VERIFICATION/CERTIFICATION REPORT

Final

Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras
in
Honduras

Monitoring period: 01/01/2009 to 30/11/2009

Report No. 2010-BQ-MD-07
Revision N°. 1.3

RINA

Verification/Certification Report

Project Title: Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras	**Country:** Honduras	**Estimated CERs (tCO2e):** 54,524 is the annual average
CDM Registration Reference Nº: 1483	**Monitoring period:** 01/01/2009 to 30/11/2009	**Certified CERs (tCO2e):** 47,786
Client: Energeticos Jaremar, S.A. de C.V.	**Client contact:** Talia Brun	
Report No.: 2010-BQ-MD-07	**Revision:** 1.3	**Date of this report:** 27/11/2012
Approved by (Final Report – Decision Maker): Roberto Cavanna		**Date of approval:** 12/12/2012

Methodology

Number:	Version:	Title:	Scale	SS(s):
AMS-III.H	Version 05 of 18/05/2007	"Methane recovery in wastewater treatment"	Small	13
AMS-I.C	Version 11 of 06/07/2007	Thermal energy for the user with or without electricity"	Small	1

RINA Services S.p.A. (RINA), commissioned by Energeticos Jaremar, S.A. de C.V., has verified of the greenhouse gas emission reductions reported for the project activity Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras in Honduras, CDM Registration Reference N° 1483 for the period 01/01/2009 to 30/11/2009, with regard to the relevant requirements for CDM activities. The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable CDM requirements in order to be certified.

The project was validated by TÜV SÜD Industrie Service GmbH (Validation Report N° 1030106 issued on 17/12/2007) and it was registered on 08/03/2008 under the CDM registration reference N°1483.

The GHG emission reductions were calculated on the basis of the approved methodology AMS-III.H , "Methane recovery in wastewater treatment", Version 05 of 18/05/2007, AMS-I.C, Thermal energy for the user with or without electricity", Version 11 of 06/07/2007 and the revised monitoring plan included in the registered Project Design Document, Version 03 of 21/12/2007 .

In conclusion, it is RINA's opinion that the project activity "Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras", in "Honduras", as described in the Monitoring Report version 5.0 of 24/05/2012 , meets all relevant requirements for CDM activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-III.H "Methane recovery in wastewater treatment", Version 05 of 18/05/2007 and AMS-I.C "Thermal energy for the user with or without electricity", Version 11 of 06/07/2007. Hence RINA is able to certify that the emission reductions from the project during the monitoring period 01/01/2009 to 30/11/2009 amount to 47,786 tCO_{2e}.

Work carried out by: Geisa Maria Príncipe Branco Saettoni Lilian Cristine Poll Herrmann Thaís de Lima Carvalho Américo Varkulya	☒ No distribution without permission from the Client or organizational unit responsible ☐ Strictly confidential ☐ Unrestricted distribution
Work verified by (Final Report – Authorized officer signing for the DOE) Laura Severino	**Keywords:** Climate Change, Kyoto Protocol, Clean Development Mechanism, Validation

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Abbreviations

BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CER(s)	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COD	Chemical Oxygen Demand
CRT	Coordination and Technical Control Staff
DCI	Certification Division of RINA Services Spa
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reductions
ex-ante	Prior to the project implementation
ex-post	After project implementation
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
HDPE	High Density Polyethylene
IEC	International Electro technical Commission
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt/hour
LoA	Letter of Approval
MoV	Means of Verification
MR	Monitoring Report
NCV	Net Calorific Value
NGO	Non-governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
PE	Project Emission
PLC	Programmable Logic Controller
POME	Palm Oil Mill Effluent
PP(s)	Project Participant(s)
Ref.	Document Reference
RINA	RINA Services SpA
SCADA	Supervisory Control And Data Acquisition
SS(s)	Sectoral Scope(s)
STP	Standard Temperature and Pressure (0°Celsius a nd 1.013 bar)
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

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1 INTRODUCTION

Energeticos Jaremar, S.A. de C.V. has commissioned RINA to carry out the verification and certification of emission reductions reported for the registered Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras in Honduras, CDM Registration Reference N°1483, for the period 01/01/2009 to 30/ 11/2009.

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

The objective of the verification is to have an independent review *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period. Certification is the written assurance by the DOE that, during a specific time period, a proposed CDM project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified.

1.2 Scope

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- to evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- to verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable UNFCCC criteria for CDM in order to be certified.

UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and procedures for small-scale CDM project activities and the subsequent decisions by the CDM Executive Board and the subsequent decisions by the CDM Executive Board..

The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

2 METHODOLOGY

The verification was conducted using RINA procedures in line with the requirements specified in the CDM M&P, the latest version of the CDM Validation and Verification Manual, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

The verification consisted of the following three phases:

* Desk review;
* On-site assessment:
* The resolution of outstanding issues and the issuance of the final verification report and certification.

The following sections outline each step in more detail.

2.1 Desk Review

The latest version of the monitoring report, version 5.0 24/05/2012 the emission reduction calculations provided in the form of a spreadsheet, *240512_Jaremar_Biogas_Workbook_v5_F.xls*, version 5 of 24/05/2012 ,were assessed as part of the verification.

In addition the Project Design Document (PDD) /2/ in particular the baseline estimations and the revised monitoring plan /6/, the previous verification report No. 1309002 07/04/2010 /4/, and the Validation Report, number 1030106 of 17/12/2007 for the project were reviewed.

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The Monitoring Report, Version 2.1 of 05/07/2010, was made publicly available on the CDM UNFCCC website on 08/07/2010.

The following table lists the documentation that was reviewed during the verification.

/1/ Ecofys Netherlands B.V Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras Monitoring Report, Version 2.1 of 05/07/2010 (published on 08/07/2010), version 3.0 of 07/03/2012, version 4.0 of 28/03/2012 and version 5.0 of 24/05/2012 .

/2/ Ecofys Netherlands B.V.: Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras Registered PDD, Version 03 of 21/12/2007 (registration date - 08/03/2008).

/3/ TÜV SÜD Industrie Service GmbH Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras Validation Report No. 1030106, issued on 17/12/2007.

/4/ TÜV SÜD Industrie Service GmbH Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras 1st Verification Report No. 1309002, issued on 07/04/2010.

/5/ Solvay Energy Services SAS, ER monthly calculation spreadsheets Version 2.4 of 18/05/2010 "*100414_Jaremar_Biogas_Workbook_v2.4_CFD.xls*", version 2.4 of 05/01/2012 "*050112_Jaremar_Biogas_Workbook_v2.4_CFD.xls*", version 3.0 of 07/03/2012 "*070312_Jaremar_Biogas_Workbook_v3_CFD.xls*", version 4.0 of 29/03/2012 "*290312_Jaremar_Biogas_Workbook_v4_CFD.xls*", version 5 of 24/05/2012 "*240512_Jaremar_Biogas_Workbook_v5_F.xls"*

/6/ Solvay Energy Services SAS Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras Revised Monitoring Plan, Version 5 of 18/10/2011 approved on 09/11/2011.

/7/ RINA S.p.A., Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras Validation Opinion on a Request of Revision of Monitoring Plan of 20/10/2011.

/8/ RINA S.p.A., photo of the plate: Cleaver Brooks Boiler S/N: 1-75877, dated 21/07/2010

/9/ RINA S.p.A.: photo of the plate: Cleaver Brooks Boiler S/N: 1-88376, dated 21/07/2010

/10/ RINA S.p.A.: photo of the plate: Gekakonus Boiler S/N: 1214/09, dated 21/07/2010

/11/ SEWERIN, Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000553 calibration certificate of. 12/12/2008

/12/ SEWERIN, Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000553 calibration certificate of. 09/05/2009

/13/ SEWERIN, Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000553 calibration certificate of. 07/11/2009

/14/ Biotec International, Letter about combustion temperature of 300°C of 21/04/2008.

/15/ OLEPSA S.A., Bunker oil specifications, no date (datosbunker.pdf)

/16/ Magnetrol International n.v. Letter about calibration frequency of 05/02/2009

/17/ Energeticos Jaremar, S.A. de C.V., Invoices of sludge transportation from January, April, June, July, August, November and December/2009.

/18/ Energeticos Jaremar, S.A. de C.V., Raw data reports for the whole period – hourly data from 01/01/2009 to 30/11/2009

/19/ Energeticos Jaremar, S.A. de C.V., Methane fractions analyses with photos of the display from the portable gas analyzers from 06/01/2009 to 14/11/2009

/20/ RINA S.p.A.: photo of Plate: Electricity production meter, dated 21/07/2010

/21/ RINA S.p.A.: photo of Plate: Electricity consumption meter, dated 21/07/2010

/22/ Magnetrol, Biogas flow meter (Flare) serial number 618962.06-001 calibration certificate of 05/11/2007.

/23/ Magnetrol, Biogas flow meter (Totalizer) serial number 618962-01-001 calibration certificate of 08/11/2007.

/24/ Magnetrol, Biogas flow meter (HTT boiler) serial number 618962-04-001 calibration certificate of 06/11/2007

/25/ Magnetrol, Biogas flow meter (Generator Jenbacher) serial number 618962-02-001 calibration certificate of 05/11/2007

/26/ Magnetrol, Biogas flow meter (Cleaver Brooks boiler) serial number 618962-05-001 calibration certificate of 05/11/2007

/27/ RINA S.p.A.: photo of plate: Generator Model: Jenbacher GE J312GSC81, 657KW, dated 21/07/2010

/28/ CDM Executive Board: CDM Validation and Verification Manual – Version 1.2, dated 30/07/2010.

/29/ CDM Executive Board: AMS-III.H , "Methane recovery in wastewater treatment", Version 05 of 18/05/2007.

/30/ CDM Executive Board: AMS-I.C, Thermal energy for the user with or without electricity", Version 11 of 06/07/2007.

/31/ CDM Executive Board: "Tool to determine project emissions from flaring gases containing methane", Version 01 (Annex 13 – EB28).

/32/ CDM Executive Board: "Simplified modalities and procedures for small–scale clean development mechanism project activities" (Annex II of FCCC/KP/CMP/2005/8/Add.1, dated 30/03/2006-no version).

/33/ CDM Executive Board: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, version 12.1 dated 16/10/2009.

/34/ CDM Executive Board: Glossary of CDM terms, "Glossary of CDM Terms", version 06.0 of 02/03/2012.

/35/ CDM Executive Board: Guidelines for Completing the Monitoring report form (CDM-MR), Version 2, dated 02/03/2012 (EB66 - Annex 20).

/36/ CDM Executive Board: "General Guidelines to SSC CDM methodologies", version 19, dated 13/09/2012(EB69 - Annex 27).

/37/ CDM Executive Board: "Guideline for sampling and surveys for CDM project activities and programme of activities", version 02, dated 13/09/2012. (EB69 Annex 05)

/38/ CDM Executive Board: "Guidelines for assessing compliance with the calibration frequency requirements", version 01, dated 12/02/2010.

/39/ UNFCCC, SSC WG 17, Clarification on the flare temperature in the methodology AMS-III.H of 01–03 September 2008 http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_HIOZ5CS1PASC187C0JQ668L2E9RCRJ

/40/ International Energy Agency: Documentation for Oil Information (2010 edition) " http://wds.iea.org" accessed 02/07/2011

/41/ Siemens S.A., letter of accreditation by Department of Industry and Trade of 05/02/2008

/42/ CDM Executive Board: Clean Development Validation and Verification Standard, version 02.0 of 25/11/2011 (EB 65 annex 4).

/43/ CDM Executive Board: Clean Development Mechanism Project Standard, version 01.0 25/11/2011 (EB 65 annex 5).

/44/ Solvay Energy Services SAS: Revised emission reduction calculation, version 5 of 09/07/2012 *"ER-calculations-changing-WU-value-version 5_090712.xlsm"* ,

/45/ Solvay Energy Services SAS: Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras – revised PDD version 05 of 09/07/2012.

/46/ Jenbacher, Electricity meter accuracy (Jenbacher_CE_Bescheinigung.pdf; Jenbacher electricity meter_specs.pdf) no date

/47/ Siemens, calibration certificates from electricity meter SN: SX-070801574-03 of 09/01/2007 (Calibration_SX-070801574-03_Lagunas.pdf) and electricity meter SN: SX-070801577-03 of 09/01/2007 (Calibration_SX-070801577-03_ControlRoom.pdf)

/48/ Power Distribution Solutions Marketing, the email from the technology provider stating that the 9200 electricity meter does not require any calibration or re-calibration. (RE Power Distribution Solutions Marketing Request For Info.htm)

/49/ Boiler 3 efficiency calculation with three different providers for similar equipment dated 18/10/2011 (Efficiency_paragraph 13 (b)_181011.xlsx)

/50/ SEWERIN, Operation Instructions of gas analyzer SR2-DO dated 01/08/2005 (SR2-DO Sewerin

Manual.pdf)

2.2 On-site assessment

On 21/07/2010, RINA visited Energeticos Jaremar, S.A. de C.V. located in Village San Alejo, Distrito de Tela, Departamento de Atlántida, in Honduras. During the on-site assessment of the project RINA assessed the implementation and operation of the proposed project activity, where all the equipment and system were accessible, reviewed the information flows for generating, aggregating and reporting the monitoring parameters, interviewed key personnel of the plant to confirm the operational and data collection procedures, cross-checked between information provided in the monitoring report and data plant, checked the monitoring equipment including calibration performance, reviewed calculations and assumptions made in determining the GHG data and emission reductions, checked the quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The key personnel interviewed and the main topics of the interviews are summarized in the table below.

	Date	Name and Role	Organization	Topic
/a/	21/07/2010	Manuel Flores/Manager	Energeticos Jaremar	Project installation, metering systems, internal procedures, quality control and quality assurance of parameters data, plant operation procedures, data storage and recording, operation, procedures calibration procedures..
/b/	21/07/2010	Evelyn Rodriguez/Coordinator	Energeticos Jaremar	Project installation, metering systems, internal procedures, quality control and quality assurance of parameters data, plant operation procedures, data storage and recording, operation procedures, calibration procedures..
/c/	21/07/2010	Gil Nemesh-Baier/Consultant	Solvay Energy Services SAS	Monitoring report, quality control and quality assurance of parameters data, metering systems, internal procedures, calibration procedures.
/d/	21/07/2010	Talia Brun/Consultant	Solvay Energy Services SAS	Monitoring report, quality control and quality assurance of parameters data, metering systems, internal procedures, calibration procedures.

2.3 Resolution of outstanding issues

The objective of this phase of the verification is to resolve any outstanding issues which need to be clarified for RINA's positive conclusion on the monitoring report and emission reductions.

To guarantee transparency a verification protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of verification and the results from verifying the identified criteria.

The verification protocol consists of three tables; the different columns in these tables are described in the figure below (see Figure 1). The completed verification protocol is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- 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;
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during verification for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

CARs, CLs and FARs identified are included in the verification protocol in Appendix A of this report.

Figure 1 Verification protocol tables

Verification Protocol, Table 1 - Requirement checklist				
Checklist Question	**Ref.**	**MoV**	**Comments**	**Conclusion**
The checklist is organized in four different sections.	Makes reference to documents where the answer to the checklist question or item is found.	Explain how conformance with the checklist question is investigated. Examples are document review (DR), interview or any other follow-up actions (I), cross checking (CC) with available information relating to projects, (N/A) means not applicable.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with checklist question so far.	For CAR, CL and FAR see the definitions above. OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements.

Verification Protocol, Table 2 - Resolution of Corrective Action Requests and Clarification			
Corrective action requests and/or clarification requests	**Reference to Table 1**	**Response by project participants**	**Verification conclusion**
The CAR and/or CLs raised in table 1 are repeated here.	Reference to the checklist question number in Table 1 where the CAR or CL is explained.	The responses given by the project participants to address the CARs and/or CLs.	The verification team's assessment and final conclusion of the CARs and/or CLs.

Verification Protocol, Table 3 - Forward Action Requests (if no FAR table 3 is deleted)		
Forward action request	**Reference to Table 1**	**Response by project participants** **Verification conclusion**
The FAR raised in table 1 is repeated here.	Reference to the checklist question number in Table 1 where the FAR is explained.	Response by the project participants on how forward action request will be addressed.

2.4 Internal quality control

All the revisions of the verification report before being submitted to the client were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

2.5 Verification team and technical reviewer(s)

The verification team and the technical reviewer/s consists of the following personnel:

Role/Qualification	Last Name	First Name	Country
Team Leader CDM	Príncipe Branco Saettoni	Geisa Maria	Brazil
CDM Verifier	Carvalho	Thaís	Brazil
Technical Expert CDM	Varkulya	Américo	Brazil
Technical Expert CDM	Poll Herrmann	Lilian Cristine	Brazil
Technical Reviewer	Valoroso	Rita	Italy
Technical Reviewer	Arokiasamy	Cyril Augustus	India
Technical Reviewer in training	Alfieri	Felice	Italy

3 VERIFICATION FINDINGS

The verification findings relate to the monitoring period from 01/01/2009 to 30/11/2009, as documented and described in the Monitoring Report version 5.0 of 24/05/2012 /1/ are stated in the following sections.

The verification requirements, the means of verification and the results from verifying the identified criteria are documented in more detail in the Verification Protocol in Appendix A.

3.1 Description of the project activity

The main information of the project is summarized in the table below.

Project Participant(s)	Energeticos Jaremar, S.A. de C.V.		
Project Title	Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras		
Location of the project	Village San Alejo, Distrito de Tela, Departamento de Atlántida, Honduras		
Methodology(ies)	AMS-III.H , "Methane recovery in wastewater treatment", Version 05 of 18/05/2007 AMS-I.C, Thermal energy for the user with or without electricity" - Version 11 of 06/07/2007		
Sectoral Scope(s)	1, 13	**RINA's Technical Area(s)**	1.1, 13.1
Registered PDD	Version 03 of 21/12/2007		
Date of registration	08/03/2008	**CDM Registration Reference N°**	1483
Revised monitoring plan	1st Revision of 18/10/2011		
Project's crediting period	08/03/2008 to 07/03/2015 (Renewable)		
Monitoring period	01/01/2009 to 30/11/2009		
Project documentation link	http://cdm.unfccc.int/Projects/DB/TUEV-SUED1198255961.11/view		

3.2 Remaining issues (FARs) from previous validation or verification

Based on the review of validation report and previous verification report, 03 FARs remained from the 1st. periodic verification process to the future process. All FAR's have been successfully closed.

