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Validation Report

Project Title:

Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia

Report No.: SQAS-CDM-EP10850002

Date : 27 September 2012

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Date of first issue: 23 March 2012	**Project No.:** SQAS-CDM-EP10850002
Approved by: Parama Iswara Subramaniam	**Project title :** Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia
Client: Perenia Pty Ltd	**Designated Operational Entity:** SIRIM QAS International Sdn Bhd

Summary:
SIRIM QAS International Sdn Bhd has performed a validation of the "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" project, based on the Kyoto Protocol requirements, UNFCCC rules and associated interpretations. The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

The validation consisted of three phases; i) a document review of the project design documents and preparation of validation protocol, ii) on-site visit to the project activity and interviews with project developer and project consultant, and, iii) resolution of outstanding issues and the issuance of final validation report and opinion.

The project is aiming to reduce GHG emissions by capturing anthropogenic methane emissions from the palm oil mill anaerobic effluent treatment ponds and utilizing it to generate electricity in the biogas engine. Any excess biogas will be utilized in the biomass boiler or flared in an enclosed flare. The total emission reductions from the project are estimated to be on the average of 27,394 tCO_2e per year over the selected 10 year crediting period.

The overall validation process, from contract review to the validation report and opinion was conducted using SIRIM QAS Intl.'s internal procedures. The first output of the validation process was a list of corrective action requests, clarification requests and a forward action request (CAR, CL and FAR), presented in Table 3 of Appendix A of this report. As a result of the findings of the validation, the PDD was revised by the client. The latest version of the PDD is 2.3 dated 27/07/2012.

In summary, it is SIRIM QAS Intl.'s opinion that the proposed CDM project activity correctly applies the baseline and monitoring methodology applied for the project activity and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria.

Report No.: SQAS-CDM-EP10850002

Report title: Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia

Work carried out by:

Mansor Shah Aziz	: Validation Team Leader
Syed Anuar Shah Syed Mansor	: Validation Team Member
Aernida Abdul Kadir	: Validation Team Member

Work reviewed by: Isnazunita Ismail

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Indexing terms

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Abbreviations

AMS	Approved Methodology Small Scale
BOD	Biological Oxygen Demand
CAR	Corrective Action Request
Carotino	Carotino Sdn Bhd.
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reductions
CH_4	Methane
CL	Clarification Request
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
COD	Chemical Oxygen Demand
CSTR	Continuous Stirred Tank Reactor
DOE	Designated Operational Entity
DNA	Designated National Authority
EB	Executive Board
EB	Executive Board
ER	Emission Reduction
FFB	Fresh Fruit Bunches
GHG	Greenhouse gas(es)
GSCP	Global Stakeholders Consultation Process
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of Approval
MoC	Modalities of Communication
MoV	Means of Verification
MP	Monitoring Plan
Perenia	Perenia Pty Ltd
POME	Palm Oil Mill Effluent
PKS	Palm Kernel Shell
PP	Project Proponent / Project Participant
ODA	Official Development Assistance
PDD	Project Design Document
QA/QC	Quality Assurance/Quality Control
SIRIM QAS Intl.	SIRIM QAS International Sdn Bhd
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual version 1.2 (EB 62 Annex 5)

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1.0 INTRODUCTION

Perenia Pty Ltd has engaged SIRIM QAS International Sdn. Bhd. to perform validation of the "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" (hereafter called "the project activity").

This report summarizes the findings of the validation of the project, performed on the basis of CDM Validation and Verification Manual 1.2 (VVM)[74] and related UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Article 12 of the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board's decisions.

1.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP), and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

SIRIM QAS Intl. has based on the recommendations in the VVM version 1.2 employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the client. However, the stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Validation Team

The following validation team has been assigned to carry out the validation of the project.

Name	Involvement						
	Validation team leader	Validation team member	Technical Expert	Others (to specify)	Desk review	On-site audit	Sectoral competence
Mansor Shah Aziz	√				√	√	√
Syed Anuar Shah Syed Mansor		√			√	√	√
Aernida Abdul Kadir		√			√		√

Mansor Shah Aziz is a Chemical Engineer by qualification and has some years of work experience in the area of anaerobic wastewater treatment plant. He is currently a lead auditor for the CDM validation and verification scheme and also a qualified Environmental Management

System (ISO 14001) auditor.

Syed Anuar Shah Syed Mansor is a Chemical Engineer by qualification. He has extensive experience in the area of renewable energy, energy efficiency and wastewater treatment technology. He has been trained in the CDM validation and verification processes, and has been qualified as a CDM lead auditor in accordance with SIRIM QAS Intl.'s qualification criteria.

Aernida Abdul Kadir holds a Degree in Electrical-Electronics Engineering and a Diploma in Palm Oil Milling and Technology Management. She has several years of working experience in palm oil milling including the operation of POME treatment plant, biomass boilers and diesel generators. She has been trained in CDM validation and verification processes, and has been qualified as a CDM lead auditor in accordance with SIRIM QAS Intl.'s qualification criteria. She is also a qualified Environmental Management System (ISO 14001) lead auditor.

The qualification of each individual validation team member is detailed in Appendix B to this Report.

1.4 Technical Reviewer : Isnazunita Ismail

Isnazunita Ismail holds a Degree in Microbiology and Microbiol Technology and currently pursuing for Master in the Environmental Biotechnology. She is at currently a senior researcher at Environmental Research and Technology Centre, SIRIM Berhad with 16 years of work experiences in the area of wastewater treatment technology and the application of biogas.

