complete operation of phase-1 and phase-2. The explanation is considered to be appropriate. Therefore, the CAR is closed.	
CAR 8 For the sustainability parameter no. 3, the sustainability indicator name has not been provided in Annex 1 of the MR. Furthermore, typo errors such as gas engines in place of boiler have been observed.	2012-03-09	The indicator for the sustainability parameter no.3 is provided in Annex 1 of the MR. The typo errors observed in the monitoring procedure for the sustainability parameter no.1 and 4	2012-03-23	OK. The correction is observed in the revised MR with reference to sustainability parameter no.3. The indicator is "Quantitative employment and income generation" and the chosen parameter is "Number of employed staffs and the level of income generation". The typo errors have also been	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		are corrected.		corrected. Therefore, the CAR is closed.	
CAR 9 For sustainability parameter no. 4, it has not been sufficiently described how the biogas utilisation (%) is calculated in the MR.	2012-03-09	Biogas utilisation (%) is the calculation for the ratio of total biogas consumption in the electricity generators/gas engines (BG gas $_{engine, y}$) and in thermal oil boilers (BG $_{boiler, y}$) to the total gas generation, which is calculated from BG $_{gas\ engine, y}$, BG $_{boiler, y}$ and BG $_{ToFlare, y}$.	2012-03-23	OK. The description for the sustainability parameter no. 4 has been updated in the revised MR. The biogas utilisation (%) is calculated as the ration of biogas consumption in gas engines and boiler to the total biogas generation. Total biogas generation is calculated as the sum of biogas consumption for gas engines, biogas consumption for boiler and biogas consumption for flare. Therefore, the CAR is closed.	2012-04-02
CAR 10 A deviation has been made by the project participants (PPs) for	2012-03-09	The detail for starch production and fossil fuel in the form of excel file is	2012-03-23	Not OK. The data has been provided in ER sheet. However, the required supporting documents for production and fuel	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
baseline emissions for estimating the fossil fuel replaced and the same has been described in Annex 2 of the MR. However, the required evidence documents of starch production and fossil fuel consumption of the starch factory during 2006 and 2007 have not been provided to the verification team. In the same section (Annex 2) of the MR under the title 'Deviated Approach', it has been stated, "This approach is mentioned in the methodology as per 29(d) for a different situation……" It is not clear what the 29 (d) refers to since there is no Para 29 (d) in any of the applied methodologies.		provided to the verification team. Regarding Annex 2 of the MR, since the paragraph 29(d) was available in the methodology AMS-I.C version 14 and was not applied for this project, the referred paragraph is corrected to 31(d) according the methodology AMS-I.C version 16.		consumption details have not yet been provided. The reference has been corrected to Paragraph 31 (d) of AMS I.C. (version 16).	
CAR 10 continues…		The official document issued by Chaodee Starch (2004) Co.,Ltd for the starch production and heavy fuel	2012-04-24	OK. The required supporting documents for starch production and fuel consumption have been	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		oil consumption is provided to the verification team.		provided. It is confirmed the value of 0.0259 litre/kg used in the emission reduction calculation is conservative. Therefore, the CAR is closed.	
CAR 11 It is observed in the ER sheet that the project emissions due to power consumption have been wrongly calculated	2012-03-09	Number of months were wrongly used in the formula. The calculation is now corrected. The value is updated in the MR also.	2012-03-23	OK. The calculation of project emissions has been corrected in the ER sheet. The revised calculation has resulted in reduction in project emissions and therefore, the emission reductions have marginally increased. The CAR is closed.	2012-05-10
CAR 12 The following information is missing in the MR: • Technical specifications of key components of project activity	2012-04-02	The required information is provided as follows; • Technical specifications of key components of the project activity is provided in Table 1 under section 1.1 of the revised	2012-04-24	OK. The required information such as technical specifications of key components, project location details and project participant details are provided in the revised MR. Based on the document search and onsite verification, the revised information is confirmed to	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	**Date** *(yyyy-mm-dd)*	**Project Participants Response** *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	**Date** *(yyyy-mm-dd)*	**GLC Assessment** *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	**Date** *(yyyy-mm-dd)*
• Project location details • Project participants details		MR • Project participants details is provided under section 1.2 of the revised MR • Location of the project activity is provided under section 1.3 of the revised MR		be correct. Therefore, the CAR is closed.	