FAR 14 stated that during following verification processes it shall be verified that the deviation identified between the total flow meter and the sum of the individual flow meters is constant in time.
During the site visit, cross-check between raw data /18/ of biogas flow measurement recorded by the PLC /18/and CERs calculation spreadsheet /5/ showed consistency. Moreover, the value showed in the computer screen was coherent with the sum of all flow meters; it was registering effectively the sum of the other meters. This issue was closed.
FAR 15 stated that the updated operation manual with the procedure in which the data gathered will be monthly compared with the calculations sheets and with the raw data shall be reviewed during next verification process. The internal operational manuals have been made available to the DOE. In them, the explanation of how each value is gathered is presented. This issue was closed.
FAR 16 stated that a revision of the Monitoring Plan should be submitted prior to the next request for issuance following the decision of the EB53, paragraph 87, (c). The monitoring plan was revised and approved on 09/11/11/6/. This issue was closed.

3.3 Monitoring Report

The Monitoring Report for the project activity "Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras" in Honduras, version 5.0 of 24/05/2012 and previous versions /1/ submitted by the Energeticos Jaremar, S.A. de C.V. has been the basis for the verification process.

RINA confirms that the above MR is based on the currently valid MR template /35/and is completed in accordance with the applicable guidance document/36//.

The main changes between the MR version 2.1 of 05/07/2010 (published at UNFCCC website on 08/07/2010) and the MR version 05 of 24/05/2012 submitted for registration are the following:

Section of the MR	Description and reason for changing the information in that section
All sections	Updated to new regulatory framework VVS
B.1.	Updated additional boiler 4 and 3 regarding the model, capacity and efficiency to be according to the manufacturer specification.
B.2.4 and E.6	Change in ID.2 WU and permanent change in the PDD due emission reduction estimation.
B.7	Updated data handling procedure to be according to the description in the PDD
C.	Description of the operational procedures due a lack of information into the MR
D.1 and D.2	Updated fixed and monitored parameters to be according to the monitoring plan
D.3	Change in methane fraction to 58.3% to be according to the methodology.
E.1	Update of the procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level to be according to the methodology

3.4 Project implementation

Actual implementation of the registered project activity.

During the on-site visit all equipments and it's respectively installation (as per the revised PDD version 05/45/) were verified by the Verification Team. The project activity consists of operation of a biogas recovery system and its energetic use. The biogas is originally produced by the palm oil mill effluent (POME) ponds at Agrotor palm oil mill located in Honduras. The project activity established a biogas recovery system which covers two existing open anaerobic lagoons with a high density polyethylene (HDPE). This system captures the biogas, which is then utilized on-site for the production of heat & electricity for internal processes of Agrotor's production facility.
The recovered biogas is primarily fed into several boilers for the production of heat and into the biogas turbine for generation of electricity. An open flare is installed for emergency cases and when the biogas is not used for heat and electricity generation. Biogas produced by Agrotor plant replaces bunker consumption of the boilers at the refinery located near the palm oil mill. The electricity produced by biogas generation system replaces electricity imports from the grid. All electricity generated is been used at the palm oil mill and the refinery.

Post-registration changes

Monitoring Plan Revision approved on the 09/11/11

The sludge management system was modified in September 2010. The old sludge management system (drying + soil application) is applicable for this monitoring period of verification but a new one (fertirrigation) will be applicable in the subsequent ones. During the site visit, it was confirmed/verified the installation of the new sludge removed system for directly application as fertilizer in the surrounding land. This change has been considered under the Validation Opinion document. /7/

The PDD version 05 /45/ foresees the installation of new thermal applications for the biogas, and allows for the implementation of such applications as the production requires it. The parameters related to the monitoring of the boilers were slightly modified to increase its clarity and assert that two additional boilers will be added to the project. Those additions are already included in the revised and approved Monitoring plan.

The biogas is utilized in the following priority:

1) Heat generation in two existing and boilers one new boiler: The biogas replaces bunker consumption at the refinery located near the palm oil mill:
Boiler 1: Utilized for the production of steam for internal production processes at the palm oil refinery.
• Thermal capacity: 7.36 MWth
• Model: Cleaver-Brooks peritubular boiler
• Efficiency from Cleaver Brooks Manual (conservative reference on Efficiency): lower value for steam boiler with biogas (81%) and higher value for steam boiler with fuel oil N°5 and N°6 (86%).
Boiler 2: Utilized for the heating of thermal oil internal production processes at the palm
• Thermal capacity: 1.17 MWth
• Model: HTT wtö 1.250-30-1-v (vertical). Provided by HTT Energy systems
• Efficiency: 85% for any fuel.

Boiler 3: Utilized for the production of steam for internal production processes at the palm oil refinery.
• Thermal capacity: 9.802 MWth
• Model: CB600-800
• Efficiency: 87.5%.

Boiler 4: Utilized for the production of steam for internal production processes at the palm oil refinery.
· Boiler 4:
• Thermal capacity: 0.93 MWth
• Model: NUK-HP 930 from GekaKonus
• Eficiency:100% default value

In the 2nd monitoring period (the object of this report), boilers 3 and 4 were not yet operating and therefore the variables related to their operation have not been recorded.

2) Electricity production by a biogas generator system: The produced electricity avoids electricity imports from the grid. All electricity generated is used at the palm oil mill and the refinery.
The project activity involves the operation of a 0.848 MWe biogas fuelled generator. The generator is sized based on the electricity needs of the complete refinery and palm oil mill in Agrotor and minimize the consumption from the grid. The specifications of the generator are:
• Installed capacity: 0.848 MWe
• Model: Jenbacher GenSet JGC316 GS-B.L
• Voltage: 840 Volts
• Frequency: 60 Hz

3) Flaring: If there is an excess of biogas, it is flared by an open candlestick flare.
New parameters were added according to the EB request (EB53, paragraph 87c), to comply with the requirement of AMS.I.C. The new parameters are ID34 through ID 45. These parameters serve to measure the biogas associated thermal energy delivered by the various boilers.

Changes to the project design of a registered CDM project activity

The water usage (WU) foreseen into the feasibility study estimated by the technology provider was 0.63m3 of water per tonne of fresh fruit. However, the consumption of water during the first 11 months of 2009 reached almost the double 1.13 m3 of water per tonne of fresh fruit in average. The reason for this level of water consumption was that the plant was re-using the water in several of its processes to produce palm oil, but stopped since it was affecting the quality of the oil production.

According to Appendix 1 of the Clean Development Mechanism Project Standard, version 01.0, EB 65 Annex 5 – IV – Changes to the project design of a registered project activity, when the actual changes

to the project design of a registered CDM project activity do not adversely impact any of the following issues, they do not require prior approval by the Board:

(a) The applicability and application of the applied methodology under which the project activity has been registered;

AMS-III.H (version 5) remains applicable, according to the following criteria:

1) This project category continues to comprise measures that recover methane from biogenic organic matter in wastewaters by means of one of the following option: (iv) "*Introduction of methane recovery and combustion to an existing anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant";*
2) The recovered methane continues to be used for heat and or electricity generation so that component of the project activity can use a corresponding category under type I;
3) The project activity measures continues to be limited to those that result in emission reductions of less than or equal to 60kt CO2 equivalent annually.

AMS-I.C (version 11)'s remains applicable, according to the following criteria:

1) The project continues to be a energy technologies that supply thermal energy that displaces fossil fuels;
2) Where thermal generation capacity is specified by the manufacturer, it shall be less than 45 MW. 3. The total thermal generation capacity of the installed units is 19.262MW_{th} (Boilers 1,2,3, and 4) and remains below 45 MW_{th};
3) For co-fired1 systems the aggregate installed capacity (specified for fossil fuel use) of all systems affected by the project activity shall not exceed 45 MWth. Cogeneration projects that displace/ avoid fossil fuel consumption in the production of thermal energy (e.g. steam or process heat) and/or electricity shall use this methodology. The capacity of the project in this case shall be the thermal energy production capacity i.e. 45 MW_{th}. Not applicable, since the project is not a co-fired nor a cogeneration project;
4) In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should be lower than 45 MWth and should be physically distinct from the existing units. The project does not involve any addition of renewable energy units at an existing renewable energy facility.

(b) The additionality of the project activity; the project was registered on the basis of technological and prevailing practice barriers. The change into the ER calculation of the average water usage per processed ton of fresh fruit does affect the additionality which is based on the barriers abovementioned;

(c) The scale of the project activity. Since the expected ERs calculated as per AMS III.H remains below 60kt CO_{2e} annually and the aggregate installed capacity considered under AMS I.C does remains below 45 MW_{th}, the project activity scale does not change.

As a conclusion, RINA confirms that according to Appendix 1 of the Clean Development Mechanism Project Standard, version 01.0, EB 65 Annex 5 the actual changes to the project design of a registered CDM project activity do not adversely impact any of the above mentioned criteria and therefore do not require prior approval by the Board.

3.5 Methodology for determining Emission Reductions

According to the applied methodologies AMS-III.H "Methane recovery in wastewater treatment", Version 05 of 18/05/2007 and "AMS-I.C Thermal energy for the user with or without electricity", Version 11 of 06/07/2007 /29//30/, the emission reductions have been calculated base on the following formula:

$ER_y = BE_y - (PE_y + Leakage_y)$.

3.5.1 Compliance of monitoring plan with the monitoring methodology and applicable methodological tools

The revised monitoring plan /6/ is in accordance with the approved methodologies applied by the proposed project activity, AMS-III.H "Methane recovery in wastewater treatment" Version 05 of 18/05/2007 and AMS-I.C "Thermal energy for the user with or without electricity" Version 11 of 06/07/2007" methodologies, the CDM Executive Board: "Tool to determine project emissions from flaring gases containing methane" version 01 .

3.5.2 Compliance of monitoring with monitoring plan

The monitoring plan in the monitoring report version 5.0 /1/ complies with the monitoring plan in the revised PDD/45/, the accepted revised monitoring plan /6/ and Validation Opinion on a Request of Revision of Monitoring Plan./7/and both AMS-III.H "Methane recovery in wastewater treatment" Version 05 of 18/05/2007 and AMS-I.C "Thermal energy for the user with or without electricity" Version 11 of 06/07/2007" methodologies, have been properly implemented and followed. Measurement method/s and the instruments for each monitored parameter are also detailed below and further explained in the internal operational manuals in them, the explanation of how each value is gathered is presented.

The following parameters have been monitored in accordance with the monitoring plan in the registered PDD /2/ and revised PDD/45/ and the monitoring report /1/.

3.5.2.1 Data and parameters fixed ex-ante or at renewal crediting period

Below the parameters determined at registration and not monitored during the monitoring period, including default values and factors. Those parameters, fixed ex-ante, were maintained for the ex-post emission reduction calculation.

DATA/PARAMETER	Source of data	Reported value for the project period	Assessment/Observation
GWP_{CH4}	Monitoring report Registered PDD	21	IPCC 2006 Guidelines
ID 6: EF_{grid}	Monitoring report Registered PDD	646 tCO_{2e}/GWh	Grid Emission Factor, Honduras determined ex-ante using ENEE data
ID 11: : EF_{CO2}	Monitoring report Registered PDD	77.4 tCO_2/TJ	Carbon emission factor of residual fuel oil (bunker) from IPCC 2006 Guidelines
ID 12: NCV_{biogas}	Monitoring report Registered PDD	50.4 TJ/Gg	NCV of methane from IPCC 2006 Guidelines
ID 15: D_{CH4}	Monitoring report Registered PDD	0.0007168 tCH_4/m^3CH_4	Density of methane at STP (273.15 K and 1,013 bar) from IPCC 2006 Guidelines
ID 17: η_{SB}	Monitoring report Registered PDD	86 %	Efficiency of the steam boiler using bunker from manufacturer
ID 18: η_{Sp}	Monitoring report Registered PDD	81 %	Efficiency of the steam boiler using biogas from manufacturer
ID 19: η_{thB}	Monitoring report Registered PDD	85 %	Efficiency of the thermal oil heater using bunker from manufacturer

ID 20: η_{thp}	Monitoring report Registered PDD	85 %	Efficiency of the thermal oil heater using biogas from manufacturer
ID 21: η_{flare}	Monitoring report Registered PDD	50 %	Efficiency of flare as per the CDM Executive Board: “Tool to determine project emissions from flaring gases containing methane”
ID 45: $\eta_{3,b}$	Monitoring report Revised PDD	87.5 %	The efficiency of boiler 3 using bunker that would have been used in the absence of the project activity. has been selected according to paragraph 13 (b) of the methodology comparing the efficiencies of three different providers for similar equipment./49/
ID 46: $\eta_{4,,b}$	Monitoring report Revised PDD	100 %	The efficiency of boiler 4 using bunker that would have been used in the absence of the project activity has been adopted. a default value - option (c) according to paragraph 13 of AMS-I.C (version 11),

3.5.2.2 Monitored data

The following parameters have been monitored in accordance with the revised monitoring plan/6/, the revised PDD /45/and the latest submitted monitoring report version /1/.

DATA/PARAMETER	ID 22/$W_{CH4,y}$
Data Unit	Fraction of methane in the biogas in the year "y"
Description	Fraction of methane in the biogas in the year
Source of data to be used	Gas analyzer.
Value data for the monitoring period	58%
Measuring frequency	Measured with an interval to satisfy statistical 95% confidence level and at least quarterly.
Reporting frequency and recording procedure	The methane fraction measurements average calculation included data from 06/01/2009 to 14/11/2009 which results in 58.3%. Regarding the number and frequency of methane measurement to ensure the 95% confidence level, the monitoring report states that "The internal instruction is to measure the fraction at least between 2-4 times per month. However, the exact measuring frequency and measurement points varied significantly depending on process requirements." The procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level was not provided and FAR 1 has been raised.
Type of monitoring and metering equipment	Type: Gas analyzer Make/Model: Sewerin/SR2-DO Serial no.: 04603000553 Date of last calibration: 07/11/2009
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is +/- 3%. Information confirmed in the calibration certificate issued by Sewerin /11/.
Calibration frequency/interval	The gas analyzer is calibrated yearly according to the recommendations regarding general maintenance and calibration procedures from the gas analyzer supplier, Sewerin./50/
Is the calibration interval in line with the monitoring plan/PDD?	Yes. Calibration certificates for the Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000553 calibrated on 12/12/2008, 09/05/2009 and 07/11/2009 by SEWERIN /11//12//13/ were provided, verified and cover the entire period in which the analyzer was used The monitoring equipment was in proper working during the monitoring period as assessed during the site visit.
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between methane fractions analyses with photos of the display from the portable gas analyzers from 06/01/2009 to 14/11/2009 /19/ and the ER calculation spreadsheet /5/ showed consistency.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Backup of all monitoring data are archived (weekly) digitally in the computerized monitoring system interface, named SCADA. Last backup verified during the site visit is dated 14/11/2009.

If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 23/BG_{Total}
Data Unit	Nm^3
Description	The total amount of biogas consumed in all boilers and flare
Source of data to be used	Totalizer mass flow meter
Value data for the monitoring period	5,461,520 Nm^3/monitoring period Values presented in the ER monthly calculation/5/
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	Data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data were provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system.
Type of monitoring and metering equipment	Totalizer mass flow meter Make/Model: Magnetrol TA2-2-21B1-530 Serial no.: 618962-01-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. Iinformation confirmed in the calibration certification issued by Magnetrol /23/. The biogas flow is measured continuously with mass flow meter, which is not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system./18/
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions. The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: Totalizer mass flow meter (ID 23) / MAGNETROL TA2-2-21B1-530 SN 618962-01-001; dated 08/11/2007 /23/. The monitoring equipment was in proper working during the monitoring period as assessed during the site visit.
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC /18/ and CERs calculation spreadsheet /5/showed consistency. Moreover, the value showed in the computer screen was

	coherent with the sum of all flow meters; it was registering effectively the sum of the other meters. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09. The total flow meter was not working during the first 24 days of the monitoring period and therefore it was not possible to perform a cross-check with the sub meters for those days. Therefore, the accuracy of the gas flow meters has been deducted to the flows of gas measured from the 1st of February to the 24th of February 2009. The verification team verified this approach.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password as verified during the site visit. The verification team confirmed that – to ensure conservativeness - the values of the total flow meter have been used for emission reduction calculations when they were lower than the sum of the individual meters. Since the flow of biogas going to the flare has been ignored for this monitoring period, the comparison has been made choosing de minimum flow among a) ID23-ID 27 and b) ID 24+ID 25+ ID 26.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 24/$BG_{boiler1,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in boiler 1
Source of data to be used	Mass flow meter
Value data for the monitoring period	3,308,516 Nm^3/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	Data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data were provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system.
Type of monitoring and metering equipment	Totalizer mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-05-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. Iinformation confirmed in the calibration certification issued by Magnetrol /23/. The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions The data is stored in the monitoring system./18/
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions. The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: - Mass flow meter - Cleaver Brooks boiler (ID 24) / MAGNETROL TA2-21B1-530 SN 618962-05-001; dated 05/11/2007/26/. The monitoring equipment was in proper working during the monitoring period as assessed during the site visit.
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC/18/ and CERs calculation spreadsheet /5/ showed consistency.