2.0 METHODOLOGY

SIRIM QAS Intl. validation process consists of the following phases:

i) a document review of the project design documents and preparation of validation protocol;
ii) on-site visit to the project activity and interviews with project developer and project consultant; and
iii) resolution of outstanding issues and the issuance of final validation report and opinion

In order to ensure transparency, a validation protocol was customized for the project according to the VVM version 1.2[74]. The protocol describes criteria (requirements), means of verification and the results from the validation of the identified criteria, in a transparent manner. The validation protocol serves the following purposes :

- it organizes, details and clarifies the requirements that a CDM project is expected to meet;
- it ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described below in Figure 1.

VALIDATION PROTOCOL TABLE 1: MANDATORY REQUIREMENTS			
Requirement	Reference	Conclusion	Cross Reference / Comment
Mandatory requirements that the project must meet.	Gives reference to the legislation or agreement where the requirement is found	This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL)	Used to refer to the relevant checklists VVM to show how the specific requirement is validated. This is to ensure a transparent validation process.

		where further clarifications are needed.	

VALIDATION PROTOCOL TABLE 2 : REQUIREMENTS CHECKLIST			
Checklist question	Means of verification (MoV)	Comment	Draft and/or final conclusion
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in seven sections. Each section is further sub-divided. The lowest level constitutes a checklist question.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided (OK), or a CAR due to non-compliance with the checklist question or CL when the validation team has identified a need for further clarification.

VALIDATION PROTOCOL TABLE 3 : RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2.	Summary of project owner response	Validation conclusion
If the conclusions from the draft Validation are either a CAR or CL, these should be listed in this section.	Reference to the checklist question number in table 2 where CAR or CL is explained.	The responses given by the project participants during the communications with the validation team should be summarized in this section.	This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in table 2, under 'Final Conclusion'

Figure 1 Validation protocol tables

The completed validation protocol is enclosed in Appendix A of this report.

Findings established during the validation, non-fulfillment of the validation protocol criteria or identified risks to the fulfillment of project objectives were raised as either Corrective Action Requests (CAR) or Clarification Requests (CL).

Corrective Action Requests (CAR) were issued, where:

i) mistakes had been made that directly impacted on the project results; or
ii) CDM requirements had not been met; or
iii) there was a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The Clarification Requests (CL) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the first verification of the project activity.

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2.1 Document Review of PDD and Other Documents

The first PDD version 1/1/ submitted by the client and additional documents related to the project design and baseline were reviewed as an initial step of the validation process. The subsequent step involved the identification of corrective action requests, clarification requests and forward action requests (CAR, CL and FAR) which are presented in Table 3 of Appendix A of this report.

As a result of these findings, the PDD was revised by the client. A complete list of all documents and records reviewed is as attached in Section 6.0 of this report. The PDD format was found to be compliant with the relevant CDM requirements and guidelines provided by the UNFCCC. The most recent version of the CDM-SSC-PDD version 3 template was used.

Major changes between the PDD version published for the global stakeholder comment period and the final version submitted for registration are as follow:

- The start date of the project activity has been corrected from 04/08/2011 to 09/08/2011/23/, in accordance to the date PP signed the 'Letter of Acceptance'.
- The 10-day COD measurement campaign date has been corrected from 12/08/2011 – 21/08/2011 to 13/08/2011-22/08/2011 as reflected in the analysis reports.
- Deletion of the 'Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (Version 02, EB41)' which is not applicable to project activity as the diesel engines in the mill is not dedicated solely for project activity use. Calculation of $PE_{power,y}$ was revised to be in accordance with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01, EB39)". in Section B.6.1 of PDD;
- Revised COD monitoring frequency from 20 times/year to once every two weeks as per-paragraph 109 of Best Practices Examples focusing on Sample Size and Reliability Calculations (Version 01.0, Annex 6, EB67) and (General Guidelines for Sampling and Surveys (Version -1, Annex 30, EB 50 for Small-scale CDM Project Activities) /61/ in Section B.7.1 of PDD;.
- Revised description on sustainable development policies in Section A.2 of PDD, to be appropriate to the objectives of National Green Technology Policy objectives and Malaysia CDM criteria.
- Deleted "$MD_y = [Q_{biogas,\ combusted} \times fm_{CH4,RG} \times CFE_{ww} \times GWP_{CH4}] + [TM_{RG,h} \times \eta_{flare,h} \times GWP_{CH4}]$" in "Emission Reductions" in Section B.6.1.
- Updated Section D.1. on the positive impacts by the project activity.
- Investment analysis was revised to include description of alternative baseline scenario in Section B.5.
- Included the biomass boiler system in the project boundary, Section B.3.
- Included sensitivity analysis for PKS used in biomass boiler in the investment analysis. in Section B.5 of PDD.

A complete list of all documents and records reviewed is as attached in Section 6.0 of this report

2.2 Follow-up interviews

SIRIM QAS Intl. conducted audit at the project site of Carotino 16 February 2012 and at PP's office on 20-21 February 2012, to confirm selected information and to resolve issues identified in the document review. The table below provides a list of all persons interviewed and the main topics covered.

NAME	ORGANISATION	TOPICS
Ms. Jeyashri Kisna Ms. Shukriah Rosdi Ms. Bhavna Khandhar	Perenia Pty Ltd	• General information about the project & the PDD • Financial; analysis, Project barriers and additionality • Stakeholder consultation • Baseline determination • Training requirements, • Monitoring and management • Project planning and design • Financial analysis, project barrier and additionality • Potential risk and emergency procedure • Relevant legal approvals • Environmental impacts & sustainable development
Mr.R. Nadarajah Mr. C. L. Tay Mr.Syed Salim Abu Bakar	Carotino Palm Oil Mill Watermech Sdn. Bhd.	• CDM early consideration • Baseline determination • Monitoring and management • Operation and maintenance procedures Training requirements • Equipment specifications • Approvals from authorityCalibration and maintenance requirements for the equipment
Mr. Liew Yen Ping Mr. Phang Kam Chin	Local Contractor Local Contractor	• Local stakeholder consultation meeting

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve the corrective action requests and clarifications and any other outstanding issues which needed to be clarified prior to SIRIM QAS Intl. positive conclusion on the project design. During the validation process, four (4) CARs, twenty (20) CLs and one (1) FAR were raised.