CL 1 Operation start date of the 1st phase and 2nd phase of the project activity has been mentioned as July 2007 and October 2010 respectively. However, evidence documents have not been provided to the verification team.	2012-03-09	The document is provided for the operation start date of the 1st phase. Regarding the 2nd phase, the technology provider confirmed that the information for the operation start date can be referred to first monitoring data presented in the excel sheet which is in October 2010.	2012-03-23	Not OK. The provided supporting document for operation start date is not clear. It represents a date in December 2010. It is understood from the ER sheet that inlet COD of BFR3 was monitored since 7 October 2010, however, outlet COD of BFR3 was monitored since 24 August 2010 which lacks clarity.	2012-04-02
CL 1 continues…		The official letters provided by the technology provider for the operation	2012-04-24	OK. The confirmation letters from the technology suppliers stating	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		start date of the biogas systems for both phases are submitted to the verification team. Regarding the available data of BFR 3, the system was under the preparation for starting up during 24 August - 7 October 2010. The technology provider needs to observe the characteristic of the effluent of the system; therefore, the COD data was monitored at that time.		the start date of operation have been provided to the verification team. Based on the provided documents it is confirmed that the operation of the first phase of the project activity was started in July 2007 and the second phase was started in October 2010. However, it was understood from the telephonic interview with the project's operation team that the second phase was under test run from 24 August 2010 to 7 October 2010. During this period the wastewater from the first phase was also pumped to BFR3 and the outlet COD of the BFR3 was monitored. The calculation has been checked and it is confirmed that by considering the COD outlet values for the specified period has only resulted in conservative estimation of emission reduction.	

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
				Therefore, the CL is closed.	
CL 2 In section 4.2 of the MR, validity date of the calibration has been provided for the monitoring equipment. However, the validity date could not be found in the submitted calibration reports.	2012-03-09	The validity date of the calibration in section 4.2 of the MR is provided as per the calibration frequency mentioned in section B.7.1 of the registered PDD.	2012-03-23	OK. It is understood that the validity date of calibration provided in the MR is based on the defined calibration in the monitoring plan and it does not represent the validity provided by the calibration agency. Therefore, the CL is closed.	2012-04-02
CL 3 Source of data for the following parameters was found to be different when compared with the monitoring plan of the registered CDM PDD. • The parameter, $COD_{ww,removed,PJ,BFR,y}$ has been calculated from $COD_{y, out, BFR}$ and COD removal efficiency of the baseline	2012-03-09	The explanation regarding the observation by DOE under CL3 is provided as follows; - The parameter $COD_{ww,removed,PJ,BFR,y}$ is calculated from $COD_{y, out, BFR,}$ which is measured by Close Reflux Titrimetric method as mentioned in the registered PDD.	2012-03-23	OK. The identified parameters have been calculated based on the measured parameters, which is considered to be appropriate. It is confirmed that the monitoring approach is still in accordance with the registered monitoring plan. Therefore, the CL is closed.	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
system. However, as per the monitoring plan, the parameter shall be measured by Close Reflux Titrimetric method. • The parameter $BG_{combusted, y}$ shall be measured continuously using gas flow meters. However, as per the MR, the parameter has been calculated based on $BG_{boiler, y}$ and $BG_{gas\ engine, y}$. • $BG_{recovered, y}$ shall be measured as per the monitoring plan. However, it has been calculated based on the values of $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$.		- The parameter $BG_{combusted, y}$ is calculated from the parameters $BG_{boiler, y}$ and $BG_{gas\ engine, y}$ which are the measured values. - The parameter $BG_{recovered, y}$ is calculated from the parameters $BG_{boiler, y}$, $BG_{ToFlare, y}$ and $BG_{gas\ engine, y}$ are the measured values.			