	During site visit an instant value of 433.16Nm^3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password as verified during the site visit.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 25/$BG_{boiler2,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in boiler 2
Source of data to be used	Mass flow meter
Value data for the monitoring period	963,091 Nm^3/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	Data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data were provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system.
Type of monitoring and metering equipment	Totalizer mass flow meter Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-04-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /24/ and the device was in proper working during the monitoring period as assessed during the site visit. The biogas flow is measured continuously with mass flow meters, which records the volume of biogas in standard conditions The data is stored in the monitoring system. /18/
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions. The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: - mass flow meter - HTT boiler (ID 25) / MAGNETROL TA2-21B1-530 SN 618962-04-001; dated

	06/11/2007/24/;
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC /18/ and CERs calculation /5/ spreadsheet showed consistency. During site visit, an instant value of 143.10Nm3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password as verified during the site visit.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 26/ $BG_{generator,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in the generator
Source of data to be used	Totalizer mass flow meter
Value data for the monitoring period	1,476,937Nm^3/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	Data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data were provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system.
Type of monitoring and metering equipment	Totalizer mass flow meter Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-02-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /24/ and the device was in proper working during the monitoring period as assessed during the site visit. The biogas flow is measured continuously with mass flow meters, which records the volume of biogas in standard conditions The data is stored in the monitoring system. ./18/
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions). The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: - mass flow meter - Generator (ID 26) / MAGNETROL TA2-21B1-530 SN 618962-02-001; dated

	05/11/2007/25/.
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC/18/ and CERs calculation /5/ spreadsheet showed consistency. During site visit, an instant value of 363.12Nm3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password as verified during the site visit.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 27/ $BG_{flare,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in the flare
Source of data to be used	Totalizer mass flow meter
Value data for the monitoring period	243,187Nm^3/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	Data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data were provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system.
Type of monitoring and metering equipment	Totalizer mass flow meter Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-06-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /24/ and the device was in proper working during the monitoring period as assessed during the site visit. The biogas flow is measured continuously with mass flow meters, which records the volume of biogas in standard conditions The data is stored in the monitoring system.
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions. The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: - mass flow meter - Flare (ID 27) / MAGNETROL TA2-21B1-530 SN 618962-06-001; dated 05/11/2007/22/
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC/18/ and

	CERs calculation /5/ spreadsheet showed consistency. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. as verified during the site visit.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

Verification/Certification Report

DATA/PARAMETER	ID 28/ $BG_{Boiler3,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in the boiler 3
Source of data to be used	Totalizer mass flow meter
Value data for the monitoring period	Value data for the monitoring system: 0 Boiler not installed yet, therefore no emission reduction has been claimed.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The monitored data will be automatically and continuously recorded and stored in the PLC's memory unit whose content will be regularly transferred to the control room's computer. Boiler not installed yet, therefore no emission reduction has been claimed.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
Is the calibration interval in line with the monitoring plan/PDD?	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
How were the values in the monitoring report verified and cross-checked?	Cross checks of the sum of all sub flow meters will be made with the total biogas recovered.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	. Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet at the time of the on site visit.

Verification/Certification Report

DATA/PARAMETER	ID 29/ $BG_{Boiler4,y}$
Data Unit	Nm^3
Description	The total amount of biogas consumed in the high pressure boiler 4
Source of data to be used	Totalizer mass flow meter
Value data for the monitoring period	Value data for the monitoring system: 0 Boiler not installed yet, therefore no emission reduction has been claimed.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The monitored data will be automatically and continuously recorded and stored in the PLC's memory unit whose content will be regularly transferred to the control room's computer. Boiler not installed yet, therefore no emission reduction has been claimed.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
Is the calibration interval in line with the monitoring plan/PDD?	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
How were the values in the monitoring report verified and cross-checked?	Cross checks of the sum of all sub flow meters will be made with the total biogas recovered.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period..
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

DATA/PARAMETER	ID 30/ $T_{flare,y}$
Data Unit	Degrees Celsius
Description	Temperature in the exaust gas of the flare
Source of data to be used	Flare - Thermocouple sensor
Value data for the monitoring period	Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by thermocouple during the operation of the flare
Reporting frequency and recording procedure	Data values for the monitoring period: The temperature measurement is used to detect if the flare is operational. The temperature is measured continuously with a thermocouple sensor to demonstrate that the flare is operational. The thermocouple is connected to the data management system. As by the revised monitoring plan /6/, this temperature should be higher than 300°C as by the formula used in the ER calculation spreadsheet /5/. The DOE verified that no biogas volumes with the correspondent temperatures bellow 300°C are being accounting for the emission reduction calculation and it is automatically limited by the formula. According to the technology provider, the minimum temperature at the flare that indicates its operation is 300°C, as by letter from Biotec of 21/04/2008 /14/. The response of the request for clarification /39/, stressing that if a thermocouple is used as a flame detection system, it is sufficient to reach the given minimum temperature from the manufacturer. The relevant Request for Clarification on the flare temperature in the methodology AMS-III.H was verified /39/
Type of monitoring and metering equipment	Type: Thermocouple Make/Model: Siemens TH200,TC type K Serial no.: AZB/U9007276. Type: Thermocouple Make/Model: Dyer, type K 18' Serial no.: 5K151-2121-010-000-016-004.
Requirements for maintenance and calibration of monitoring and metering equipment	Since it is more expensive to calibrate the thermocouple as to change it every two years, the PO changes it periodically. The first device was installed in 10/03/08 and removed the 16/05/09. A new one was installed in 01/06/2009. Nonetheless, since the PO did not find documental support for the frequency of calibration/change used, the project will not claim credits for flaring biogas this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Accuracy: 22.8mA A letter from Siemens /41/ stating that it is an accredited company to accomplish the analysis of the temperature sensors J and K was provided.
Calibration frequency/interval	Since it is more expensive to calibrate the thermocouple as to change it every two years, the PO changes it periodically The first device was installed in 10/03/08 and removed the 16/05/09. A new one was installed in 01/06/2009. Nonetheless, since the PO did not find documental support for the frequency of calibration/change used, the project will not claim credits

	for flaring biogas this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Since it is more expensive to calibrate the thermocouple as to change it every two years, the PO changes it periodically. The first device was installed in 10/03/08 and removed the 16/05/09. A new one was installed in 01/06/2009. Nonetheless, since the PO did not find documental support for the frequency of calibration/change used, the project will not claim credits for flaring biogas this monitoring period.
How were the values in the monitoring report verified and cross-checked?	During the site visit, cross-check between raw data of temperature/18/ measurement recorded by the PLC and CERs calculation/5/ spreadsheet showed consistency.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan/6/. The temperature is measured continuously with a thermocouple sensor to demonstrate that the flare is operational. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Emission reductions from flaring has been neglected for this monitoring period, since there is a gap between the factory calibration of the first thermocouple and the second one and there were some data missing from the second thermocouple.

Verification/Certification Report

DATA/PARAMETER	ID 31/ EC_y
Data Unit	GWh
Description	Electricity consumption of the project activity
Source of data to be used	Electricity meter connected to the data management system
Value data for the monitoring period	0.29117 GWh/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by electricity meter
Reporting frequency and recording procedure	The parameter is measured continuously and at least weekly readings of the accumulated values of electricity consumption. This measurement includes the electricity consumption of the complete biogas recovery equipment, pumps, compressors and lightning of the gas handling area. This does not include electricity consumption from previous wastewater treatment system (baseline).
Type of monitoring and metering equipment	Sealed electricity meter Type: Electricity meter Make/Model: Siemens 9200. Serial no: SX07080157403 and SX07080157703
Requirements for maintenance and calibration of monitoring and metering equipment	PP provided the email from the technology provider (RE Power Distribution Solutions Marketing Request For Info.htm), where it states that the 9200 meter does not require any calibration or re-calibration./48/
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Its accuracy is 0.5s /46/
Calibration frequency/interval	The device is recalibrated according to the instructions (schedules, procedures) for QA of the technology provider.
Is the calibration interval in line with the monitoring plan/PDD?	Yes. The following calibration certificates were provided by PP and checked during the verification: - Sealed electricity meter (ID 31) / SIEMENS Calibration_SX-070801574-03_Lagunas.pdf, Calibration_SX-070801577-03_ControlRoom.pdf/47/
How were the values in the monitoring report verified and cross-checked?	Cross check: During the site visit, cross-check between raw data of electricity consumption/18/ recorded by the PLC and CERs calculation/5/ spreadsheet showed consistency.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The net electricity production is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. The net electricity production is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.
If only partial data are available	All the data necessary for the ER calculation in the

because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	monitoring period were available.

Verification/Certification Report

DATA/PARAMETER	ID 32/ EG_y
Data Unit	GWh
Description	Electricity production by the project activity
Source of data to be used	Electricity meter connected to the data management system
Value data for the monitoring period	2.9483 GWh/monitoring period Values presented in the ER monthly calculation spreadsheets Version 5 of 24/05/2012 (*240512_Jaremar_Biogas_Workbook_v5_F.xls*)./5/
Measuring frequency	Continuously by electricity meter
Reporting frequency and recording procedure	The parameter is measured continuously and daily readings and relies on accumulated values of electricity consumption. This measurement includes the electricity consumption of the complete biogas recovery equipment, pumps, compressors and lightning of the gas handling area. This does not include electricity consumption from previous wastewater treatment system (baseline).
Type of monitoring and metering equipment	Electricity meter Type: Electricity meter Make/Model: Jenbacher/JGC316GS-B.L. Serial no: 5421991
Requirements for maintenance and calibration of monitoring and metering equipment	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Its accuracy is 0.5% /46/
Calibration frequency/interval	Specification of the multi-measurement converter and synchronization was provided. However, the PO has decided to give up the credits associated to electricity generation because it has not been possible to obtain calibration frequency information. The ER calculation data have been updated and the credits associated to electricity generation were not considerate.
Is the calibration interval in line with the monitoring plan/PDD?	The recalibration frequency is in line with the MR and according to the instructions (Schedules, procedures) for QA of the technology provider.
How were the values in the monitoring report verified and cross-checked?	Cross check: During the site visit, cross-check between raw data of electricity consumption/18/ recorded by the PLC and CERs calculation/5/ spreadsheet showed consistency.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Yes, it is in line with the monitoring plan. The net electricity production is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. The net electricity production is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.

If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Since it was not possible to obtain calibration frequency information, the credits associated to electricity generation are not been claimed for this monitoring period.

DATA/PARAMETER	ID 33/ End use of final sludge
Data Unit	Use of sludge
Description	End use of the final sludge
Source of data to be used	Project logbook and weighbridge tickets from the trucks taking the sludge to the fields
Value data for the monitoring period	Data values for the monitoring period: Small amounts of sludge from January/2009 to November/2009 were removed from the lagoons on a weekly basis and dispersed on the plantations.
Measuring frequency	Only in case sludge is removed from the system and sent to the palm plantations
Reporting frequency and recording procedure	The sludge management system was modified in September 2010. The old sludge management system (drying + soil application) is applicable for this monitoring period of verification but a new one (fertirrigation) will be applicable in the subsequent ones. During the site visit, it was confirmed/verified the installation of the new sludge removed system for directly application as fertilizer in the surrounding land. This change has been considered under the Validation Opinion document. /7/
Type of monitoring and metering equipment	Not applicable
Requirements for maintenance and calibration of monitoring and metering equipment	Not applicable
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Not applicable
Calibration frequency/interval	Not applicable
Is the calibration interval in line with the monitoring plan/PDD?	Not applicable
How were the values in the monitoring report verified and cross-checked?	During the site visit cross-check between Jaremar spreadsheet of sludge removal control and the invoices of sludge transportation of January, April, June, July, August, November and December/2009/17/ was performed by RINA.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Not applicable
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data necessary for the ER calculation in the monitoring period were available.

DATA/PARAMETER	ID 34/$HG_{measured,1,y}$
Data Unit	TJ
Description	The directly measured total quantity of thermal energy supplied by steam boiler 1
Source of data to be used	Mass flow meter. Calculated using ID.24.
Value data for the monitoring period	0. No emission reduction has been claimed for this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialised mass flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are known, so that the mass flow can converted to energy using standard steam tables.
Type of monitoring and metering equipment	The amount of the generated steam will be measured with a specialized mass flow meter. However, the value used to cross check HG_1, calculated according to equation 18, will be the thermal energy generation prediction calculated using the amount of biogas combusted. Totalizer mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-05-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage./16/
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. Iinformation confirmed in the calibration certification issued by Magnetrol /23/. The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions.The data is stored in the monitoring system.
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which records the volume of biogas in standard conditions . The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit and cover the entire period: - Mass flow meter - Cleaver Brooks boiler (ID 24) / MAGNETROL TA2-21B1-530 SN 618962-05-001;

	dated 05/11/2007/26/. The monitoring equipment was in proper working during the monitoring period as assessed during the site visit.
How were the values in the monitoring report verified and cross-checked?	The value will be compared to HG_1 as calculated according to equation 18 of the PDD using the amount of methane destroyed. The data will be cross-checked by equation: $HG_{1,y} = MD_{boiler\ 1,y} \times NCV_{biogas} \times \eta_{s,p} \times 1/1000$ $HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 1,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $\eta_{s,p}$ = The efficiency of the boiler using biogas
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	The operation conditions of the boilers are known so the mass flow (measured) will be converted to energy using standard steam tables.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No emission reductions from thermal energy generation have been claimed for this monitoring period.

DATA/PARAMETER	ID 35/ $HG_{measured,2,y}$
Data Unit	TJ
Description	The directly measured total quantity of thermal energy supplied by steam boiler 2
Source of data to be used	Mass flow meter. Calculated using ID.25.
Value data for the monitoring period	0. No emission reduction has been claimed for this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialised mass flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are known, so that the mass flow can converted to energy using standard steam tables.
Type of monitoring and metering equipment	The amount of the generated steam will be measured with a specialized mass flow meter. However, the value used to cross check HG_2, calculated according to equation 19, will be the thermal energy generation prediction calculated using the amount of biogas combusted. Totalizer mass flow meter Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-04-001
Requirements for maintenance and calibration of monitoring and metering equipment	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. /16/
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	The accuracy of the device is 1%. Iinformation confirmed in the calibration certification issued by Magnetrol /23/. The biogas flow is measured continuously with mass flow meter, which is not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system.
Calibration frequency/interval	From the monitoring report version 5, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage.
Is the calibration interval in line with the monitoring plan/PDD?	The biogas flow is measured continuously with mass flow meter, which is not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol

	was provided by PP and checked during the site visit and cover the entire period: - Mass flow meter - HTT boiler (ID 25) / MAGNETROL TA2-21B1-530 SN 618962-04-001; dated 06/11/2007/24/;The monitoring equipment was working properly during the monitoring period as assessed during the site visit.
How were the values in the monitoring report verified and cross-checked?	The value will be compared to HG_2 as calculated according to equation 19 of the PDD using the amount of methane destroyed. The data will be cross-checked by equation: $HG_{2,y} = MD_{boiler\ 2,y} \times NCV_{biogas} \times \eta_{s,p} \times 1/1000$ $HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 2,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $H_{th,p}$ = The efficiency of the boiler using biogas
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	The operation conditions of the boilers are known so the mass flow (measured) will be converted to energy using standard steam tables.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No emission reductions from thermal energy generation have been claimed for this monitoring period.

DATA/PARAMETER	ID 36/ $HG_{measured,3,y}$
Data Unit	TJ
Description	The directly measured total quantity of thermal energy supplied by steam boiler 3
Source of data to be used	Mass flow meter
Value data for the monitoring period	0. No emission reductions have been claimed for this monitoring period.
Measuring frequency	Continuously by flow meter. Calculated using ID.28.
Reporting frequency and recording procedure	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialised mass flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are known, so that the mass flow can converted to energy using standard steam tables.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
Is the calibration interval in line with the monitoring plan/PDD?	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
How were the values in the monitoring report verified and cross-checked?	The value of this parameter will be cross checked with HG_3, calculated according to equation 20 of the PDD using the amount of methane destroyed. The lower of the two values will be used in the ER calculation, as the methodology requires.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

DATA/PARAMETER	ID 37/ $HG_{measured,4,y}$
Data Unit	TJ
Description	The directly measured total quantity of thermal energy supplied by steam boiler 4
Source of data to be used	Mass flow meter
Value data for the monitoring period	0. No emission reduction has been claimed for this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialised mass flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are known, so that the mass flow can converted to energy using standard steam tables.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
Is the calibration interval in line with the monitoring plan/PDD?	The device will be recalibrated according to the instructions (schedules, procedures) for QA of the technology provider
How were the values in the monitoring report verified and cross-checked?	The value of this parameter will be cross checked with HG_4, calculated according to equation 21 of the PDD using the amount of methane destroyed. The lower of the two values will be used in the ER calculation, as the methodology requires.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

Verification/Certification Report

DATA/PARAMETER	ID 38/$FF_{boiler,1}$
Data Unit	Gg
Description	Bunker fuel consumption by boiler 1
Source of data to be used	Volume flow meter
Value data for the monitoring period	0. Not monitored in this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	The measurements will be logged and documented. The result will be used, together with the thermal energy produced, to crosscheck the biogas consumption.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Its monitoring will be integrated in the plant's operational procedures. If the volume flow meter data are temporarily unavailable for technical reasons, internal fuel inventories will be used to calculate the fuel consumed. In such a case, internal inventories' procedures will be detailed in the monitoring report.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No emission reduction has been claimed for this monitoring period for the energy generated by boiler 1.

DATA/PARAMETER	ID 39/$FF_{boiler,2}$
Data Unit	Gg
Description	Bunker fuel consumption by boiler 2
Source of data to be used	Volume flow meter
Value data for the monitoring period	0. Not monitored in this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be recorded manually but archived electronically.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	The measurements will be logged and documented. The result will be used, together with the thermal energy produced, to crosscheck the biogas consumption.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Its monitoring will be integrated in the plant's operational procedures. If the volume flow meter data are temporarily unavailable for technical reasons, internal fuel inventories will be used to calculate the fuel consumed. In such a case, internal inventories' procedures will be detailed in the monitoring report.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No emission reduction has been claimed for this monitoring period for the energy generated by boiler 2.

DATA/PARAMETER	ID 40/$FF_{boiler,3}$
Data Unit	Gg
Description	Bunker fuel consumption by boiler 3
Source of data to be used	Volume flow meter
Value data for the monitoring period	0. Not monitored in this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	The measurements will be logged and documented. The result will be used, together with the thermal energy produced, to crosscheck the biogas consumption.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Its monitoring will be integrated in the plant's operational procedures. If the volume flow meter data are temporarily unavailable for technical reasons, internal fuel inventories will be used to calculate the fuel consumed. In such a case, internal inventories' procedures will be detailed in the monitoring report.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

DATA/PARAMETER	ID 41/$FF_{boiler,4}$
Data Unit	Gg
Description	Bunker fuel consumption by boiler 4
Source of data to be used	Volume flow meter
Value data for the monitoring period	0. Not monitored in this monitoring period.
Measuring frequency	Continuously by flow meter
Reporting frequency and recording procedure	The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	The measurements will be logged and documented. The result will be used, together with the thermal energy produced, to crosscheck the biogas consumption.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Its monitoring will be integrated in the plant's operational procedures. If the volume flow meter data are temporarily unavailable for technical reasons, internal fuel inventories will be used to calculate the fuel consumed. In such a case, internal inventories' procedures will be detailed in the monitoring report.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

DATA/PARAMETER	ID 42/ $\eta_{,3,p}$
Data Unit	-
Description	The efficiency of boiler 3 using biogas
Source of data to be used	-
Value data for the monitoring period	This parameter will be determined only once as the new boiler/application is added to the project.
Measuring frequency	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Reporting frequency and recording procedure	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

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DATA/PARAMETER	ID 43/ $\eta_{,4,p}$
Data Unit	-
Description	The efficiency of boiler 4 using biogas
Source of data to be used	-
Value data for the monitoring period	This parameter will be determined only once as the new boiler/application is added to the project.
Measuring frequency	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Reporting frequency and recording procedure	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Type of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Requirements for maintenance and calibration of monitoring and metering equipment	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Calibration frequency/interval	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Is the calibration interval in line with the monitoring plan/PDD?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
How were the values in the monitoring report verified and cross-checked?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Metering equipment not yet installed at the time of the on site visit and not applicable for this monitoring period.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No data was available, since the boiler and metering equipment were not installed yet.