All the CARs and CLs were resolved during this phase. In order to ensure the transparency of the validation process, the concerns raised and responses that were given are summarized in Section 3 of this report and documented in more details in Table 3 of the Validation Protocol in Appendix A. All the corrective actions have been incorporated into the PDD version 2.3[/48/], CER calculation spreadsheet version 2.1[/6/] and Carotino FM Version 2.1[/50/],
The resolved validation protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria and are in accordance to validation protocol tables (1 -3) as shown in Figure 1 of Section 2.0.

2.4 Internal quality control

SIRIM QAS Intl. has established an internal quality control process. A Technical Reviewer is appointed to review the final draft validation report. The comments made by the Technical Reviewer are taken into consideration and incorporated in the final report.

The final report (after resolutions of all findings) is then submitted to the CDM Quality Manager for review and approval.

3.0 VALIDATION FINDINGS

This section summarizes the main issues that were found during the validation process. A detailed listing of all findings is available in Table 2 and 3 of the validation protocols (Appendix A of this report).

3.1 Participation requirements

The project participants are Carotino Sdn. Bhd. of Malaysia, and Perenia Pty Ltd of Australia. Malaysia, as the host party, and Australia, as the Annex 1 party, meet the requirements to participate in the CDM. Malaysia ratified the Kyoto Protocol on 4 September 2002 while Australia on 12 December 2007. The ratification dates to Kyoto Protocol were further confirmed in the UNFCCC website. (http://maindb.unfccc.int/public/country.pl?country=MY,and http://maindb.unfccc.int/public/country.pl?country=AU).

The Letter of Approval (LoA) from the DNA of Malaysia was issued on 14/08/2012/55/ while the LoA from the DNA of Australia was issued on 23/07/2012/56/ . Both LoA were provided to the validation team by the Perenia. The validation team had further obtained confirmation through emails/57//58/ from the representatives of the DNA of both the countries on the issued LoAs. The validation team does not doubt the authenticity of the LoAs.

The LoA issued by the DNA of Malaysia was reviewed and deemed appropriate in confirming the following:

- Malaysia is party to the Kyoto Protocol;
- CDM is a voluntary participation,
- The proposed project will assist in Malaysia's sustainable development;
- the project title is in line with the title mentioned under section A.1 of the PDD.

The LoA issued by the DNA of the Australia affirms that Australia:

- has ratified the Kyoto Protocol on 12 December 2007;
- approves voluntary participation in this proposed CDM activity;
- authorizes Perenia Pty. Ltd. as a participant of the proposed CDM project activity;
- the project title is in line with the title mentioned under section A.1 of the PDD.

The validation team has confirmed that the LoAs have met the requirements of paragraph 45-48 of the VVM version 1.2.

During the on-site validation, the Letters of Approval (LoA) from the DNA of both countries have yet to be obtained. CAR 1 was raised on the issue and is subsequently closed. Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.2 Modalities of Communication

A statement of Modalities of Communication (MoC)/54/ with the EB and UNFCCC secretariat has also been issued and signed by authorized persons of both project participants. The MoC is found to be appropriate as it has clearly defined the responsible parties for communicating with EB and UNFCCC secretariat regarding the issuance of CER of the proposed CDM project. The latest template of the MoC was used, i.e. version 01.4, dated 25 July 2011

3.3 Project Design Document

The project document uses the latest CDM-SSC-PDD template version 3 which is currently applicable. The corresponding sections of the PDD were correctly filled and follows the guidelines specified in CDM-SSC-PDD version 5, dated 14 September 2007.

3.4 Description of Project Activity

The "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" (hereafter referred to as the project activity) is a methane capturing and utilizing project developed by Carotino Sdn Bhd (hereafter referred to as the project participant). The project is located in the premises of the Carotino Palm Oil Mill ("the mill") located in Sri Jaya, Maran, Pahang, Peninsular Malaysia. The GPS coordinates of the project activity are +3° 49' 01"N, +102° 49' 04" E. These coordinates were cross checked with http://mapper.acme.com/[/75/] and was found to be correct. The mill has a processing capacity of 144,000 tonnes of fresh fruit bunches (FFB) per year in 2011 and is projected to increase to 216,000 tonnes of FFB per year in 2013. The validation team confirms that this is based on the processing capacity of 45tonnes / hour and operational days of 300 days / year at 16 hours per day. The operational days and hours are further crossed check with the mills log book and average figures are confirmed.

The processing of fresh fruit bunches (FFB) into crude palm oil and palm kernels, generates large amounts of organic rich wastewater known as the palm oil mill effluent (POME) which is currently treated in the open anaerobic ponds system. The anaerobic treatment process produces large amounts of methane which is freely released to the atmosphere. The aim of the project is to reduce GHG emissions from the current open ponds system where the anaerobic decay of organic matter in the ponds resulted in the production of biogas containing methane, continuously emitted into the atmosphere.

The proposed CDM project activity involves the installation of a new closed tank anaerobic digester equipped with a biogas capture and collection system. The project activity will replace the existing anaerobic ponds in the wastewater treatment system. The captured biogas will be used as fuel in the biogas engine to generate electricity. Any excess biogas will be utilized as fuel in the biomass boiler or combusted in an enclosed flare system. However, the biogas utilisation will not be included in the project activity and will not be considered in the emissions reduction calculation.