CL 4 A value has been provided against	2012-03-09	The detail about the neglect of the	2012-03-23	OK. It is understood that the parameter, EG_y, was monitored	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
the monitored value for Parameter EG_y in the MR. However, it has been further stated that the parameter is neglected from emission reduction calculation due to erratic and discontinuous supply to grid, which is inconsistent. Besides, the serial number of the meter mentioned in the MR was found to be not correct from the onsite observation.		parameter EGy is provided in the revised ER sheet and in section 4.2 of the revised MR. It was mentioned wrongly about the erratic and discontinuous supply to grid since the parameter is neglected because of a little amount of electricity exported to the grid. The serial no. of the meter is corrected and the PEA no. is added in section 4.2 of the MR.		during the monitoring period. Since the project started exporting to grid only in December 2010 and the monitored value was very small, it was not taken into consideration for the calculation of baseline emissions. The action is considered to be appropriate since it results into conservative estimation of emission reductions. It is confirmed that the serial number of the electricity meter has been corrected and the PEA number has been provided. Therefore, the CL is closed.	
CL 5 The project is applying for Pre-CDM VERs under GS Version 2.0. GS Requirements Ver.2.0	2012-03-09	Regarding section V.a.6.1 of the GS Requirements v2, kindly refer to the rule updated announced by the GS	2012-03-23	Not OK. It is understood from the GS rule update and the email conversation between PP and GS team that the	2012-04-02

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
document states in section V.a.6, "Project activities approved as Gold Standard VER project activities that are in the process of seeking CDM or JI registration under the UNFCCC are eligible to +claim Gold Standard VERs for a maximum of one year prior to the start of the CDM crediting period (date of registration under UNFCCC) provided: *V.a.6.1.* The project developer provides proof that the final version of the Project Development Document (PDD) was submitted for CDM validation to the Designated Operating Entity (DOE) prior to 31 January 2008; and *V.a.6.2.* The reasons for the mismatch between the start of		on 22 May 2009 which the deadline mentioned under section V.a.6.1 is extended to December 2009. In the case of the project, the final version of PDD was submitted to DOE for the CDM validation in January 2009 and was published for the Global Stakeholder Process (GSP) between February to March 2009 (link to information uploaded for public availability: http://cdm.unfccc.int/Projects/Validation/DB/LPCZTTNZ8ZSJYJP4BOCATXSGM75XVL/view.html). Therefore, the project is in line with the updated rule. Regarding V.a.6.2, the reason for the mismatch between the start of		deadline for submission of the PDD to the DOE for validation was extended to 31 December 2009. It is observed from the UNFCCC website that the PDD was published on UNFCCC CDM web page from 7 February 2009 to 8 March 2009 for global stakeholder comments. It is confirmed from the above mentioned dates that the project meets the specified criteria to apply for pre-CDM VERs. It is also clear from the information available at UNFCCC webpage that the PDD was webhosted for global stakeholder consultation during February – March 2009 and the project was registered on	

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
project operation and the CDM registration date are provided to the DOE and confirmed by the DOE as part of the Verification Report covering the GS VER period." The required evidence on the above two points has not yet been provided to the verification team. It is clear from the registered PDD and the validation report that the final version of the PDD submitted for registration was dated 2010-11-18. However, final version of the PDD submitted to DOE for validation has not yet been provided.		project operation and the CDM registration date is because the process was taken a long time to register the project activity as CDM project while the project implementation of the first phase was started in July 2007 and October 2010 for the second phase.		9 April 2011. The first phase of the project operation start date was in July 2007. However, the provided response does not sufficiently clarify the reason for the time gap. Besides, the provided evidences for operation start date of phase 1 and phase 2 are not clear as mentioned under CL 1.	
CL 5 continues…		Since the operation start date of the first phase was in July 2007 and the final version of PDD was published at UNFCCC for the Global Stakeholder Process (GSP) between	2012-04-24	OK. The evidence documents for the operation start date of the first phase and second phase have been provided to the verification team. It is confirmed based on the	2012-05-10

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Date *(yyyy-mm-dd)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	Date *(yyyy-mm-dd)*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Date *(yyyy-mm-dd)*
		February to March 2009, the mismatch between the start of project operation and the CDM registration date therefore occurred. Further information for the timeline of the project activity, kindly refer to section B.5 of the registered PDD of the project activity. The official letters provided by the technology provider for the operation start date of the biogas systems for both phases are submitted to the verification team.		provided documents and the timelines described in the registered PDD that the operation of the first phase of the project activity was started in July 2007 while the PDD was webhosted for global stakeholder consultation in February 2009. This has resulted in the mismatch between the project start date and CDM registration. Therefore, the CL is closed.	