DATA/PARAMETER	ID 44/ $\rho_{fuel\ oil\ 6}$
Data Unit	Kg/m^3
Description	Density of fossil fuel no.6 (bunker)
Source of data to be used	Maximum density of the different local providers used
Value data for the monitoring period	995.9
Measuring frequency	Monitoring period
Reporting frequency and recording procedure	At each monitoring period, Jaremar's fossil fuel suppliers will be asked to provide the specifications of the bunker provided. The maximum density among the values provided will be chosen to ensure conservativeness.
Type of monitoring and metering equipment	Not applicable
Requirements for maintenance and calibration of monitoring and metering equipment	Not applicable
Is accuracy of the monitoring equipment as stated in the monitoring plan/PDD?	Not applicable
Calibration frequency/interval	Not applicable
Is the calibration interval in line with the monitoring plan/PDD?	Not applicable
How were the values in the monitoring report verified and cross-checked?	Not applicable
Does the data management (from monitoring equipment to emission reductions calculation) ensure correct transfer of data and reporting of emission reductions?	Not applicable
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	No emission reduction has been claimed from thermal energy generation for this monitoring period so this parameter is not necessary for the calculations.

3.5.3 Assement of data and calculation of emission reduction calculations

According to the applied methodology, AMS-III.H , "Methane recovery in wastewater treatment", Version 05 of 18/05/2007 and AMS-I.C, Thermal energy for the user with or without electricity", Version 11 of 06/07/2007, the emission reductions have been calculated based on the following formula:

1) Ex-post determination of methane combusted and destroyed

$$ER_{MD,y} = (MD_{boiler1,y} + MD_{boiler\,2,y} + MD_{boiler\,3,y} + MD_{boiler\,4,y} + MD_{generator,y} + MD_{flared,y)} \times GWP_{CH4}$$

Where:

$ER_{MD,y}$= Emission reductions from the CH4 combusted and destroyed as fuel and flared in tCO2eq /y

MD_y = Amount of methane fuelled and flared in tones

GWP_{CH4} = Global warming potential for CH_4 (a value of 21 is used)

$MD_{boiler1,y}$ = Amount of methane destroyed by boiler 1 in tones;

$MD_{boiler\,2,y}$ = Amount of methane destroyed by boiler 2 in tones;

$MD_{boiler\,3,y}$ = Amount of methane destroyed by boiler 3 in tones;

$MD_{boiler\,4,y}$ = Amount of methane destroyed by boiler 4 in tones;

$MD_{generator,y}$ = Amount of methane destroyed by generator in tones;

$MD_{flared,y}$ = Amount of methane destroyed by flare in tones.

The amount of methane destroyed in the boilers is calculated according to:

$$MD_{boiler,i,y} = BG_{boiler,i,y} * w_{CH4,y} * D_{CH4}$$

Where:

$MD_{boiler,i,y}$ = The amount of methane destroyed by boiler *i* in tones;

$BG_{boiler,i,y}$ = The quantity of biogas fed into boiler i in Nm^3

$w_{CH4,y}$ = The average methane fraction of the biogas as measured and expressed as a fraction (in m^3 CH_4 / m^3BG)

D_{CH4} = The methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/Nm^3CH_4)

The amount of methane destroyed by the flare is calculated according to:

$$MD_{flared,y} = BG_{flared,y} * w_{CH4,y} * D_{CH4} * \eta_{flare}$$

Where:

$MD_{flared,y}$ = The amount of methane destroyed by flare in tones;

$BG_{flared,y}$ = The quantity of biogas fed into the flare in Nm^3

$w_{CH4,y}$ = The average methane fraction of the biogas as measured and expressed as a fraction (in m^3 CH_4 / m^3BG)

D_{CH4} = The methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/Nm^3CH_4)

η_{flare} = flare efficiency (50%)

The amount of methane destroyed by the generator is calculated according to:

$$MD_{generator,i,y} = BG_{generator,y} \times w_{CH4,y} \times D_{CH4}$$

Where:

$MD_{generator,i,y}$= Amount of CH_4 combusted in generator in tCH_4/y

$BG_{generator,y}$= The quantity of biogas fed into the generator in Nm^3/y

$w_{CH4,y}$ = The average CH_4 fraction of the biogas as measured and expressed as a fraction in m^3 CH_4/m^3

The methane fraction measurements average calculation included data after 26/07/2009 until 14/11/2009 which results in 58.3% Regarding the number and frequency of methane measurement to ensure the 95% confidence level, the monitoring report states that "The internal instruction is to measure the fraction at least between 2-4 times per month. However, the exact measuring frequency and measurement points varied significantly depending on process requirements." The procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level was not provided and FAR 1 has been raised.

2) Ex-post emission reduction from heat generation

Evaluation of supplied thermal energy using methane destroyed:
For the steam boiler (boiler 1):

$$HG_{1,y} = MD_{boiler1y} * NCV_{biogas} * \eta_{sp} * (1/1000)$$

Where:
$HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the steam boiler to the process in the project activity during the year y in TJ/year.
$h_{s,p}$ = The efficiency of the steam boiler using biogas.
$MD_{boiler,1,y}$ = Amount of CH4 consumed by the steam boiler in year "y" in tonnes CH4/year
NCV_{biogas} = Calorific value of biogas in TJ/Gg.

Evaluation of supplied thermal energy using methane destroyed:
For the steam boiler (boiler 2):

$$HG_{2,y} = MD_{boiler2y} * NCV_{biogas} * \eta t_{th,p} * (1/1000)$$

Where:
$HG_{2,y}$ = The net quantity of biogas associated thermal energy supplied by the steam boiler to the process in the project activity during the year y in TJ/year.
$\eta_{th,p}$ = The efficiency of the thermal oil heater using biogas.
$MD_{boiler,2,y}$ = Amount of CH4 consumed by the steam boiler in year "y" in tonnes CH4/year
NCV_{biogas} = Calorific value of biogas in TJ/Gg.

Evaluation of supplied thermal energy using methane destroyed:
For the steam boiler (boiler 3):

$$HG_{3,y} = MD_{boiler3y} * NCV_{biogas} * \eta_{3,p} * (1/1000)$$

Where:
$HG_{3,y}$ = The net quantity of biogas associated thermal energy supplied by the steam boiler to the process in the project activity during the year y in TJ/year.
$\eta_{3,p}$ = The efficiency of the steam generation unit using biogas.

$MD_{boiler,3,y}$ = Amount of CH4 consumed by the steam boiler in year "y" in tonnes CH4/year
NCV_{biogas} = Calorific value of biogas in TJ/Gg.

Evaluation of supplied thermal energy using methane destroyed:
For the steam boiler (boiler 4):

$$HG_{4,y} = MD_{boiler\,4\,y} * NCV_{biogas} * \eta_{4,p} * (1/1000)$$

Where:
$HG_{4,y}$ = The net quantity of biogas associated thermal energy supplied by the steam boiler to the process in the project activity during the year y in TJ/year.
$\eta_{4,p}$ = The efficiency of the steam boiler using biogas.
$MD_{boiler,4,y}$ = Amount of CH4 consumed by the steam boiler in year "y" in tonnes CH4/year
NCV_{biogas} = Calorific value of biogas in TJ/Gg.

Comparison of estimated with measured thermal energy:
For the all boilers the heat generation estimation using biogas inflow will be compared to the measured heat generated by the boiler, and the lower value will be used for the calculations:

$$HG_{\min,i,y} = \min(HG_{i,y}, HG_{measured,i,y} - \frac{FF_{i,y}}{SFC_i})$$

Where:
$HG_{min,i,y}$ = The conservative quantity of biogas associated thermal energy supplied by boiler i to the process in the project activity during the year y in TJ/year.
$HG_{i,y}$ = The net quantity of biogas associated thermal energy supplied by boiler i during the year y in TJ/year.
$HG_{measured,i,y}$= The directly measured total quantity of thermal energy supplied by boiler i during the year y in TJ/year.
$FF_{i,y}$ = The amount of fossil fuel used in boiler i in Gg/y
SFC_i = Specific fuel consumption for fossil fuel in boiler i in Gg/TJ

Emission reduction for thermal energy generation:
The emission reductions related to the heat/steam generation component are calculated as follows:

$$EG_{Thermali,y} = (\frac{HG_{\min,1,y}}{\eta_{s,b}} + \frac{HG_{\min,2,y}}{\eta_{th,b}} + \frac{HG_{\min,3,y}}{\eta_{3,b}} + \frac{HG_{\min,4,y}}{\eta_{4,b}}) * EF_{CO_2}$$

Where:
$ER_{thermal,y}$ = The total baseline emissions from steam/heat displaced by the project activity during the year
y in tonnes CO2eq/year.
$HG_{min,1,y}$ = The conservative quantity of biogas associated thermal energy supplied by the steam boiler 1 to the process in the project activity during the year y in TJ/year.
$HG_{min,2,y}$ = The conservative quantity of biogas associated thermal energy supplied by the thermal oil heater 2 to the process in the project activity during the year y in TJ/year.
$HG_{min,3,y}$ = The conservative quantity of biogas associated thermal energy supplied by the steam boiler 3 to the process in the project activity during the year y in TJ/year.
$HG_{min,4,y}$ = The conservative quantity of biogas associated thermal energy supplied by the high pressure steam boiler 4 to the process in the project activity during the year y in TJ/year.
EF_{CO2} = The CO2 emission factor per unit of energy of bunker that would have been used in the baseline plant in tonnes CO2 / TJ.
$\eta_{s,p}$ = The efficiency of the steam boiler using bunker that would have been used in the absence of the project activity.
$\eta_{th,b}$ = The efficiency of the thermal oil heater using bunker that would have been used in the absence of the project activity.
$\eta_{3,p}$ = The efficiency of steam boiler 3 using bunker that would have been used in the absence of the project activity.

$\eta_{4,p}$ = The efficiency of high pressure steam boiler 4 using bunker that would have been used in the absence of the project activity.

Boilers 1 and 2 have been operating but since there is a lack of monitoring data on variables $HG_{measured,1,y}$, $HG_{measured,2,y}$, $FF_{1,y}$ and $FF_{2,y}$ according to the revision ofin the Monitoring Plan, no emission reductions linked to heat generation under AMS – I.C are been claimed for this monitoring period. In the same way, since boilers 3 and 4 did not operate in the current monitoring period, emission reduction related to those boilers are been neglected.

3) Ex-post emission reductions from electricity generation (AMS-I.C)

$$ER_{power,y} = (EG_y - EC_y) \times EF_{grid}$$

Where:

EG_y = Net amount of electricity produced by the project activity in GWh/y

EC_y = Electricity consumption of the project activity in year "y" in GWh/y

EF_{grid} = Emission factor of the Honduran grid, determined ex ante in tCO2eq/GWh

Since it was not possible to obtain calibration frequency information, the credits associated to electricity generation are not been claimed for this monitoring period.

4) Leakage emissions.

Since the used technology is not transferred from another activity and the project does not result in an increase in transportation of fuel, the leakage emissions are not taken into consideration.

3.5.4 Accuracy of emission reduction calculations

The emission reduction calculations provided in the spreadsheet /5// have been verified to be correct and in line with the registered PDD /2//45/.

The emission reductions from the project for the monitoring period as reported in the monitoring report version 5.0 24/05/2012 /1/ are equivalent to 47,786 tCO_{2e}. The reported emission reductions estimated taking into consideration the changes notified in the revised PDD /45/ are 54,524tCO_{2e} for the period.
As described before, an analysis of the impact in the additionality was done. Since the increase in the average of water usage per processed ton of fresh fruit does not impact in the additionality, scale of project activity, and the applicability/application of the approved methodologies no permanent change to the PDD was necessary to modify this value used for ex-ante calculations.

The data presented in the monitoring report /1/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidence was presented and verified by RINA for the reported emission reductions as listed in the above Section 3.5.3.

3.5.5 Management system and quality control

In the on site inspection, data from 01/01/2009 to 30/11/2009 recorded by the PLC (programmable logic controllers) and stored in a data management system directly connected to the PLC (called SCADA) were inspected. SCADA is the main interface of the monitoring system; moreover the data stored will be also kept in an external hard drive which will work as a back up. This system will permit to graphically represent the collected data.

There are several exceptions for the above-mentioned SCADA interface:

- The methane fraction of the gas (ID.22) is measured with a portable meter with a set frequency. Initially, it was considered to control this variable through SCADA and use on-line metering but the high cost of the device and its technical problems made the PO opt for a portable meter.
- The parameters related to the efficiency of the new boilers 3 and 4 (ID.42, ID.43) will be evaluated once in the first verification for which they are relevant and fixed for the rest of the crediting period.
- The density of bunker oil (ID.44) will be evaluated once per monitoring period based on fossil fuel provider's information or default values.

- The parameters related to the additional boilers, boilers 3 and 4, which due to the physical distance to the control room will have independent PLCs which will register data continuously, which data will be regularly transferred to the control room computer.
- The bunker consumption measurements which are not digitalised, and will be regularly manually recorded. Both these procedures are detailed in the operation procedures and are considered appropriate.

This system is located in the control room of the project and there is an operator constantly controlling its correct operation. A backup copy of the data is made weekly in an external hard drive which works as a backup. The system also has a UPS to avoid data loss in case of a power cut.

The data are also collected manually in a daily data collection form at 6:00a.m. which includes readings directly from the instruments, is kept in the project's file.

All project data are sent weekly to the Jaremar Project Manager who completes the excel file called CDM Workbook.

The internal operational manuals have been made available to the DOE. In them, the explanation of how each value is gathered is presented.

There are several variables in the monitoring plan which concern boilers 3 and 4. These variables have not been monitored for the current monitoring period since those two boilers were not in operation at the time. The procedure description for the plan's operators was provided to the DOE.

Regarding the number and frequency of methane measurement to ensure the 95% confidence level, the monitoring report states that "The internal instruction is to measure the fraction at least between 2-4 times per month. However, the exact measuring frequency and measurement points varied significantly depending on process requirements." The procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level was not provided and FAR 1 has been raised.

4 VERIFICATION AND CERTIFICATION OPINION

RINA Service Spa (RINA) has performed verification of the emission reductions reported for the project activity "Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras" in Honduras, CDM Registration Reference N° 1483, for the period 01/01/2009 to 30/11/2009, with regard to the relevant requirements for CDM activities.

The project participants of the "Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras" project are responsible for:

- the preparation of greenhouses gas emissions data and the reported greenhouse gas emission reductions from the project on the basis set out in the monitoring plan contained in the registered project design document version /2/ of 21/12/2007
- the development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of greenhouse gas emission reductions of the project

It is the responsibility of RINA to express an independent verification opinion about the project's conformity with the requirements of paragraph 62 of the CDM modalities and procedures and on the reported greenhouse gas emission reductions from the project.

Based on documented evidence and corroborated by an on-site assessment RINA can confirm that:

- the project has been implemented and operated as per the registered PDD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable CDM requirements;
- the monitoring is in place as per the applied baseline and monitoring methodology;
- the monitoring complies with the monitoring plan in the registered PDD;
- the monitoring plan in the registered PDD is as per the applied baseline and monitoring methodology.

It is RINA's opinion that the GHG emission reduction stated in the monitoring report version 5.0 of 24/05/2012 for the Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras" project in Honduras for the period 01/01/2009 to 30/11/2009 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-III.H "Methane recovery in wastewater treatment" Version 05 of 18/05/2007, and the monitoring plan contained in the registered.

Hence RINA is able to certify that the emission reductions from the project during the monitoring period 01/01/2009 to 30/11/2009amount to 47,786 tCO_{2e}.

São Paulo, 10/12/2012

Geisa Maria Principe Branco Saettoni
CDM Team Leader
RINA Brazil

Genova, 12/12/2012

Laura Severino
Authorized officer signing for the DOE
RINA Services S.p.A.