In the baseline scenario, POME is treated through a series of open anaerobic and aerobic ponds wastewater treatment system without biogas recovery system, while electricity is generated primarily from biomass-based boilers and diesel gensets as back-up. The baseline ponds consist of three anaerobic ponds, two biomass boiler and two units of diesel gensets[/87/].

The proposed project activity involves replacement of all three open anaerobic ponds with two new units of first stage anaerobic digester (AD) tanks with fixed roof and one unit second stage AD tank/sedimentation tank with floating roof. These tanks will be fully equipped with biogas capture and collection system. The treated POME from the anaerobic digester system will overflow to the existing aerobic pond and subsequently to polishing plant prior to discharge to the plantation for land irrigation. The sludge from the anaerobic digester tanks will be sent to the plantation for soil application as a fertiliser.

The generated biogas will be captured and treated in the desulphurisation plant before being used as fuel in the biogas engine for electricity generation. The generated electricity will be used for the project activity auxiliary equipment and any excess will be sent to back to mill and for other uses. Any excess biogas will be used in the biomass boiler or flared in an enclosed flaring system. However, the scope of biogas utilisation will not be included in the project activity and was not considered in the emissions reduction calculation.

Detail document[/15/78/] relating to the design of the project activity were provided to the validation

team. Based on these documents the following was confirmed:

Technical Specification : Anaerobic Digester Tank System/15//78/		
Technology provider	:	Watermech Engineering Sdn. Bhd.
Quantity	:	Two units of first stage anaerobic digester (AD) tank with fixed roof and one unit second stage AD tank/sedimentation tank with floating roof.
Capacity	:	5000m^3 for the first stage AD, and 1400 m^3 for the second stage AD.
COD Removal Efficiency		80%/15/78/

Technical Specification : Flare system/76//77/		
Technology provider	:	Watermech Engineering Sdn. Bhd.
Quantity	:	1 unit of enclosed flare system
Capacity	:	500 m^3 / hour of biogas

Implementation of the proposed project will result in an estimated reduction of emissions the average of 27,394 tCO_2e per year

At the time of the on-site validation, the construction of the project activity is still in the early stage of earthworks and this progress is consistent with the project implementation schedule/39/.

The proposed project activity qualifies as a CDM Small Scale Project as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM. The project will result in emission reductions that are less than the threshold value of 60,000 t CO2e per annum as defined in AMS III.H Version 16. The discussions on the applicability of the methodology as presented in Section B.2 of the PDD were also found correct.

The project activity is not a debundled component of a larger project activity as there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity with the same project participant in the same project category and technology/measure within the previous two years and whose project boundary is within 1 km of the project boundary of the proposed small-scale project activity at the closest point. Hence this project activity is not a de-bundled component of any other project activity of the same PP in accordance with "Guidelines on assessment of debundling for SSC project activities" (EB-54, Annex 13).

The project is internally funded /27//59/. The validation team did not reveal any information that indicates the project can be seen as a diversion of official development assistance (ODA) funding towards Malaysia.

The operational lifetime of the project activity is estimated to be 15 years. This is considered reasonable as the referred document provided by the technology provider, Watermech Engineering Sdn. Bhd/15/ uses the same assumption.

In accordance with paragraph 64 of the VVM, the validation team hereby confirms that the project descriptions and project design in PDD are accurate and complete based on the document review, on-site inspection, physical verification and interviews conducted.

In this section, three (3) CLs were raised as follow:

- CL 2 – on the specification of the enclosed digester tank system, enclosed flare general specification and gas engine;
- CL 4 – on the description of the sustainable development policies in page 4, section A.2 of PDD version 1.0, and was not quite matching the objectives of National Green Technology Policy objectives and host country national CDM criteria; and
- CL 6 – on the GPS coordinates.

Detail findings and the resolutions are as in Table 3 of Appendix A of this report.

3.5 Baseline and Monitoring Methodology

The project activity applies the approved baseline and monitoring methodology of AMS-III.H (version 16, EB 58) 'Other Project Activities: Methane recovery in wastewater treatment'[/2/]. This methodology is valid at the time of submission to registration in line with paragraph 14 of EB 48 Annex 60.

The PDD also refers to the following tools which are applicable to the project activity:

- "Tool to determine project emissions from flaring gases containing methane" (Version 1, EB 28)[/3/]
- "Tool to calculate baseline and project and/or leakage emissions from electricity consumption" (version 01, EB 39)[/4/]

The validation team agreed with the application of the approved baseline methodologies for the project activity. The methodology and tools applied in the proposed project activity are confirmed to be the latest version as available from the UNFCCC website.

3.5.1 Applicability of the Selected Methodology

The project fulfills the applicability of AMS III.H Version 16 as follow:

#	Applicability criteria for AMS-III.H (version 16)	Justification
1	This methodology comprises measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options: a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion; b) Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment c) Introduction of biogas recovery and combustion to a sludge treatment system d) Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant; e) Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream; f) Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an	The validation team confirmed that the proposed project activity involves the introduction of an anaerobic digester tank system equipped with methane capture and collection system without sludge treatment. The sequential stage wastewater treatment in the form of closed tank anaerobic digesters will be installed to replace the existing system anaerobic open ponds, which does not have biogas recovery. This was evident in documents reviewed related to design[/15/]. Therefore, the project activity complies with option (f).

	anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).	
2	In cases where baseline system is anaerobic lagoon the methodology is applicable if: a) The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents, or through direct measurement, or by dividing the surface area by the total volume. If the lagoon filling level varies seasonally, the average of the highest and lowest levels may be taken; b) Ambient temperature above 15°C, at least during part of the year, on a monthly average basis; c) The minimum interval between two consecutive sludge removal events shall be 30 days.	Based on the drawing provided for the existing POME treatment system[/17/] it was confirmed that the existing wastewater treatment system which consists of three (3) anaerobic open ponds are more than 2 meters depth and without aeration. All the ponds are with depth of 4.20m to 4.42m and without aeration system. The temperature in Malaysia is always above 15°C. This was validated from the website[/18/]. The last desludging of accumulated solids in the wastewater treatment ponds was carried out in 2008. This was based on the evidence of written permission from the Department of Environment[/19/]. From the interviews conducted, it was further confirmed that the desludging of the ponds was carried out at intervals of more than 30 days.
3	The recovered biogas from the above measures may also be utilized for the following applications instead of combustion/flaring: a) Thermal or mechanical, electrical energy generation directly; b) Thermal or mechanical, electrical energy generation after bottling of upgraded biogas, in this case additional guidance provided in Annex 1 shall be followed; c) Thermal or mechanical, electrical energy generation after upgrading and distribution, in this case additional guidance provided in Annex 1 shall be followed: (i) Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints; or (ii) Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or (iii) Upgrading and transportation of biogas (e.g. by trucks) to distribution points for end users. d) Hydrogen production; e) Use as fuel in transportation applications after upgrading.	The recovered biogas will be utilised in the biogas engine for electricity generation for the mill and project activity use and the excess biogas will be combusted either through burner in the biomass boiler and/or enclosed flare[/76/77/]. Hence, paragraph 3(a) of AMS-III.H is applicable. This was evident in documents related to the design[/15/].

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4	If the recovered biogas is used for project activities covered under paragraph 3 (a), that component of the project activity can use a corresponding methodology under Type I.	The recovered biogas will be used to generate electricity for its auxiliary consumption. However, PP intended not to claim any emission reductions from generation of renewable energy, thus methodologies under type I are not applicable.
5	For project activities covered under paragraph 3 (b), if bottles with upgraded biogas are sold outside the project boundary, the end-use of the biogas shall be ensured via a contract between the bottled biogas vendor and the end-user. No emission reductions may be claimed from the displacement of fuels from the end use of bottled biogas in such situations. If however the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period CO_2 emissions avoided by the displacement of fossil fuel can be claimed under the corresponding Type I methodology, e.g. AMS-I.C 'Thermal energy production with or without electricity'.	It was confirmed through the document review/15/ and site visit that the project does not involve any bottling of biogas.
6	For project activities covered under paragraph 3 (c) (i), emission reductions from the displacement of the use of natural gas are eligible under this methodology, provided the geographical extent of the natural gas distribution grid is within the host country boundaries.	From the review of the project document/15/ and on-site validation, it was confirmed that the project does not involve any distribution of methane to a gas distribution grid.
7	For project activities covered under paragraph 3 (c) (ii), emission reductions for the displacement of the use of fuels can be claimed following the provision in the corresponding Type I methodology, e.g. AMS-I.C.	From the review of the project document/15/ and on-site validation, it was confirmed that the project does not involve any distribution of methane via a dedicated piped network to a group of end users.
8	In particular, for the case of 3 (b) and (c) (iii), the physical leakage during storage and transportation of upgraded biogas, as well as the emissions from fossil fuel consumed by vehicles for transporting biogas shall be considered. Relevant procedures in paragraph 11 of Annex 1 of AMS-III.H 'Methane recovery in wastewater treatment' shall be followed in this regard.	From the review of the project document/15/ and on-site validation, it was confirmed that the project does not involve distribution of methane to other users.
9	For project activities covered under paragraph 3 (b) and (c), this methodology is applicable if the upgraded methane content of the biogas is in accordance with relevant national regulations (where these exist) or, in the absence of national regulations, a minimum of 96% (by volume).	From the review of the project document/15/78/ and on-site validation,, it was confirmed that the project does not involve any bottling and distribution of methane to other users.
10	If the recovered biogas is utilized for the production of hydrogen (project activities	From the review of the project document/15/78/ and on-site validation, it

	covered under paragraph 3 (d)), that component of the project activity shall use the corresponding methodology AMS-III.O 'Hydrogen production using methane extracted from biogas'.	was confirmed that the project does not involve any production of hydrogen.
11	If the recovered biogas is used for project activities covered under paragraph 3 (e), that component of the project activity shall use corresponding methodology AMS-III.AQ 'Introduction of Bio-CNG in road transportation'.	From the review of the project document[/15/78/] and on-site validation, it was confirmed that the project does not involve any use of methane as a fuel in transportation applications.
12	New facilities (Greenfield projects) and project activities involving a change of equipment resulting in a capacity addition of the wastewater or sludge treatment system compared to the designed capacity of the baseline treatment system are only eligible to apply this methodology if they comply with the relevant requirements in the 'General guidelines to SSC CDM methodologies'. In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall be followed.	From the review of the project design documents[/12//13//14//76/&/77/] documents and on-site, it was confirmed that the project activity is not a Greenfield project and is not a new facilities with any capacity addition of the wastewater or sludge treatment system compared to the designed capacity of the baseline treatment system.
13	The location of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the PDD.	The location of the wastewater treatment plant has been uniquely defined in Section A.4.1.4 of the PDD. This was further confirmed by validation team during the site visit to the project site. The wastewater is generated through the process of extracting CPO from FFB.
14	Measures are limited to those that result in aggregate emissions reductions of less than or equal to 60 $ktCO_2$ equivalent annually from all Type III components of the project activity.	The estimated emission reductions are 27,394 tCO_2e per annum as demonstrated in Section B.6.3, which is lower than the 60,000 tCO_2e thresholds

The validation team hereby confirms that the selected baseline and monitoring methodology (AMS.III.H version 16) was previously approved by the CDM Executive Board, and is applicable to the project activity, which complies with all the applicability conditions therein. This is in compliance with paragraph 76 of VVM.