APPENDIX A

VERIFICATION PROTOCOL

TABLE 1 REQUIREMENTS CHECKLIST

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
A. Monitoring Report						
A.1.	Does the used project title clearly enable the reader to identify the unique CDM activity? Is there an indication of a revision number, the date of the revision and the monitoring period?	/1/ /2/	DR	The title of project activity is Energeticos Jaremar – Biogas recovery from Palm Oil Mill Effluent (POME) ponds, and heat & electricity generation, Honduras, as per the registered PDD Version 03 of 21/12/2007 The Monitoring Report, Version 2.1 of 05/07/2010 , was made publicly available on the CDM UNFCCC website on 08/07/2010.		**OK**
A.2.	Does the project comply with the applicable requirements for completing the Monitoring Reports (latest version available)?	/1/	DR	Yes, the monitoring report version 5.0 24/05/2012 complies with the applicable requirements for completing the Monitoring Reports		**OK**
A.3.	Does the MR comply with the template available (latest version)?	/2/	DR	Yes, the monitoring report version 5.0 24/05/2012 complies with the latest template available.		**OK**
B. Description of Project Activity						
B.1.	Is the actual implementation and operation of the proposed project activity in accordance with the project activity in the registered PDD?	/1/ /2/ /8/ /9/ /10/	DR I	During site visit the following major equipments were verified: - Boiler 1: Cleaver-Brooks with 7.36MW_{th} of installed capacity and with efficiency of 81% (lower value for boiler using biogas) and 86% (higher value for boiler using fuel oil). This boiler is being used as steam production for internal production process at the palm oil refinery; - Boiler 2: HTT wtö 1.250-30-1-v (vertical) with 1.17 MW_{th} of installed capacity and with efficiency of 85% for any fuel. This boiler is being used as		**OK**

[1] MoV: DR document review, I interview, CC cross checking

Checklist Question	Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
			heating thermal oil. - Generator: GenSet JGC316 GS-B.L of installed capacity of 0.848 MWe. - Flare: open flare that burns the surplus biogas. The additional boilers 3 and 4 during site visit were under construction: - Boiler 3: Gekakonus with 0.93MWth of installed capacity and efficiency of 83.1% for steam generation using biogas and 87.5% for steam generation using bunker.		
			The monitoring report does not present information regarding the additional boiler 4 (model, capacity and efficiency) and the efficiency of boiler 3 according to the manufacturer specification.	~~CAR 1~~	
			The monitoring report mentioned a generator Model: Jenbacher GenSet JGC316 GS-B.L with 848KWe of capacity, while in the site visit it was verified a Motor Model: Jenbacher GE J312GSC81 with 657KW of capacity. PP is requested to evidence the capacity of the generator and to clarify difference between the capacities of motor and generator stated in the monitoring report.	~~CL 1~~	
			The PP is requested to provide further explanation and evidence on the increasing of actual CERs claimed of 53,915 tCO2e against 28,092 tCO2e. (Annual average of ex-ante estimation for 11 months).	~~CAR 2~~	
			During the site visit the environmental licenses	~~CAR 3~~	

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				for the project activity were not available.		
B.2.	In case of deviation between the registered project and the actual implementation/operation, do they comply with the requirements of the Project Standards?			The water usage (WU) foreseen into the feasibility study estimated by the technology provider was 0.63m3 of water per tonne of fresh fruit. However, the consumption of water during the first 11 months of 2009 reached almost the double 1.13 m3 of water per tonne of fresh fruit in average. The reason for this level of water consumption was that the plant was re-using the water in several of its processes to produce palm oil, but stopped since it was affecting the quality of the oil production. An analysis of the impact in the additionality was done. Since the increase in the average of water usage per processed ton of fresh fruit does not impact in the additionality, scale of project activity, and the applicability/application of the approved methodologies no permanent change to the PDD was necessary to modify this value used for ex-ante calculations.		**OK**
B.3.	For project activity that consist of more than one site: - describe the status of the implementation and starting date of opearation of each site; For project activity with phased implementation: - describe the progress of the proposed project activity achieved in each phase number; if the phased implementation is delayed, described the reasons and the expected implementation dates.			In this monitoring period (the object of this report), boilers 3 and 4 were not yet operating and therefore the variables related to their operation have not been recorded.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
B.4.	Methodology and methodological tool applied for the registered project activity	/1/ /2/ /29/ /30/	DR	The applied methodologies are AMS-III.H , "Methane recovery in wastewater treatment", Version 05 of 18/05/2007 and AMS-I.C Thermal energy for the user with or without electricity" Version 11 of 06/07/2007.		**OK**
C. Compliance of the monitoring activities with the registered monitoring plan / Compliance of the monitoring plan with the monitoring methodology and methodological tool						
C.1. Monitoring plan						
C.1.1.	Does the monitoring plan included in the registered CDM project activity comply with the applied methodology?	/1/ /2/ /6/	DR/CC	Yes. The revised monitoring plan was approved on 09/11/2011 by the EB.		**OK**
C.1.2.	Does the monitoring comply with the monitoring plan in the registered PDD?	/1/ /2/ /6/ /17/	DR/CC	The revised monitoring plan has been approved on 09/11/2011 by EB. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan. The removed sludge is dried on dedicated fields and the project proponent used to use the sludge for land application to enhance the quality of the soil. PP is requested to explain how the sludge is dried in dedicated fields, specially the procedures to assure the avoidance of methane emission and update monitoring report accordingly. The sludge management system was modified in September 2010. The old sludge management system (drying + soil application) is applicable for this monitoring period of verification but a new one (fertirrigation) will be applicable in the subsequent ones. During the site visit, it was confirmed/verified the installation of the new sludge removed system	~~CAR 4~~ ~~CL 2~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				for directly application as fertilizer in the surrounding land. This change has been considered under the Validation Opinion document. /7/ Invoices of sludge transportation of January, April, June, July, August, November and December/2009 /17/ were provided by the project participant.		
C.2. Data and parameters fixed ex-ante						
C.2.1.	Which parameters were available at validation and how were they verified?	/1/ /2/ /10/ /17/ /18/ /35/	DR/CC	The following parameters available at validation and presented in the MR were assessed in detail, based on the approved monitoring methodology, relevant CDM Executive Board decisions and registered PDD/revised monitoring plan /6/: GWP_CH4 - Global Warming Potential for CH4 (value of 21 is used); ID 15: $D_{CH4:}$ Density of methane at STP (273.15 ºK and 1,013 bar) (value of 0.0007168 tCH4/m³CH4 is used); ID 21: η_{flare} - Efficiency of the flaring process. According to the methodology a standard factor of 50 % is used; ID 6: EF_{grid} - Grid Emission Factor, Honduras, determined ex-ante in PDD using ENEE data. The used value is 646 tCH4/m³CH4; ID 11: EF_{CO2} - Carbon Emission factor of residual fuel oil (bunker). A default IPCC 2006 value of 77.4 tCO2/TJ was used. ID 12: NCV_{biogas} – Net Calorific Value of methane. A default IPCC 2006 value of 50,4TJ/Gg was used; ID 17: η_{SB} - Efficiency of the steam boiler using bunker. A value of 86% provided by the manufacturer was used;		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				ID 18: η_{SP} - Efficiency of the steam boiler using biogas. A value of 81% provided by the manufacturer was used; ID 19: η_{thB} - Efficiency of the thermal oil heater using bunker. A value of 85% provided by the manufacturer was used; ID 20: η_{thP} - Efficiency of the thermal oil heater using biogas. A value of 85% provided by the manufacturer was used; New fixed parameters (available in the revised monitoring plan) ID 45: $\eta_{3,p}$. The efficiency of high-pressure boiler 3 using biogas; A value of 87.5% provided by the manufacturer was used; ID 46: $\eta_{4,p}$. The efficiency of high-pressure boiler 4 using biogas. The default value of 100% was used in accordance with paragraph 13 (c) of AMS.I.C. The PP is requested to updated the fixed parameter in accordance with the registered PDD and the approved revised monitoring plan	~~CAR 5~~	
C.2.2.	What default data were selected and applied?			Please, refer to item C.2.1	~~CAR 5~~	**OK**
C.3.	**Data and parameters monitored ex-post**					
Parameter ID 22/ $w_{CH4,y}$						
C.3.1.	Which parameter has been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /19/ /37/	DR/CC	Description: Methane fraction of biogas. Data Unit: m^3 CH4/m^3 BG Source of data to be used: The methane fraction is been measured with a portable gas analyzer and registered manually and periodically with a frequency to satisfy statistical 95 %/10% confidence level/precision and at least quarterly.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				Data values for the monitoring period: The methane fraction value in the monitoring report is 61.13%, while the one used for the calculations is 59%, which corresponds to the average of 42 samples of methane fraction analysis accomplished with two different portable methane fraction analyzers: Sewerin SR2-DO 046 03 000555 and Sewerin SR2-DO 046 03 000553. The methane fraction value presented in the monitoring report (61.13%) is not the same as that presented in the emission reduction calculation spreadsheet. PP should explain the difference between both values and update the monitoring report in line with the emission reduction calculation spreadsheet. Moreover, PP shall explain how it has ensured the 95% confidence level and whether the measurement of methane content in biogas are been performed periodically. Rina has cross-checked the Excel spread against raw data and verified that data after 26/07/2009 were not accounted for the methane fraction calculation. PP is requested to explain why data after 26/07/2009 were not accounted for the calculation of methane fraction since there are analyses available until 14/11/09. Moreover, PP should provide the procedure for sampling (Sampling Techniques by Cochem) and clearly state the procedure in the monitoring report. Cross check: During the site visit, cross-check between methane fractions analyses with photos of the display from the portable gas analyzers from 06/01/2009 to 14/11/2009 /19/	~~CAR 8~~ ~~CL 5~~	