In this section, one clarification request (CL) was raised as follow :

- CL5 – on the description in Table B.2 of PDD of the project scenario item 2(c) that was not corresponded to the methodology requirement;

Detail findings and the resolutions are as in Table 3 of Appendix A of this report.

3.5.2 Project Boundary

As per paragraph 15 the applied methodology AMS-III.H (version 16), the project boundary is *the physical, geographical site where the wastewater takes place, in the baseline and project situations. It covers all facilities affected by the project activity including sites where processing, transportation and application or disposal of waste products as well as biogas takes place. The treatment systems not affected by the project activity shall be described in the PDD, but emissions from those sections do not have to be accounted for in the baseline and project emission calculations.*

From the discussion with PP and from the visit to the project site, the delineation of the project boundary as stated in section A.4.2 of PDD is correct. The project boundary includes the anaerobic digester tanks system, the existing aerobic ponds treatment system, biogas capturing and cleaning system, biogas engine, biomass boiler system and enclosed flare system and the end use of sludge.

The combustion of biogas in gas engine and biomass boiler was correctly included in the project boundary system. It is also confirmed that the utilization of the biogas is not included as project activity and emission reduction as per-type I; renewable energy projects was not claimed.

Based on drawing/78/ approved by Department of Environment Malaysia/47/ for the project activity implementation, it is confirmed that the project activity alters the baseline treatment system by introducing anaerobic digester tank system at the upstream of existing wastewater treatment system i.e.; after the acidification ponds. The treatment system affected by the project activity is categorized as Anaerobic Digester Tank System and aerobic pond, settling pond and polishing plant. It is further confirmed that there is no modification for the existing aerobic ponds and it remain to operate the same as in baseline scenario. It is also verified from the drawings/78/ that the inflow COD into the project activity is the same as in baseline anaerobic system (primary and secondary anaerobic ponds).

The project boundary was assessed by conducting physical site inspection, interviews and reviewing supporting document on the design of the project/15/. From the assessment, the validation team confirmed that the identified boundary and the selected sources and gases as documented in PDD are justified for the project activity. Methane (CH_4) is indicated as the main source of the baseline emissions, which is correct as per the project activity and the applicable methodology. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AMS-III.H. (version 16).

3.5.3 Baseline Identification

In accordance to AMS-III.H (Version 16) paragraph 16, it is required that an ex-ante assessment and identification of the systems affected by the project activity be undertaken. The assessment is done to identify any systems which are not affected by the proposed project activity, and hence excluded from baseline and project emission calculations.

It is confirmed that the open lagoon system for wastewater treatment system continued to be used in the absence of the project activity. It was also verified that presently no regulatory or contractual requirements that enforces implementation of a specific wastewater treatment technology, such as anaerobic digester or aerobic treatment system at palm oil processing plants for effluent treatment. Malaysian regulation allows utilization of open lagoon systems for wastewater treatment in the palm oil industry as per requirement in Environmental Quality (Prescribed) (Crude Palm Oil) Regulations 1977/60/.

The mill is only required to comply with enforced legislation by Department of Environment Malaysia for final treated effluent discharge for plantation irrigation by achieving BOD concentration of less than 100 milligram per litre (mg/l)/12/. It is verified during the site visit and through a review of

the mills' quarterly report to the Department of Environment for the period October 2008 till September 2011 that the treated effluent BOD concentration discharged by the mill is well below 100 mg/l limit/12/.

The baseline scenario for this project has been identified as the continuation of the current treatment of the wastewater from palm oil mill (POME) in the open ponds system without the biogas recovery system. This was confirmed during an on-site visit to the project site. The existing open ponds treatment system consists of three anaerobic ponds and one aerobic pond wastewater treatment system, and one polishing plant before discharged to the plantation irrigation. Sludge accumulated in the ponds is desludged periodically to avoid siltation problems/19/ and sent to the plantation for soil application.

From the review of the existing treatment plant document/17/, it can be confirmed that the anaerobic ponds have depth of more than two (2) meters without any aeration system, thus a methane correction factor (MCF) of 0.8 for anaerobic deep has been applied based on MCF values as stated in table III.H.1 of the methodology. The aerobic pond is with depth of 2.65m. The ponds are aerobically well managed/17/ , and are actively aerated using blowers/17/. Additionally the mill has achieved BOD discharge below regulation limits demonstrating the entire system is not overloaded, thus a MCF value of zero has been applied.

The drawing "Effluent Treatment Plant Drawing Layout drawing of the existing wastewater treatment system" /17/ provided, approved by the Department of Environment Malaysia further confirms the dimension of the treatment ponds including its depth which is 4.20 - 4.42 m for anaerobic ponds. Thus, it is evident from the site visit and COD data/44/ that significant anaerobic activity was happening in the baseline as tabled below are correctly applied in the PDD/48/.

Figure 2 Baseline open ponds

Type of Ponds	Pond Depth (m)	MCF factor used as per AMS-III.H ver16
Primary Anaerobic Pond 1A	4.38 m	0.8
Secondary Anaerobic Pond 2	4.42 m	0.8
Secondary Anaerobic Pond 1B	4.20 m	0.8
Aerobic Pond	2.65 m	0.0

It was confirmed that the COD removal efficiency in the baseline scenario was determined from 10-day measurement campaign/44/. The detailed efficiency calculation in ER calculation spreadsheet/73/ is checked and confirmed to be correct. It is also confirmed at site that the mill was operating in normal condition from 13/08/2011 till 22/08/2011 based on FFB production records/43/. The uncertainty factor of 0.89 was multiplied to the average COD values from the measurement campaign as stipulated in paragraph 27 (b) of methodology AMS IIIH (version 16). The calculated COD removal efficiency using anaerobic ponds in the baseline scenario is 99%.

It is further confirmed from drawings/17//47/ that the baseline scenario will also remain in the project activity. The PP also has correctly identified that higher COD inflow to baseline aerobic ponds in the project activity compared to baseline system and accounted it in the calculation of baseline and project emissions in the PDD/48/.

In palm oil mill, it is conventional to use steam turbine generator with the availability of free biomass as the source of fuel for the boilers. The validation team able to confirm during the site audit that the power supply to the mill and existing wastewater treatment system is supplied mainly by mill's biomass boiler with turbine capacity of 640 and 1,000 kW/34//35/. This source of power is also backed-up with two units of diesel generator; for start-up, shut down or emergencies with generation capacity of 200 kW each/34//35/ as per written approval/35/ provided by PP. This is further

verified with historical electricity generation data for the period of June 2010 to June 2011. The calculated proportion of electricity generated by biomass turbine compared diesel engines is confirmed at 87.07% and 12.93% respectively[/29/].

In the absence of the project activity, the wastewater from the palm oil mill would continue to be treated using the existing practice of open anaerobic ponds where methane generated as a result of anaerobic degradation of biogenic materials, would have escaped into the atmosphere. The open ponds system without methane recovery is able to treat the wastewater and meet the current environmental standards[/60/] which specified that the final discharge of the treated POME shall be within 500 mg BOD/litre. The status of compliance of the discharges is reported to the local Department of Environment on a quarterly basis. It has been confirmed that based on the result of the analysis conducted for the final discharge of the mill, the results were all within the limit. Currently, there is no discharge standard for COD.

There are no policies or legislation that prevents the existing open ponds system from continuing operation. There are no existing, pending or planned national regulatory requirements that govern the GHG emissions from agro-industry operations (specifically palm oil mill processing activities). With the above justifications, it is the validation team's opinion that the treatment of wastewater from the palm oil mill in the open anaerobic ponds without methane recovery is the baseline scenario for the project activity.

No alternative scenarios are considered in the identification of the most reasonable baseline scenario according to the approved methodology.

In this section, one CAR (CAR 3) and one CL (CL1 and) were raised as follow:

- CAR3 - on the 10-day measurement campaign result under normal operation from 13 August – 22 August 2011 where PP has yet to show how paragraph 27 (a) and (c) of AMS-III.H (Version 16) were assessed in the determination of the baseline emission;
- CL 1 – on the consistency on usage of acidification pond in Figure B3 of the PDD as per existing practice ;

Detail findings and the resolutions are as in Table 3 of Appendix A of this report. The description on the baseline as per AMS-III.H (ver.16) and its development has been discussed in detail in Section B.4 of the PDD. As a whole, the described baseline would totally represent the most likely scenario that would have occurred in absence of the project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

3.6 Additionality

According to Attachment A of Appendix B of the simplified modalities and procedures for CDM small scale project activities, the proposed project activity is considered additional if it can be demonstrated *that the project activity would not have occurred anyway due to at least one of the following barriers: (a) investment barriers; (b) technological barrier; (c) barrier due to prevailing practice; and (d) other barriers.*

For this project activity, the additionality has been demonstrated through:

- General Guidelines to SSC CDM methodologies [/61/]
- Attachment A to Appendix B of "Simplified modalities and procedures for small-scale Clean Development Mechanism project activities" [/62/.]

Section B.5 of the PDD had demonstrated that the project had applied a barrier analysis from the

"Attachment A of Appendix B" of the simplified modalities and procedures for small-scale CDM project activities. PP had chosen to demonstrate the additionality through investment barrier .

3.6.1 Prior Consideration of the CDM

As per the CDM Guidance (Glossary of CDM Terms, ver. 06)[/63/], the start date shall be considered to be the earliest date at which either the implementation or construction or real action of a CDM project activity begins. For this project activity, the start date was taken as 09 August 2011, following the date of signing the "Letter of Acceptance of Offer" [/23/] by the PP. With the issuance of the letter, PP had committed to expenditures related to the implementation of the project. Hence, the start date was in accordance with the "Glossary of CDM Terms" [/64/], and fulfills the requirements of paragraph 99 of VVM.

This is deemed acceptable as the earliest of financial commitment decision for the project activity, i.e. the project site clearing and earthwork was signed in 01 October 2011[/51/]. The validation team also able to confirm at site inspection that only the land clearance work been carried out at the project site during the time of visit.

The start date is prior to the date of publication of the PDD for global stakeholder consultation. As per the "Guidelines on the demonstration and assessment of prior consideration of the CDM", version 04 (EB 62, Annex 13), for project activity with a start date after 2nd August 2008, project participant to notify the UNFCCC secretariat and the Host Party DNA in writing of the commencement of the project activity and of their intention to seek CDM status.

It was noted that the 'Prior Consideration of the CDM Form'[/24/] was sent to UNFCCC secretariat and the Host Party DNA through email on 21 October 2011. Acknowledgement was received from UNFCCC secretariat on 21 October 2011[/25/] and from the Host Party DNA on 15 December 2011[/26/]. Records of this communication were made available to the validation team. The notification was made within six months of the project activity start date. Validation team has checked the letter and found it to be appropriate. It was further cross checked and confirmed from the UNFCCC website http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html.