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				and the ER calculation spreadsheet /5/ showed consistency. Backup of all monitoring data are archived (weekly) digitally in the computerized monitoring system interface, named SCADA. Last backup verified during the site visit is dated 14/11/09.		
C.3.2.	Is the measurement equipment described? Is the accuracy of the monitoring and metering equipment addressed and deemed appropriate?	/1/ /2/ /6/ /11/	DR/CC	The monitoring equipment is described: Type: Gas analyzer Make/Model: Sewerin SR2-DO Serial no.: 046 03 000555 and 046 03 000553. The accuracy of the device is +/- 3%. Information confirmed in the calibration certificate issued by Sewerin /11/. The gas analyzer is calibrated yearly according to the recommendations regarding general maintenance and calibration procedures from the gas analyzer supplier, Sewerin. Calibration certificate for both device were provided. Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000553 calibrated on 12/12/2008, 09/05/09 and 07/11/09 by SEWERIN /11/ Portable gas analyzer SEWERIN SR2-DO, SN: 046 03 000555 calibrated on 21/05//2008 by SEWERIN PP is requested to provide the calibration instructions frequency of the technology provider from the gas analyzers: Sewerin SR2-DO 046 03 000555 and Sewerin SR2-DO 046 03 000553. According to the monitoring report version 1, the electricity meter (S/N 5421991) does not	~~CL 4~~ ~~CAR 6~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				require calibration. The PP shall explain how calibration frequency for this meter complies with EB 61 annex 21 para. 17 (C). The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	
C.3.3.	Is the measurement/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/ /11/ /19/	DR/CC	Yes, it is adequate and in line with the revised registered monitoring plan. Measuring frequency: The methane fraction is measured with an interval to satisfy statistical 95% confidence level and at least quarterly. The measurement is made by two different portable methane fraction analyzers: Sewerin SR2-DO 046 03 000555 and Sewerin SR2-DO 046 03 000553. The monitored data is saved digitally in the computerized monitoring system. The security of the system is guaranteed by a multilevel password. PP is requested to clarify which analyses were taken with which methane analyzer in order to satisfy statistical 95%/10% confidence level/precision and at least quarterly. Moreover explain the sampling procedure/method: how periodicity and frequency is determined, how the number of samples is chosen/determined. It seems that the measurement of the methane content of biogas is not taken within standard periods as required by methodology. Example, in January 2009, seven samples were taken; in February and March, three samples; April, nine samples and son on.	~~CL 3~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
Parameter ID 23/ BG_{total}						
C.3.4.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/ /18/	DR/CC	Description: The total amount of biogas consumed in all boilers and the flare Data Unit: Nm^3 Source of data to be used: measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data was provided to the DOE /18/. The monitored data is saved digitally in the computerized monitoring system. According to the monitoring report and the raw data records, the measurement of the total amount of biogas is 5,995,683Nm3. PP is requested to explain the difference between the sum of the biogas flow of all boilers and the flare of 6,291,175 Nm3. Cross check: During the site visit, cross-check between raw data /18/ of biogas flow measurement recorded by the PLC and CERs calculation spreadsheet showed consistency. Moreover, the value showed in the computer screen was coherent with the sum of all flow meters; it was registering effectively the sum of the other meters. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.	~~CL 7~~	**OK**
C.3.5.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/ /16/ /23/	DR/CC	The monitoring equipment is described: Type: Mass flow meter Make/Model: Magnetrol TA2-2-21B1-530 Serial no.: 618962-01-001 The accuracy of the device is 1%. Iinformation		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
		/33/ /36/		confirmed in the calibration certification issued by Magnetrol /23/. The biogas flow is measured continuously with mass flow meter, which is not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system. The following calibration certificate issued by Magnetrol was provided by PP and checked during the site visit: - Totalizer mass flow meter (ID 23) / MAGNETROL TA2-2-21B1-530 SN 618962-01-001; dated 8/11/2007/23/. From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	
C.3.6.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password.		
Parameter ID 24/ $BG_{Boiler\ 1,y}$						
C.3.7.	Which parameter have been monitored during the monitoring period?	/1/ /2/ ./5/ /6/ /18/	DR/CC	Description: The amount of biogas combusted in boiler 1 Data Unit: Nm^3 Source of data to be used: data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data /18/ was provided to the DOE. The monitored data is saved digitally in the computerized monitoring system. According to the monitoring report and the raw data records, the measurement of the biogas consumed in boiler 1 is 3,311,409Nm3 and is according to the ER calculation spreadsheet./5/ Cross check: During the site visit, cross-check between raw data/18/ of biogas flow measurement recorded by the PLC and CERs calculation spreadsheet /5/ showed consistency. During site visit an instant value of 433.16Nm3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		**OK**
C.3.8.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/ /16/	DR/CC	The monitoring equipment is described: Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-05-001		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
		/18/ /26/ /33/		The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol. The biogas flow is measured continuously with mass flow meters, which are not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system. The following calibration certificate issued by MAGNETROL was provided by PP and checked during the site visit: - mass flow meter - Cleaver Brooks boiler (ID 24) / MAGNETROL TA2-21B1-530 SN 618962-05-001; dated 05/11/2007; From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	
C.3.9.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password.		
Parameter ID 25 / $BG_{Boiler2,y}$						
C.3.10.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /18/	DR/CC	Description: The amount of biogas combusted in boiler 2 Data Unit: Nm^3 Source of data to be used: data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data /18/ was provided to the DOE. The monitored data is saved digitally in the computerized monitoring system. According to the monitoring report and the raw data records /18/, the measurement of the biogas consumed in boiler 2 is 963,769Nm3 and is according to the ER calculation spreadsheet /5/. Cross check: During the site visit, cross-check between raw data /18/ of biogas flow measurement recorded by the PLC and CERs calculation /5/ spreadsheet showed consistency. During site visit, an instant value of 143.10Nm3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		**OK**
C.3.11.	Is the measurement equipment described? Is the	/1/	DR/CC	The monitoring equipment is described:		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
	accuracy of the measurement equipment addressed and deemed appropriate?	/2/ /6/ /16/ /18/ /24/ /33/		Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-04-001 The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /24/. The biogas flow is measured continuously with mass flow meters, which are not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system. The following calibration certificate issued by MAGNETROL was provided by PP and checked during the site visit: - mass flow meter - Cleaver Brooks boiler (ID 25) / MAGNETROL TA2-21B1-530 SN 618962-04-001; dated 06/11/2007; From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	
C.3.12.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password.		
Parameter ID 26 / $BG_{generator,y}$						
C.3.13.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /18/	DR/CC	Description: The amount of biogas combusted in the generator Data Unit: Nm^3 Source of data to be used: data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data /18/ was provided to the DOE. The monitored data is saved digitally in the computerized monitoring system. According to the monitoring report /1/ and the raw data records /18/, the measurement of the biogas consumed in the generator is 1,476,969Nm3 and is according to the ER calculation spreadsheet /5/. Cross check: During the site visit, cross-check between raw data of biogas flow measurement recorded by the PLC and CERs calculation /5/ spreadsheet showed consistency. During site visit, an instant value of 363.12Nm3/h was verified in the mass flow meter display and cross checked with the computer screen; Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
C.3.14.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/ /18/ /25/ /33/ /36/	DR/CC	The monitoring equipment is described: Type: Mass flow meter Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-02-001 The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /25/. The biogas flow is measured continuously with mass flow meters, which are not affected by changes in temperature or pressure (this in relation to the volume of gas). The data is stored in the monitoring system. The following calibration certificate issued by MAGNETROL was provided by PP and checked during the site visit: - mass flow meter - Cleaver Brooks boiler (ID 26) / MAGNETROL TA2-21B1-530 SN 618962-02-001; dated 05/11/2007/25/. From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	**OK**
C.3.15.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password.		
Parameter ID 27/ $BG_{flared,y}$						
C.3.16.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /18/	DR/CC	Description: The amount of biogas combusted in the flare Data Unit: Nm^3 Source of data to be used: data is measured by flow meter and registered automatically by the PLC system. Data values for the monitoring period: data aggregated every second. The raw data/18/ was provided to the DOE. The monitored data is saved digitally in the computerized monitoring system. According to the monitoring report and the raw data records /18/, the measurement of the biogas consumed in boiler 2 is 243,187 Nm3 and is according to the ER calculation spreadsheet /5/. Cross check: During the site visit, cross-check between raw data /18/ of biogas flow measurement recorded by the PLC and CERs calculation /5/ spreadsheet showed consistency. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		**OK**
C.3.17.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed	/1/ /2/	DR/CC	The monitoring equipment is described: Type: Mass flow meter		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
	and deemed appropriate?	/6/ /22/		Make/Model: Magnetrol TA2-21B1-530 Serial no.: 618962-06-001 The accuracy of the device is 1%. The information was confirmed in the calibration certification issued by Magnetrol /22/. The following calibration certificate issued by MAGNETROL /22/ was provided by PP and checked during the site visit: - mass flow meter - Cleaver Brooks boiler (ID 27) / MAGNETROL TA2-21B1-530 SN 618962-06-001; dated 05/11/2007/22/; From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) states that there is no reason for periodic calibrations, unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	
C.3.18.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The biogas flow is continuously measured with mass flow meters. There is no need to monitoring separately temperature and pressure, since the measuring equipment converts automatically the biogas flow to gas volume at standard conditions (STP). The monitored data is automatically recorded and		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password.		
Parameter ID 28 / $BG_{boiler3,y}$						
C.3.19.	Which parameter have been monitored during the monitoring period? .	/1/ /2/ /6/	DR/CC	Description: The flow of biogas consumed in boiler 3 in year "y" Data Unit: Nm^3/year Source of data to be used: data will be measured by flow meter and registered in the PLC system. Value data for the monitoring system: 0 Boiler not installed yet, therefore no emission reduction has been claimed. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~**CAR 4**~~	**OK**
C.3.20.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/	DR/CC	Please refer to C.3.19		**OK**
C.3.21.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	The monitored data will be automatically and continuously recorded and stored in the PLC's memory unit whose content will be regularly transferred to the control room's computer. Boiler not installed yet, therefore no emission reduction has been claimed.		**OK**
Parameter ID 29 / $BG_{boiler4,y}$						
C.3.22.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: The flow of biogas consumed high pressure boiler 4 in year "y" Data Unit: Nm^3/year Source of data to be used: data will be measured by flow meter and registered in the PLC system. Value data for the monitoring system: 0		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				Boiler not installed yet, therefore no emission reduction has been claimed. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~CAR 4~~	
C.3.23.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/	DR/CC	Please refer to C.3.22		**OK**
C.3.24.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	The monitored data will be automatically and continuously recorded and stored in the PLC's memory unit whose content will be regularly transferred to the control room's computer. Boiler not installed yet, therefore no emission reduction has been claimed.		**OK**
Parameter ID 30/ T_{flare}						
C.3.25.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /14/ /39/	DR/CC	Description: Temperature in the exhaust gas of the flare Data Unit: ℃elsius Source of data to be used: The temperature is measured continuously by a thermocouple sensor and recorded automatically in the monitoring system's interface, SCADA. The security of the system is guaranteed by a password. Data values for the monitoring period: The temperature measurement is used to detect if the flare is operational. The temperature is measured continuously with a thermocouple sensor to demonstrate that the flare is operational. The thermocouple is connected to the data management system. As by the revised monitoring plan /6/, this temperature should be higher than 300^{o}C as by		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				the formula used in the ER calculation spreadsheet /5/. The DOE verified that no biogas volumes with the correspondent temperatures bellow 300^{o}C are being accounting for the emission reduction calculation and it is automatically limited by the formula. According to the technology provider, the minimum temperature at the flare that indicates its operation is 300^{o}C, as by letter from Biotec of 21/04/2008 /14/. The response of the request for clarification /39/, stressing that if a thermocouple is used as a flame detection system, it is sufficient to reach the given minimum temperature from the manufacturer. The relevant Request for Clarification on the flare temperature in the methodology AMS-III.H was verified /39/ Cross check: During the site visit, cross-check between raw data of temperature/18/ measurement recorded by the PLC and CERs calculation/5/ spreadsheet showed consistency. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~CAR 4~~	
C.3.26.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /41/	DR/CC	The monitoring equipment is described: Type: Thermocouple Make/Model: Siemens TH200,TC type K Serial no.: AZB/U9007276. The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 10~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				A letter from Siemens /41/ stating that it is an accredited company to accomplish the analysis of the temperature sensors J and K was provided. PP is requested to provide temperature sensors type J and K calibrations certificates and recalibrations instruction with the indicative recalibration frequency, as well the accuracy of the equipment.	~~CL 11~~	
C.3.27.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/ /10/	DR/CC	Yes, it is in line with the monitoring plan/6/. The temperature is measured continuously with a thermocouple sensor to demonstrate that the flare is operational. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building.		**OK**
Parameter ID 31/ EC_y						
C.3.28.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/ /18/	DR/CC	Description: Electricity consumption of the biogas recovery equipment Data Unit: GWh/year Source of data to be used: data is measured by electricity meter and registered automatically by the PLC system. This measurement includes the electricity consumption of the complete biogas recovery equipment, pumps, compressors and lightning of the gas handling area. This does not include electricity consumption from previous wastewater treatment system (baseline). Cross check: During the site visit, cross-check between raw data of electricity consumption/18/ recorded by the PLC and CERs calculation/5/ spreadsheet showed consistency.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~CAR 4~~	
C.3.29.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/	DR/CC	The monitoring equipment is described: Type: Electricity meter Make/Model: Siemens 9200. Serial no: SX07080157403 and SX07080157703 The recalibration frequency according to the MR is every 10 years. PP is requested to provide the calibration certificate for the electricity meters SX07080157403 and SX07080157703; provide the technology provider instruction about the recalibration frequency and; correct the data unit according to the methodology The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~CL 9~~ ~~CL 10~~	**OK**
C.3.30.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	The parameter is measured continuously and daily readings and relies on accumulated values of electricity consumption. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. The electricity consumption is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
Parameter ID 32/ EG_y						
C.3.31.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /5/ /6/	DR/CC	Description: Net electricity production by the project activity Data Unit: GWh/yr Source of data to be used: Electricity meter connected to the data management system and registered automatically by the PLC system. The total amount of 2.9483 GWh was achieved for this monitoring period. Cross check: During the site visit, cross-check between raw data/18/ of electricity production measurement recorded by the PLC and CERs calculation spreadsheet showed consistency /5/.		**OK**
C.3.32.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/	DR/CC	The monitoring equipment is described: Type: Electricity meter Make/Model: Jenbacher / JGC 316 GS-BL. Serial no: 542199 1 The recalibration frequency according to the MR is never and according to the instructions (Schedules, procedures) for QA of the technology provider. According to the monitoring report version 1, the electricity meter (S/N 5421991) does not require calibration. The PP shall explain how calibration frequency for this meter complies with EB 61 annex 21 para. 17 (C). The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	~~**CAR 7**~~ ~~**CL 10**~~	**OK**
C.3.33.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR/CC	Yes, it is in line with the monitoring plan. The net electricity production is been measured continuously. The monitored data is		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. The net electricity production is been measured continuously. The monitored data is automatically recorded and stored in the monitoring system's interface, SCADA (Supervisory Control And Data Acquisition). The security of the system is guaranteed by a password. Backup of all monitoring data from the PLC is archived (daily/monthly) in the Biogas building. Last backup verified during the site visit is dated 30/11/09.		
Parameter ID 33/ End use of final sludge						
C.3.34.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/ /7/ /17/	DR/CC	Description: End use of final sludge Data Unit: Use of sludge Source of data to be used: Invoices of sludge transportation of January, April, June, July, August, November and December/2009 /17/ were provided by the project participant. The sludge management system was modified in September 2010. The old sludge management system (drying + soil application) is applicable for this monitoring period of verification but a new one (fertirrigation) will be applicable in the subsequent ones. During the site visit, it was confirmed/verified the installation of the new sludge removed system for directly application as fertilizer in the surrounding land. This change has been considered under the Validation Opinion document. /7/ Data values for the monitoring period: Small amounts of sludge from January/2009 to November/2009 were removed from the		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				lagoons on a weekly basis and dispersed on the plantations. Cross check: During the site visit cross-check between Jaremar spreadsheet of sludge removal control and the invoices of sludge transportation of January, April, June, July, August, November and December/2009/17/ was performed by RINA.		
C.3.35.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.36.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 34/ $HG_{measured,1,y}$						
C.3.37.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: The directly measured total quantity of thermal energy supplied by steam boiler 1 during Data Unit: TJ/yr Source of data to be used: data will be measured by flow meter. Value data for the monitoring system: 0 The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan. According to the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialised mass flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are known, so that the mass flow can converted to energy	~~**CAR 4**~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				using standard steam tables. The value will be compared to HG1 as calculated according to equation 18 below using the amount of methane destroyed. The data will be cross-checked by equation: $HG_{1,y} = MD_{boiler\ 1,y} \times NCV_{biogas} \times \eta_{s,p} \times 1/1000$ $HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 1,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $\eta_{s,p}$ = The efficiency of the boiler using biogas		
C.3.38.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/ /10/	DR/CC	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with flow meter. The calibration frequency will be determined according to technology provider.		**OK**
C.3.39.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	No emission reduction has been claimed for this monitoring period.		**OK**
Parameter ID 35/ $HG_{measured,2,y}$						
C.3.40.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: The directly measured total quantity of thermal energy supplied by thermal oil heater (boiler 2) during the year y Data Unit: TJ/yr Value data for the monitoring system: 0 The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan. From the revised monitoring plan /6/, the enthalpy of the generated energy will be	~~**CAR 4**~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				calculated using measurement of the temperature gain and flow properties. $HG_{measured,2,y} = \_\Delta T_{tboiler,2}$ * Flow Heat capacity The value will be cross-checked using the formula 19: $HG_{2,y} = MD_{boiler\ 2,y} \times NCV_{biogas} \times \eta_{s,p} \times 1/1000$ $HG_{2,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 2,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $H_{th,p}$ = The efficiency of the boiler using biogas		
C.3.41.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /6/ /10/	DR/CC	The calibration frequency will be determined according to technology provider.		**OK**
C.3.42.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	No emission reduction has been claimed for this monitoring period.		**OK**
Parameter ID 36/ $HG_{measured,3,y}$						
C.3.43.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: The directly measured total quantity of thermal energy supplied by steam boiler 3 during the year y Data Unit: TJ/yr Source of data to be used: data will be measured by flow meter. Value data for the monitoring system: 0 The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~**CAR 4**~~	**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				From the revised monitoring plan /6/, the amount of the generated steam will be measured with a specialized flow meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The value will be compared to HG_3 as calculated according to equation 20. $HG_{3,y} = MD_{boiler\ 3,y} \times NCV_{biogas} \times \eta_{3,p} \times 1/1000$ $HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 3,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $H_{3,p}$ = The efficiency of the boiler using biogas		
C.3.44.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with flow meter. The calibration frequency will be determined according to technology provider.		**OK**
C.3.45.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	No emission reduction has been claimed for this monitoring period.		**OK**
Parameter ID 37/ $HG_{measured,4,y}$						
C.3.46.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: Energy delivered by the steam boiler Data Unit: TJ/yr Source of data to be used: data will be measured by flow meter. Value data for the monitoring system: 0		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan. From the revised monitoring plan, the volume of the generated steam will be measured with a specialised steam meter, which automatically internally compensates for the temperature and pressure of the steam, delivering reliable and accurate output. The operation conditions of the boilers are pre-set by the refinery process and known, so that the temperature, pressure, composition and density of the steam are know, and the volume flow is converted to energy using this information and standard steam tables. The value will be compared to HG_4 as calculated according to equation 21. $HG_{4,y} = MD_{boiler\ 4,y} \times NCV_{biogas} \times \eta_{3,p} \times 1/1000$ $HG_{1,y}$ = The net quantity of biogas associated thermal energy supplied by the boiler to the process in the project activity in TJ/year $MD_{boiler\ 4,y}$ = Amount of CH_4 combusted by the boiler in tCH_4 /y NCV_{biogas} = Net calorific value CH4 in TJ/Gg $H_{4,p}$ = The efficiency of the boiler using biogas	~~CAR 4~~	
C.3.47.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	According to the revised monitoring plan /6/, the amount of the generated steam will be measured with flow meter. The calibration frequency will be determined according to technology provider.		**OK**
C.3.48.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	No emission reduction has been claimed for this monitoring period.		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
Parameter ID 38/ $FF_{boiler,1}$						
C.3.49.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/ /40/	DR/CC	Description: Bunker fuel consumption by boiler 1 Data Unit: Gg/y Source of data: flow meter. Value data for the monitoring system: 0 The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~**CAR 4**~~	**OK**
C.3.50.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.51.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 39/ $FF_{boiler,2}$						
C.3.52.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: Bunker fuel consumption by boiler 2 Data Unit: Gg/y Source of data: flow meter. Value data for the monitoring system: 0 The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~CAR 4~~	
C.3.53.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.54.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 40/ $FF_{boiler,3}$						
C.3.55.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: Bunker fuel consumption by boiler 3 Data Unit: Gg/y Source of data: flow meter. Value data for the monitoring system: 0 The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~CAR 4~~	**OK**
C.3.56.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate? Is the measurement	/1/ /2/ /10/	DR/CC	Not applicable		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
	(*monitoring / metering*) equipment described? Is the accuracy of the monitoring and metering equipment addressed and deemed appropriate?					
C.3.57.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 41/ $FF_{boiler,4}$						
C.3.58.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: Bunker fuel consumption by boiler 4 Data Unit: Gg/y Source of data: flow meter. Value data for the monitoring system: 0 The volume of bunker used will be continuously monitored. The mass of the consumed fuel will be determined by using the volume flow measured and multiplying it by the density of bunker. There will be at least monthly recording of the volume consumed. The volume data will be archived electronically. The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	~~**CAR 4**~~	**OK**
C.3.59.	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.60.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	The measurement equipment used will be of high quality. The measurements will be logged and documented. The result will be used, together with the thermal energy produced, to crosscheck the biogas consumption.		**OK**
Parameter ID 42/ η_{3b}						
C.3.61.	Which parameter have been monitored during the monitoring period?	/1/ /2/	DR/CC	Description: The efficiency of boiler 3 using biogas		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
		/6/		Data Unit: N/A Source of data to be used: this parameter will be determined only once as the new boiler/application is added to the project.		
C.3.62.	Is the measurement (*monitoring / metering*) equipment described? Is the accuracy of the monitoring and metering equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.63.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 43/ η_{4p}						
C.3.64.	Which parameter have been monitored during the monitoring period?	/1/ /2/ /6/	DR/CC	Description: The efficiency of high-pressure boiler 4 using biogas. Data Unit: N/A Source of data to be used: this parameter will be determined only once as the new boiler/application is added to the project.		**OK**
C.3.65.	Is the measurement (*monitoring / metering*) equipment described? Is the accuracy of the monitoring and metering equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.66.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
Parameter ID 44/ $\rho_{fuel\ oil\ 6}$						
C.3.67.	Which parameter have been monitored during the monitoring period? .	/1/ /2/ /6/	DR/CC	Description: Density of fossil fuel n°6 (bunker) Data Unit:kg/m^3 Source of data to be used: Maximum density of the different local providers used At each monitoring period, Jaremar's fossil fuel suppliers will be asked to provide the specifications of the bunker provided. The		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				maximum density among the values provided will be chosen to ensure conservativeness.		
C.3.68.	Is the measurement (*monitoring / metering*) equipment described? Is the accuracy of the monitoring and metering equipment addressed and deemed appropriate?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.3.69.	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /10/	DR/CC	Not applicable		**OK**
C.4.	**Calibration requirements**					
C.4.1.	Are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate?	/1/ /2/ /6/	DR/CC	Yes, all the devices have been recalibrated according to the instructions (schedules, procedures) for QA of the technology provider.		**OK**
C.4.2.	Does the calibration cover the monitoring period?	/1/ /2/ /6/ /11/	DR/CC	Yes. Calibration certificates for all devices were provided, verified and cover the entire period in which the analyzer was used The monitoring equipment was in proper working during the monitoring period as assessed during the site visit.		**OK**
C.4.3.	Has the calibration frequency been respected?	/1/ /2/ /6/ /16/ /36/	DR/CC	Yes, From the monitoring report version 1, the calibration will be performed every 3 years. It is in line with General Guidelines to SSC CDM methodologies /36/. The supplier (Magnetrol) /16/ states that there is no reason for periodic calibrations; unless something happens to the sensor (100 % microprocessor based electronic device) given that it is calibrated. The supplier states that tests have proven that the calibration is still valid after 10 years of usage. PP provided the email from the technology provider (RE Power Distribution Solutions Marketing Request For Info.htm), where it states that the 9200 meter does not require any		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				calibration or re-calibration./48/		
C.4.4.	In case of delay, describe the applied maximum permissible error			Since it is more expensive to calibrate the thermocouple as to change it every two years, the PO changes it periodically. The first device was installed in 10/03/08 and removed the 16/05/09. A new one was installed in 01/06/2009. Nonetheless, since the PO did not find documental support for the frequency of calibration/change used, the project will not claim credits for flaring biogas this monitoring period. Moreover, the PO has decided to give up the credits associated to electricity generation because it has not been possible to obtain calibration frequency information. The credits associated to electricity generation were not considerate into the ER calculation.		**OK**
C.5.	**Monitoring of the sustainable indicators**					
C.5.1.	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host Country?	/1/ /2/ /6/	DR/CC	Not applicable.		**OK**
C.6.	**Management system and quality control**					**OK**
C.6.1.	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/ /2/ /6/	DR/CC	An on site inspection has been performed from 01/01/2009 to 30/11/2009 by the PLC (programmable logic controllers) and stored in a data management system directly connected to the PLC which is called SCADA. SCADA is the main interface of the monitoring system; moreover the data stored will be also kept in an external hard drive which will work as a back up. This system will permit to graphically represent the collected data. Every week a copy of this information will be stored on an external hard drive as a compilation of the variables of the monitoring plan and as backup. There are two exceptions for the above-mentioned SCADA interface. One exception is		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				the parameters related to the additional boilers, boilers 3 and 4, which due to the physical distance to the control room will have independent PLCs which will register data continuously, which data will be regularly transferred to the control room computer. The second exception is the bunker consumption measurements which are not digitalised, and will be regularly manually recorded. Both these procedures are detailed in the operation procedures and are considered appropriate. PP is requested to provide the operational procedures for data transferring and reporting for the emission reduction calculation and to include into the monitoring report	~~CL 6~~	
C.6.2.	Are procedures identified for day-to-day record handling (including what records to keep, storage area of records and how to process performance documentation)? Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /2/	DR	Please, refer to C.6.1	~~CL 6~~	**OK**
C.6.3.	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported *ex post* and verified?	/1/ /2/ /15/ /16/	DR	PP is requested to provide the procedures for data management and quality assurance and quality control to ensure that the emission reductions achieved by/resulting from the project can be reported *ex post* and verified.	~~CL 8~~	**OK**
C.6.4.	Are the responsibilities and authorities for monitoring and reporting in accordance with the responsibilities and authorities stated in the monitoring plan?	/1/ /2/ /6/	DR	Yes, the data are also collected manually in a daily data collection form at 6:00a.m. which includes readings directly from the instruments is kept in the project's file. All project data are sent weekly to the Jaremar Project Manager (Manuel Calidonio) who completes the excel file called CDM Workbook. The internal operational manuals have been made available to the DOE. In them, the explanation of how each value is		**OK**

Checklist Question		Ref.	MoV1	Comments	Draft Conclusion	Final Conclusion
				gathered is presented.		
C.6.5.	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /2/ /6/	DR	As per the revised monitoring plan/6/, records of the monitoring plan will be kept at least two years after the crediting period, permitting any future auditing of the values.		**OK**

TABLE 2 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
~~**CAR 1**~~ The monitoring report does not present information regarding the additional boiler 4 (model, capacity and efficiency) and the efficiency of boiler 3 according to the manufacturer specification.	B.1	The Monitoring Report has been corrected in line with the Monitoring Plan. The two new boilers and their efficiencies have been clearly described: · Boiler 3: • Thermal capacity: 9.802 MW_{th} • Model: CB600-800 • Purpose: Energy steam production for internal production process at the palm oil refinery. • According to "Cleaver Brooks Efficiency Facts", when testing the efficiency of a CB600-800 using fuel oil No.6 across a range of operating conditions, the highest value obtained is 87.5%. This value has been selected according to paragraph 13 (b) of the methodology comparing the efficiencies of three different providers for similar equipment. • The efficiency of the boiler using biogas is to be determined during the first verification for which ID.42 will be relevant.	The monitoring report v.2.1 has been updated accordingly. The PP has reported correctly the technical specification for boiler 3 (*Plate_cleaver brooks boiler.jpg*) and boiler 4 (*Specifications_Gekakonus.jpg*) , CAR 1 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		· Boiler 4: • Thermal capacity: 0.93 MW_{th} • Model: NUK-HP 930 from GekaKonus • Purpose: Energy steam production for internal production process at the palm oil refinery. • A default value of 100% efficiency using fuel oil No.6 was adopted during the Monitoring Plan Revision due to the lack of available information (paragraph 13 of AMS-I.C (version 11, option c). The project owner will be able to use a more realistic (lower) efficiency value if sufficient information is provided at verification to support a change. • The efficiency of the boiler using biogas is to be determined during the first verification for which ID.43 will be relevant. Please find attached: Cleaver Brooks boiler_Efficiency_facts.pdf, Specifications_Gekakonus.jpg , Plate_cleaver brooks boiler.jpg	
~~**CAR 2**~~ The PP is requested to provide further explanation and evidence on the increasing of actual CERs claimed of 53,915 tCO_{2e} against 28,092 $tCO_{2e.}$ (Annual average of ex-ante estimation for 11 months).	B.1	The CER performance of the project is linked to the amount of biogas captured (which in turn determines the electricity generation and auxiliary consumption). According to the PDD, 18.25m³ of biogas de biogas would be generated per tonne of fruit processed and in reality, the anaerobic lagoons generate around 20-22 m³ of	PP is requested to inform and justify the Tonne of Fresh Fruit produced during the verification period against the quantity informed into the PDD. According to the PDD the TFF is growing from 240,000 ton/year (2008) at a rate of additional 5,714 tons/year. Taking into account the biogas production rates informed into the

<table>
<tr><th>Corrective action and/ or clarification requests</th><th>Reference to Table 2</th><th>Response by project participants</th><th>Verification Conclusion</th></tr>
<tr><td></td><td></td><td>biogas per tonne.

Although some methane generation determinants do show an increase with respect to the PDD expectations, they cannot explain the whole difference of expected and realized CERs.

Much of the explanation lies in the different calculation methods to quantify the amount of biogas captured used ex-ante and ex-post.

In the ex-ante estimation, the total methane generation potential (BE_y) is estimated using the IPCC model. Combining equations 2, 3 and 4 of the PDD we obtain:

$BE_{y,methane} = (WU*TFF_y *COD_{y,wwun,treated} * B_{0ww}* MCF_{treatment}) * GWP\_CH_4$

Where:
<table><tr><td>WU</td><td>= projected volume of wastewater treated in the year “y” in m^3/year</td><td>The palm oil mill processed a volume of fruit 6.3% higher than expected. This explains a part of the increase in methane</td></tr></table></td><td>PDD of 18.38m³ of biogas per tonne of fruit processed before the project and 22m³ of biogas per tonne for the year of 2009, the increase in biogas production results in 22.5%. PP shall explain the increase in ERs calculation, once biogas production increases 22.5% and ER increases 86% related to the TFF forecasted growing of the PDD.
In addition PP should discuss (address) a possible “permanent change” due to the increase of this parameter (para 2 of EB 48 annex 66).

CAR 2 remains open

<u>RINA’s response on 23/03/2012:</u>
According to the new information of TFF processed of 262,282 tons in 2009, the increase in biogas production results in 31%. Since the PP cannot explain the increase in ERs calculation, once biogas production increases 31% and ER increases 86% related to the TFF forecasted growing of the PDD, a request for revision of the PDD shall be applied.

CAR 2 remains open.

RINA’s response on 03/04/2012:</td></tr>
</table>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants			Verification Conclusion
				production[2].	PP justified that the increase in the ER calculation is due the increase in water usage, where the rate of the average water usage per processed ton of fresh fruit is 0.63m^3/TFF into the PDD against the real of 1.13m^3/TFF, which is almost the double. PP is requested to send evidence of the water usage rate and that the project design does not changed, since the biodigester capacity should provide twice the expected amount of wastewater. PP should provide the biodigesters design as well the "as built" design. CAR 2 remains open. RINA's response on 05/07/2012: PP justified that the increase in the ER calculation is due the increase in water usage, where the rate of the average water usage per processed ton of fresh fruit was corrected from 0.63m^3/TFF to the real rate of 1.13m^3/TFF into the New template PDD version 04 of 24/04/2012. PP sent an evidence of the pre-project design of the year of 2006. PP is requested to send evidence of the current water usage rate and the "As Built" project design. Moreover, the PDD New Template still presents a biogas
			TFF_y	= average water usage per processed ton of fresh fruit in m^3/ton of fresh fruit - 0.63m^3/ton FF	Stable value.
			COD_y	= chemical oxygen demand of the untreated wastewater in year y (tonnes/m^3)	The COD was around expected values, even a little bit below (PDD value 64,238mg/l and realized value 61,525 mg/l). The efficiency of the lagoons has been slightly lower than expected but within a reasonable range. The removal rate was 85% in the PDD and a

[2] Fruit Processed by the Palm Oil Mill

Year	*Tonnes/y*	*(PDD value).*
2008	*214,523 (from April onwards)*	*180,000 (9 months)*
2009	*262,282*	*245,714*

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion

		realized value of 78% in 2009 (in the anaerobic lagoons, not the whole system).
B_{0ww}	= methane generation capacity of the untreated wastewater ($kgCH_4/kgCOD$)	IPCC
$MCF_{treatment}$	= methane correction factor for the wastewater treatment system that will be equipped with methane recovery equipment	IPCC
GWP_{CH4}	= Global warming potential for CH_4 (value of 21 is used)	This stays constant in ex-post calculations.

In the ex-post calculation, the value of how much biogas is captured and utilized ($ER_{md,y}$) is directly measured (mass-flow meters).

Therefore, the ER calculated ex-ante and ex-post differ although monitored values have remained within reasonable ranges and both calculation methods are in accordance to the methodology. The

production rate of 18.38m³ of biogas per tonne of fruit. PP is requested to justify this value.

CAR 2 remains open.

RINA's response on 09/07/2012:
PP sent the evidence of the water used per tonne of fresh fruit from Jan to Nov 2009, which average is 1.13m^3/TFF, in the tab "Data WU and m3 per TTF" of the file ER-calculations-changing-WU-value-version 5_090712.xlsm. Since the project design has not changed with respect to the one described in the PDD, the "As Built" project is not necessary. The biogas production rate of 18.38m³ of biogas per tonne of fruit has been changed to 25.59m³ in page 68 of the PDD version 5 and evidenced by the calculation presented in the tab "Data WU and m3 per TTF" of the file ER-calculations-changing-WU-value-version 5_090712.xlsm.

CAR 2 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		proposed ex-ante model has proven to predict lower methane capture values than the realized ones since the start of the project's operation. **Further information:** Annex 67 of EB 48 paragraph 2 states that: "If at verification a DOE identifies that the implementation or operation of a CDM project activity does not conform with the description contained in the registered Project Design Document (PDD), and the DOE determines that the changes do not raise concerns with respect to aspects outlined in paragraph 10(c) and the relevant guidelines established by the Executive Board, the DOE shall submit a notification of the changes with relevant documentation in accordance with Section C of this procedure, and the notification will be processed in accordance with Section D of this procedure." In turn, paragraph 10 (C) states that: "An assessment, following the guideline by the Board, regarding whether or not the changes would impact the following aspects: (i) Additionality of the project activity; (ii) Scale of CDM project activity; (iii) Applicability and application of Approved Baseline Methodology under which the project activity has been registered." According to the PDD the TFF in 2009, 245,714 ton/year (2009), the reality was that	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		in 2009 262,282 tons were processed. This means a 6% increase in production with respect to planned values. Production forecasts are not perfect and this percentage growth is within reason. Moreover, it does not affect the additionality, the scale or the applicability of the baseline methodology. Thus we see no reason for a "permanent change" in the PDD. On the other hand, as explained in our previous answer, biogas production rates informed into the PDD are based on theoretical estimates made following scrupulously the methodology. The values introduced in the function to calculate BE are still valid as demonstrated above but the model that the methodology used at the time to calculate BE was simply too conservative. A permanent change in the PDD would not enable us to modify the biogas production rates if we were to obey the methodology and therefore would not solve the mismatch between estimates and realized values. In addition, such a change would not make sense in accordance with paragraph 10 (c). **Further information:** Please see our answer in section *E.5. Comparison of actual emission reductions with estimates in the CDM-PDD* of the Monitoring Report.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		Additional calculations have been included in the ER calculations spreadsheet, in tab "Comparative ex-ante and ex-post". There, we present BE calculated using the measured values during 2009 with the ex-ante formulas. We can observe that the data which is responsible for the under-estimation of ER ex-ante is the average water usage per processed ton of fresh fruit (ID.2 WU). In the MR, section E.5, we analyze the impact of that change in ID.2 WU and openly discuss the need for a permanent change in the PDD. Please find attached 290312_Jaremar_Biogas_Workbook_v4_CFD.xls	
~~**CAR 3**~~ During the site visit the environmental licenses for the project activity were not available.	B.1	At the time of the site visit, the project owner was still requesting the renewal of the environmental license. Administrative processes in Honduras slowed down as a result of the political turbulences in 2009. With successive changes in the government, the renewal of environmental licenses took time. Jaremar successively requested the renewal and obtained it in 2011. Please find attached: Renewed Environmental License Energeticos Jaremar.jpg, 1st Environmental License Energeticos JAREMAR.pdf, License in Process proof.jpg	PP provided the first Environmental License No. 047-2007 of 11/06/2007 valid for 2 years, the License No: 079-2011of 16/03/2011 and the letter of requesting the renewal of the Environmental License of 08/04/2010. CAR 3 is closed.
~~**CAR 4**~~	C.1.2	The Monitoring Report has been updated	The number of the monitored parameter

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
The PP is requested to update the monitoring report in accordance with the approved revised monitoring plan.	C.3.19 C.3.22 C.3.25 C.3.28 C.3.40 C.3.49 C.3.52 C.1.2 C.3.19 C.3.22 C.3.25 C.3.28 C.3.37 C.3.40 C.3.43 C.3.46 C.3.49	accordingly. **Further information:** The number has been corrected.	ID 43 / η4,p in the monitoring report is not according to the revised monitoring plan. CAR 4 remains open RINA's response on 23/03/2012: PP corrected the number of the monitored parameter ID 43 / η4,p in the monitoring report. CAR 4 is closed
~~**CAR 5**~~ The PP is requested to updated the fixed parameter in accordance with the registered PDD and the approved revised monitoring plan	C.2.1	The Monitoring Report has been updated accordingly.	The monitoring report v. 2.1 was updated the fixed parameters in line with the approved revised monitoring plan. CAR 5 is closed
~~**CAR 6**~~ According to the monitoring report version 1, the portable methane meter (serial # 046 03 000555) was calibrated on 21/05/2008. The PP is requested to include in the monitoring report the calibration which covers the whole monitoring period.	C.3.2	All the analyses for the period were made using the SR2-DO (serial 04603000553). The meter SR2-DO (serial 04603000555), was only kept as a backup. This has been corrected in the meters referenced in ID.22 in the Monitoring Report. Please see: Calibration certificates_ SEWERIN 04603000553 **Further information:** Please see: Calibration certificates_ SEWERIN 04603000553 (the file previously sent was corrupted)	Calibration certificate of Sewerin SN 04603000553 is not available. The folder called CAR is empty. CAR 6 remains open RINA's response on 23/03/2012: PP provided calibration certificates of Sewerin SN 04603000553 of 12/12/2008 of 09/05/2009, and of 07/11/2009, which covers the whole monitoring period. CAR 6 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
~~**CAR 7**~~ According to the monitoring report version 1, the electricity meter (S/N 5421991) does not require calibration. The PP shall explain how calibration frequency for this meter complies with EB 61 annex 21 para. 17 (C).	C.3.32	The referred serial number belongs to the electricity meter incorporated in the Jenbacher engine. The Jenbacher engine's electricity meter has factory calibration since 20/06/08 and does not need to be calibrated under normal conditions. Its accuracy is 0.5% (See files: Jenbacher_CE_Bescheinigung.pdf; Jenbacher electricity meter_specs.pdf). The PO installed the 12/07/2010 an external electricity meter: a PowerLogic PM800 (n.26072154). The new meter fully complies with paragraph in EB 61, Annex 21, paragraph 17 (c). The new meter is certified to IEC62053-22.Class0.5S and has complied since its installation with all relevant calibrations as described by the manufacturer (See files: PowerLogic PM800_Manual.pdf, PowerLogic PM800_calibration_communication from manufacturer.pdf, PowerLogic PM800_Calibration Dec11.jpg). We can demonstrate the correct calibration of the engine's meter by comparing its measurements with those provided by the Powerlogic since its installation. When we done so and obtained no significant discrepancies (See file: EGeneration-Cross check 2 meters.xlsx). Therefore:	The calibration for the electricity S/N 5421991was not provided by PP. The PP added another electricity meter on 12/07/2010, which is after this verification period. Cross check evidences were provided, however it doesn't cover the verification period. CAR 7 remains open <u>RINA's response on 23/03/2012</u> Specification of the multi-measurement converter and synchronization was provided. However, the PO has decided to give up the credits associated to electricity generation because it has not been possible to obtain calibration frequency information. The ER calculation data have been updated and the credits associated to electricity generation were not considerate. CAR 7 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		• We can prove that the engine's meter is calibrated by comparing its results with the results of a new meter certified to IEC standards. • The engine's meter was calibrated in 2008 and therefore its calibration is still valid even considering the 3 year minimum frequency requested by CDM. For future verifications, the values of both electricity generation meters will be cross-checked. **Further information:** It was possible to demonstrate that the meter is working correctly by comparing its readings to a new meter installed and certified to IEC standards. It was possible to demonstrate that the meter S/N 5421991 was also certified according to IEC standards. Please find attached: X20CM0985- In line with IEC standards.pdf , Electricity Multi-measurement converter and synchronisation_Jaremar.pdf Nonetheless, the PO has decided to give up the credits associated to electricity generation because it has not been possible to obtain calibration frequency information from the technology provider within a reasonable delay. As a consequence, ER calculation data have been updated in the MR.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
~~**CAR 8**~~ The methane fraction value presented in the monitoring report (61.13%) is not the same as that presented in the emission reduction calculation spreadsheet. PP should explain the difference between both values and update the monitoring report in line with the emission reduction calculation spreadsheet. Moreover, PP shall explain how it has ensured the 95% confidence level and whether the measurement of methane content in biogas are been performed periodically.	C.3.1	In the old version of the calculations there was a mistake and the methane fraction measurements after 26/07/09 were not considered. The new value for the methane fraction is 58.3%. This mistake has been corrected in the Monitoring Report and the ER calculation spreadsheet. Regarding the confidence level, the PDD and the methodology require measuring the methane fraction of the gas at least quarterly and ensuring a confidence level of at least 95%. The project followed this requirement throughout the monitoring period. The amount of measurements required was estimated using measurements from previous monitoring periods to evaluate the process characteristics. This was done using the following equation[3]: $n = s_1^2/V \cdot (1 + 2/n_1)$ Where: n number of samples required s_1 standard deviation of past measurements V desired variance[4] n_1 number of past measurements Once the minimal number of samples is determined, the frequency can be	PP included methane fraction measurements after 26/07/2009 until 14/11/2009 for the methane fraction average calculation, which results in 58.3% and updated the monitoring report and ER calculation spreadsheet. Regarding the number and frequency of methane measurement to ensure the 95% confidence level, the monitoring report states that "The internal instruction is to measure the fraction at least between 2-4 times per month. However, the exact measuring frequency and measurement points varied significantly depending on process requirements." The procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level was not provided and FAR 1 has been raised. CAR 8 is closed.

[3] Cochran, William Gemell, 1977, Sampling Techniques 3rd ed., John Wiley & Sons Inc. pp 78-79 eq 4.7
[4] ibid, p 27 eq 2.23

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		determined by distributing the samples evenly. Nonetheless, the project is practicing over-sampling (which results in a higher statistical certainty and a higher measurement frequency than strictly required). The internal instruction is to measure the fraction at least between 2-4 times per month. However, the exact measuring frequency and measurement points vary and are determined by the process requirements. The confidence level of the methane fraction used exceeds the required 95% as a result of oversampling. This confirms that the sample size estimation was sufficient. The precise values are available in the ER calculation spreadsheet.	
~~**CL 1**~~ The monitoring report mentioned a generator Model: Jenbacher GenSet JGC316 GS-B.L with 848KWe of capacity, while in the site visit it was verified a Motor Model: Jenbacher GE J312GSC81 with 657KW of capacity. PP is requested to evidence the capacity of the generator and to clarify difference between the capacities of motor and generator stated in the monitoring report.	B.1	The DOE is kindly requested to revise her on-site notes. The generator installed in Jaremar is Jenbacher GenSet JGC316. The cited model mentioned belongs to a project visited during the same week also in Honduras, Eecopalsa. Please find attached the image of the generator taken during the on-site visit and its specifications: Generator model Jenbacher GenSet JGC316 GS-B.L 848KW.JPG and Specifications_Generator_Jenbacher.pdf	PP provided evidence of the generator model and capacity. CL 1 is closed
~~**CL 2**~~ PP is requested to explain how the sludge is dried in dedicated fields, specially the procedures to	C.1.2 C.1.2	The project's sludge is used as soil	PP explained that the sludge is used as soil application and a pumping system was installed to fertirrigate the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
assure the avoidance of methane emission and update monitoring report accordingly.		application so its emissions can be neglected in line with paragraph 13 of the methodology. During the first years of operation of the project, the sludge was transported in trucks and spread in the palm plantations nearby as fertilizer. Later, a pumping system was installed to fertirrigate the surrounding fields. The procedure used will be recorded and included in the monitoring system by the team responsible of the implementation of the monitoring plan. All the sludge generated during the monitoring period (2nd verification) was transported with trucks to palm plantations given that the new pumping system was installed on the 15/05/10. This change has been clearly mentioned in the Monitoring Plan.	surrounding fields. The monitoring report was updated accordingly. CL 2 is closed
~~**CL 3**~~ PP is requested to clarify which analyses were taken with which methane analyzer in order to satisfy statistical 95%/10% confidence level/precision and at least quarterly. Moreover explain the sampling procedure/method: how periodicity and frequency is determined, how the number of samples is chosen/determined. It seems that the measurement of the methane content of biogas is not taken within standard periods as required by methodology. Example, in January 2009, seven samples were taken; in February and March, three samples; April, nine samples and son on.	C.3.3	The PDD and the methodology require measuring the methane fraction of the gas at least quarterly and ensuring a confidence level of at least 95%. The project followed this requirement throughout the monitoring period. As explained in our response to CAR 8, after using Cochran's equation to determine the minimum number of measurements necessary to reach a 95%confidence level, the PO decided to systematically practice over-sampling to ensure the reliability of its estimates. Thus, the PO set the internal	PP informed that the PP will establish a stable frequency of measurements of two measurements per month with the possibility to increase it to 4 if there are any special events some months. To establish The procedure for standardizing the number and frequency of measurement shall be available. In this way, FAR 1 has been raised. CL 3 is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		instruction of measuring the methane fraction between 2 and 4 times per month. However, the exact measuring frequency and measurement points have been determined by the process requirements. As a result, the confidence level of the methane fraction estimate is much greater than strictly required. Nonetheless, there has not been a uniform frequency of measurement throughout the period. In the future, although the frequency of sampling is not required to be fix in accordance to the *Guidelines for assessing compliance with the calibration frequency requirements (version 01)* or the methodology, the PO will establish a stable frequency of measurements. From now on, two measurements will take place every month with the possibility to increase it to 4 if there are any special events some months (e.g. technical problem in during previous month, strange values due to a technical event in the lagoons, etc.).	
~~**CL 4**~~ PP is requested to provide the calibration instructions frequency of the technology provider from the gas analyzers: Sewerin SR2-DO 046 03 000555 and Sewerin SR2-DO 046 03 000553.	C.3.2	As mentioned above, only SR2-DO 046 03 000553 was used during this monitoring period. Please find attached the document indicating the testing / calibration frequency of the meter: SR2-DO_Sewerin Manual.pdf The PO has calibrated these meters every six months. Please find attached the folder: Calibration certificates_ SEWERIN	The provided document SR2-DO_Sewerin Manual.pdf did not inform the calibration frequency. Besides, the calibration certificate of Sewerin SN 04603000553 was not available CL 4 remains open <u>RINA's response on 23/03/2012</u> As per the document SR2 DO_calibration frequency (page 33) the instrument must be maintained at least once a year by SEWERIN Service. The calibration

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		04603000553 The entity in charge of calibrating them was Biotec with an authorization of the meter's manufacturer: Calibration Permission Sewerin_Biotec.pdf Further information: Please see: SR2 DO_calibration frequency (page 37).pdf and the documents attached in CAR 6.	certificates of Sewerin SN 04603000553 of 12/12/2008 of 09/05/2009, and of 06/11/2009 were provided. CL 4 is closed.
~~**CL 5**~~ Rina has cross-checked the Excel spread against raw data and verified that data after 26/07/2009 were not accounted for the methane fraction calculation. PP is requested to explain why data after 26/07/2009 were not accounted for the calculation of methane fraction since there are analyses available until 14/11/09. Moreover, PP should provide the procedure for sampling (Sampling Techniques by Cochem) and clearly state the procedure in the monitoring report.	C.3.1	Please refer to the answer provided to CAR 8.	PP included methane fraction measurements after 26/07/2009 until 14/11/2009 for the methane fraction average calculation, which results in 58.3% and updated the monitoring report and ER calculation spreadsheet. The procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level was not provided and FAR 1 has been raised CL 5 is closed.
~~**CL 6**~~ PP is requested to provide the operational procedures for data transferring and reporting for the emission reduction calculation and to include into the monitoring report.	C.6.1 C.6.2	The operational procedures have been described in section C. Data handling was carried out according to the description in the PDD (see B.7 of the PDD) and additionally according to the experience accumulated during the project operation and the previous verification.	PP updated the monitoring report in Section C including the operational procedures for data transferring and reporting. The evidence file of the procedure description for the plan's operators was not available. CL 6 remains open RINA's response on 23/03/2012 PP provided procedures of flow

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		The monitored data is read by the PLC (programmable logic controllers) and stored in a data management system directly connected to the PLC which is called SCADA. SCADA is the main interface of the monitoring system. This system is located in the control room of the project and there is an operator constantly controlling its correct operation. A backup copy of the data is made weekly in an external hard drive which works as a backup. The system also has a UPS to avoid data loss in case of a power cut. There are some exceptions - groups of variables that do not directly send a signal to the SCADA system - detailed below: The methane fraction of the gas (ID.22) is measured with a portable meter with a set frequency. Initially, it was considered to control this variable through SCADA and use on-line metering but the high cost of the device and its technical problems made the PO opt for a portable meter. The fuel oil n.6 consumption was manually recorded during the monitoring period (ID.38, ID.39). The density of bunker oil (ID.44) will be evaluated once per monitoring period based on fossil fuel provider's information or default values. The above-mentioned exceptions might be, in the future, improved to enable remote and/or improved monitoring.	measurement in boiler HTT, (procedimiento medicion flujo masica caldera HTT.docx); in boiler cleaver (procedimiento medicion flujo masico caldera cleaver.docx); of consumed energy measurement (procedimiento para la medicion de energia consumida.docx); of flare temperature measurement (procedimiento para medicion de temperatura en TEa.docx); of biogas temperature measurement (procedimiento para medicion temperatura de biogas.docx); of mass flow in the flare (procedmiento medicion flujo masico en la tea.docx and procedmiento medicion flujo masico generacion.docx) CL 6 is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		The data are also collected manually in a daily data collection form at 6:00a.m. which includes readings directly from the instruments is kept in the project's file. All project data are sent weekly to the Jaremar Project Manager (Manuel Calidonio) who completes the excel file called CDM Workbook. The internal operational manuals have been made available to the DOE. In them, the explanation of how each value is gathered is presented. There are several variables in the monitoring plan which concern boilers 3 and 4. These variables have not been monitored for the current monitoring period since those two boilers were not in operation at the time. However, their monitoring has also been described in section C. The procedure description for the plan's operators can be found attached "Procedures_data". Further information: Please find re-attached: "Procedures_data". (the file previously sent was corrupted)	
~~CL 7~~ According to the monitoring report and the raw data records, the measurement of the total	C.3.4	According to the CDM Workbook and the	As wrote, the measurement of the total amount of biogas is lower than the sum of the biogas flow of all boilers and the flare

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
amount of biogas is 5,995,683Nm3. PP is requested to explain the difference between the sum of the biogas flow of all boilers and the flare of 6,291,175 Nm^3.		raw data, the value of 5,995,683Nm^3 cited by the DOE is the total amount of biogas if we add up the mass flow meters of all individual devices instead of the total meter value. The total meter was out of order during the first 24 days of January 2009 and a new one started working on the 25th of that month. Thus, only the dates from the 25th of January can be used for the cross-check. When we do that exercise, we obtain: Total gas captured (Nm3) Total meter: 5,779,068 Sum of individual meters: 5,635,107 Percentage difference: 2.5% This difference is within normality. The accuracy of Magnetrol meters is 1% so the maximum difference between both values considering the error of the flow meters shall be 2%. Nonetheless, the total flow meter is located one mile away from the rest of the meters. The signal is sent through a signal transmitter and then goes to a receptor and then to a PLC. From the PLC, the data are incorporated into the SCADA system. Thus, the data goes through many transmitters and signal convertors with their own accuracy factors which can account for the rest of the difference. Since the individual's meters total is lower, it is that value which has been used for ER	As per PP's response, "since the individual's meters total is lower, it is that value which has been used for ER calculations to ensure conservativeness. Rather, no conservative measurements were taken for the ER calculation. ER calculation spreadsheet has taken values of the individual's meters, which sum is higher than the biogas measurement of the total flow meter. Especially for January, where the total flow meter was out of order during the first 24 days of January 2009 no correction were done into the ER calculation. CL 7 remains open <u>RINA's response on 23/03/2012</u> PP corrected the spreadsheet and considered the lower of the two values between the measurements of the total meter and the individual meters for conservativeness. Moreover, regarding the data of January, it was used the data from the individual meters which were working the whole month and the accuracy of the meter (1%) has been subtracted for that period, since a cross-check was not possible during 24 days. CL 7 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		calculations to ensure conservativeness. Although all meters are calibrated and working correctly, to be sure that everything was working well the engineering team in charge of the Project (Falcon) was asked to revise them and analyse the discrepancies found. They concluded that there were no problems in the installed measurement devices and gave some explanations for the differences found[5]. The report of the engineers who examined the problem has been attached: Falcon_flow meters_totalizer&individual measurements.pdf Further information: The measurement of the total amount of biogas (5,779,068 Nm^3) is higher than the sum of the biogas flow (5,635,107Nm^3) when we consider the dates for which both metres were working i.e. since the 25th of January. Given that it is lower, the value which has been used for ER calculations – the sum of the individual meters - is conservative.	

[5] They pointed at three reasons for the small discrepancies:

1. Small losses in the pipes that transport the gas from the lagoons to the plant.
2. Accuracy of the different meters and the PLC.
3. Punctual humidity in the pipes which could affect the instantaneous flow recorded by the PLC.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		Nonetheless, since it is true that for some months the total meter values are higher, the lowest of the two values has been chosen each month for conservativeness. Regarding the data of January, we have used the data from the individual meters which were working the whole month. Since a cross-check was not possible during 24 days, the accuracy of the meter (1%) has been subtracted for that period. The result of both of this changes is a reduction in BE claimed under III. H for the period.	
~~**CL 8**~~ PP is requested to provide the procedures for data management and quality assurance and quality control to ensure that the emission reductions achieved by/resulting from the project can be reported *ex post* and verified.	C.6.3	The quality assurance and control procedures have been described in section C. The reliability of the data collected is assured through high quality metering and a strict calibration plan. As well as that, it is possible to perform cross-checks: There is a total recovered biogas meter and meters at the different applications. For future verifications, there will be two meters of electricity generation (the one of the engine and a PowerLogic installed in 2010). Regarding quality control, the project manager fills in the CDM Workbook with the data sent from the control room on a weekly basis. There are monthly audits of the	PP updated the monitoring report in Section C including the procedures for data management and quality assurance and quality control. The evidence file of the procedure description was not available. CL 8 remains open <u>RINA's response on 23/03/2012</u> PP provided procedures of flow measurement in boiler HTT, (procedimiento medicion flujo masica caldera HTT.docx); in boiler cleaver (procedimiento medicion flujo masico caldera cleaver.docx); of consumed energy measurement (procedimiento para la medicion de energia consumida.docx); of flare temperature measurement (procedimiento para medicion de temperatura en TEa.docx); of biogas temperature measurement (procedimiento

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		management system include review of the data collected and the reports written according to this manual, to confirm that indeed the data is gathered and processed as required. Orbeo does a final quality check of the data before including them in the Monitoring Report. Agrotor is a subsidiary of Jaremar Group, of which divisions / sections are certified since 2008 according the international quality standard ISO 9001. The operation of the biogas plant is not certified according to this standard but the same quality standards applied in the rest of the sections are implemented. Further information: Please find re-attached: "Procedures_data". (the file previously sent was corrupted)	para medicion temperatura de biogas.docx); of mass flow in the flare (procedmiento medicion flujo masico en la tea.docx and procedmiento medicion flujo masico generacion.docx) CL 8 is closed
~~**CL 9**~~ PP is requested to provide the calibration certificate for the electricity meters SX07080157403 and SX07080157703; provide the technology provider instruction about the recalibration frequency and; correct the data unit according to the methodology	C.3.29	The referred meters do not need to be re-calibrated. The Manufacturer's Manual does not talk about calibration and this was confirmed through email by the technology provider. The meter is however tested by Falcon every year to make sure is working properly. Please find attached the folder " Siemens 9200_ElectricityMeter" which contains: the calibration certificates Calibration_SX-070801574-03_Lagunas.pdf, Calibration_SX-070801577-03_ControlRoom.pdf an email from the technology provider RE Power Distribution Solutions Marketing Request For Info.htm	Calibration certificates for the electricity meters SX07080157403 and SX07080157703 of 09/01/2007 and annual reports of testing for the meters of 29/07/2009 have been provided. The email from the technology provider was not available. CL 9 remains open <u>RINA's response on 23/03/2012</u> PP provided the email from the technology provider (RE Power Distribution Solutions Marketing Request For Info.htm), where it states that the 9200 meter does not require any calibration or re-calibration.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		and the reports pf the annual testing of the meters: Siemens_reading verification reports_09.rar The Monitoring report's electricity units have been changed from MWh to GWh in accordance with the Monitoring Plan. Further information: Please find re-attached: RE Power Distribution Solutions Marketing Request For Info.htm	CL 9 is closed.
~~**CL 10**~~ The accuracy of monitoring equipments shall be mentioned in the monitoring as per EB 54 annex 34.	C.3.2 C.3.5 C.3.8 C.3.11 C.3.14 C.3.17 C.3.26 C.3.29 C.3.32	The monitoring equipment has now been described in the Monitoring Report including type, model and accuracy of the measurement device. Please find attached the folder the relevant proofs and a summary table: Monitoring equipment.xls	Accuracies of the equipments were included into the monitoring report. Summary table with accuracies and calibration frequency information was provided. CL 10 is closed
~~**CL 11**~~ PP is requested to provide temperature sensors type J and K calibrations certificates and recalibrations instruction with the indicative recalibration frequency, as well the accuracy of the equipment.	C.3.26	The project uses a type K temperature sensor. It is as expensive to calibrate the thermocouple as to change it every two years. Thus, the PO changes it periodically. The first device was device was installed in 10/03/08 and removed the 16/05/ 09. A new one was installed in June 2009. Nonetheless, since the PO did not find documental support for the frequency of calibration/change used, the project will not claim credits for flaring biogas this monitoring period.	Thermocouples were changed, instead of calibrated. Frequency of calibration was not available. PP updated the calculation spreadsheet discounting biogas flaring. CL 11 is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		Please find attached: Calibration certificate Siemens thermocouple_100308.pdf, Picture_ Replacement Thermocouple.jpg	

TABLE 3 FORWARD ACTION REQUESTS

Forward action request	Reference to Table 2	Response by project participants	Verification Conclusion
FAR 1 That is, PP is requested to provide the procedure for standardizing the number and frequency of measurement taken for the calculation of the 95% confidence level during the monitoring period.			

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Geisa Maria Principe Branco Saettoni**
è qualificato come[1]: *is qualified as:*	**CDM(-TEC, -VAL, -VER, -TL, -FIN-EXP), VCS (-VAL, -VER, -TL), GS (-VAL, -VER, -TL), SCS (-VAL, -VER, -TL)**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable energy sources	1
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	27-08-2009	-
7	10-09-2012	Annual revision

Il Resp. QPT
Head of QPT

[1] Legend:

VAL:	Validator	CDM: Clean Development Mechanism
VER:	Verifier	VCS : Verified Carbon Standard:
TEC:	Technical Expert	GS: Gold Standard
TL:	Team Leader	SCS: SocialCarbon Standard
FIN-EXP:	Financial Expert	JI: Joint Implementation
DET:	Determiner	

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CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Thais De Lima Carvalho**
è qualificato come[1]: *is qualified as:*	**CDM (TEC, VAL, VER, TL, FIN-EXP)** **VCS, GS, SCS (VAL, VER, TL)**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable Energy sources	1
13.1	Waste handling and disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	19-08-2009	-
8	01-06-2012	Annual revision

Il Resp. QPT
Head of QPT

[1] Legend:

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **Americo Junior Varkulya**

We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM/VCS/JI/GS/SCS-TEC, CDM-VAL, CDM-VER, CDM-TL, CDM-FIN-EXP GS-VAL, GS-VER, GS-TL SCS-VAL, SCS-VER, SCS-TL**

is qualified as:

per le seguenti aree tecniche: **1.1, 1.2, 13.1**

for the following technical areas:

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.1	Thermal energy generation from fossil fuel and biomass including thermal electricity from solar	1
1.2	Energy generation from renewable energy sources	1
13.1	Waste handling and disposal	13.1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	30-01-2009	-
1	04-05-2009	Annual Revision
2	14-12-2009	Changes in module structure
3	27-04-2010	Annual Revision
4	18-10-2010	Changes in certificate module
5	17-03-2011	Changes due to new accreditation standard
6	13-06-2011	Annual Revision
7	01-06-2012	Annual Revision
8	10-08-2012	Extension to TA 1.2
9	06-09-2012	Updating qualification to TL

Il Resp. QPT
Head of QPT

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CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Lilian Cristine Poll Herrmann**
è qualificato come[1]: *is qualified as:*	**CDM (TEC, VAL, VER, -TL, FIN-EXP)** **VCS, GS (VAL, VER, TL)**
per le seguenti aree tecniche: for the following technical areas:	**13.1, 13.2, 15.2**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
13.1	Waste Handling and Disposal	13
13.2	Animal waste management	13
15.2	Animal waste management	15

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	06-03-08	-
9	12-09-12	Updating qualification as TL

Il Resp. QPT
Head of QPT

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TL:	Team Leader	SCS: SocialCarbon Standard
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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Rita Valoroso**
è qualificato come1: *is qualified as:*	**CDM-TEC, CDM-VAL, CDM-VER, CDM-TL, CDM-FIN-EXP VCS–TEC, VCS-VAL, VCS-VER, VCS-TL GS-TEC, GS-VAL, GS-VER, GS-TL SCS-TEC, SCS-VAL, SCS-VER, SCS-TL JI-TEC**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable Energy sources	1
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	18-01-10	-
6	13-07-12	Annual revision

Il Resp. QPT
Head of QPT

[1] Legend:

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CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **A. Cyril Augustus Arokiasamy**

We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM-TEC, CDM-VAL, CDM-VER, CDM-TL, CDM-FIN-EXP, GS-VAL, GS-VER, GS-TL, SCS-VAL, SCS-VER, SCS-TL VCS-TEC, JI-TEC**
is qualified as:

per le seguenti aree tecniche: **1.1, 1.2, 2.2, 3.1, 4.5, 4.10, 5.1, 11.1, 13.1**
for the following technical areas:

AREE TECNICHE *TECHNICAL AREAS*	**DESCRIZIONE DELL'AREA TECNICA** *TECHNICAL AREA DESCRIPTION*	**SCOPO SETTORIALE** *SECTORAL SCOPE*
1.1	Thermal energy generation from fossil fuel and biomass including thermal electricity from solar	1
1.2	Energy generation from renewable energy sources	1
2.2	Heat Distribution	2
3.1	Energy Demand	3
4.5	Rubber and Plastics	4
4.10	Fuel switching and/or energy efficiency and/or waste heat/gas/pressure recovered and utilization for power generation at manufacturing industries	4
5.1	Chemical process industries	5
11.1	Chemical process industries	11
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	**DATA** *DATE*	**MOTIVAZIONI PER LA REVISIONE** *REASON FOR THE REVISION*
0	30-06-2010	-
8	08-06-2012	Updating qualification in TA 1.2

Il Resp. QPT
Head of QPT

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Felice Alfieri**
è qualificato come[1]: *is qualified as:*	**CDM/VCS/GS/JI/SCS-TEC**
per le seguenti aree tecniche: for the following technical areas:	**13.2, 15.2**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
13.2	Animal Waste Management	13
15.2	Animal Waste Management	15

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	13-09-2010	-
4	01-06-2012	Annual revision

Il Resp. QPT
Head of QPT

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TL:	Team Leader	SCS: SocialCarbon Standard
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