The chronicle events for CDM consideration is listed in Table B.5, Section B.5 of PDD and a summary as below:

Event	Date
Board approving development of the proposed project activity as a CDM project.[/27/]. This date is considered as the investment decision date.	14/04/2011
Term sheet signed between Perenia and Carotino on the purchase of CERs[/28/]	10/06/2011
PP Signed "Letter of Acceptance of Offer" with Watermech Engineering Sdn. Bhd [/23/]	09/08/2011
ERPA signed between Perenia and Carotino Sdn Bhd.[/64/]	18/10/2011
Prior consideration notification posted on UNFCCC website[/24/]	21/10/2011
Response received from UNFCCC[/25/]	21/10/2011
Prior consideration sent out to Malaysian DNA for the proposed biogas activity[/36/]	21/10/2011
Local Stakeholder Consultation Meeting[/41/]	09/11/2011
Response received from Malaysian DNA[/26/]	15/12/2011

Webhosting of the PDD	07/01/2012

From the time of the decision of the board meeting to develop the project activity, to the time of the web hosting of PDD is less than 2 years. Hence, it is concluded that continuing and real actions were taken to secure CDM status for the project activity This is in line with the Guidelines on the demonstration and assessment of prior consideration of CDM Version 03/79/.

In this section, one CAR (CAR 2) was raised on the starting date of the project activity which was not the same as date of acceptance by the project proponent in the Letter of Offer/23/. Detail of the findings and the resolutions are as in Table 3 of Appendix A of this report

3.6.2 Investment Analysis

The baseline scenario for the project activity is continuation operation of the existing open pond treatment system without methane recovery and combustion. There is no existing, pending, or planned national, state, or local regulatory requirements that govern GHG emissions from wastewater treatment operations. The baseline option (business as usual) is financially attractive because it represents the lowest cost option but results in continual methane emission to atmosphere. The existing open pond wastewater treatment concept used by the palm oil mill is able to treat the POME to meet the discharge limit set by the Department of Environment. The Department of Environment continues to approve open pond wastewater treatment systems whether for new mills or upgraded mills since this method is the most economical to operate and is able to meet the discharge limits.

"Non-binding best practice examples to demonstrate additionality for SSC project activities" (EB 35, Annex 34) /66/ was used as guide in selection of barriers to demonstrate additionality. Since the project activity will only receive revenue in the form of fuel saving, PP applied benchmark analysis with national accounting practices and standards for the project's investment analysis. The latest version of "Guidelines on the Assessment of Investment Analysis"/65/ was used in the analysis.

Benchmark Analysis
The PP used the benchmark analysis to determine whether or not the project activity is economically or financially less attractive than other alternatives. PP has selected 15 years as the period of assessment and this was in accordance with paragraph 3 of the "Guidelines on the Assessment of Investment Analysis" (version 5.0)/65/, and the life time of major equipment was further confirmed by the technology provider/30/.

The benchmark selected is the default expected return on equity of 10.9% for 'Waste Handling and Disposal' (Group 1, Sectoral Scope 13) in the Host Country, Malaysia as defined in the "Guidelines on the Assessment of Investment Analysis" (EB 62, Annex5)/65/ is applied. This was found to be in accordance with the requirement specified in paragraph 15 of the Guideline/65/
As described in the PDD, the investment for the implementation of this project is considered to be the most significant barrier to project scenario, both during implementation and in the operation. This is in-line with the applicable CDM regulation - Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Attachment A to Appendix B/62/.

According to paragraph 6 of the Guideline/65/, the input values used in all investment analysis should be valid and applicable at the time of the investment decision. The key assumptions in validating the appropriateness and justification for each parameters are tabulated below:

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<table>
<tr><th>Parameters</th><th>Justifications</th></tr>
<tr><td>Total project cost of RM 13,913,790</td><td>As per the Guideline on the Assessment of Investment Analysis[/65/], the project cost should correspond with the date of investment decision[/27/]. It has been confirmed that the total project cost has been determined primarily based on proposal from technology provider[/51/] The proposal included the cost for the supply, construction and installation of the main equipment and the monitoring equipment as following:

<table>
<tr><th>Capital Cost</th><th>Cost (RM)</th></tr>
<tr><td>Earthworks for Biogas site</td><td>200,000</td></tr>
<tr><td>Roads & Perimeter drains</td><td>300,000</td></tr>
<tr><td>Piling work for Biogas site</td><td>263,000</td></tr>
<tr><td>Construction of Biogas Plant (Including civil & mechanical)</td><td>10,885,900</td></tr>
<tr><td>Electrical work from the Mill to Biogas Plant</td><td>1,000,000</td></tr>
<tr><td>Contingencies</td><td>1,264,890</td></tr>
<tr><td>Total Overall Capital Expenditure</td><td>13,913,790</td></tr>
</table>

The validation team had also cross checked with another project owned by the same owner, the JC group, the biogas project in Melewar Palm Oil Mill[/88/] (which is also under validation by SIRIM) the actual cost of earthwork and piling amounting RM 388, 296.28[/89/] an RM 481,280[/90/] already awarded to the same contractor for the implementation of similar project activity. Thus, the estimated cost is found reasonable. The pending costs for overall project execution i.e. installation of the biogas plant at project site, road works and electrical is justifiable since the costs are incurred progressively during project work. The contingency cost of 10% which is taken from publicly available source[/53/] is acceptable. A sensitivity analysis on the project cost was carried out. Based on this analysis[/50/], the project is not additional even if the project has a zero capital cost.

The validation team reviewed the document[/15//51/] during the validation and confirmed the main investment items (digester tanks, enclosed flare system, biogas engine system, control system and monitoring system) with the technology provider's signed letter of contract acceptance[/23/] and concluded that the indicated initial agreement on RM 8,598,000 costs is plausible.

The estimated CAPEX is found reasonable compared to other registered CDM projects as indicated in Figure 3.

During validation process, it was anticipated that there may be a future provision for the project proponent to combust the biogas in a new biomass boiler or modify the existing biomass boiler with biogas burner. The cost of the biomass boiler system was not included in the investment analysis because the decision on the biomass boiler system was made only after the date of investment decision. The cost of biomass boiler system had not been included with the argument that the equity IRR was not able to meet the benchmark of 10.9% even without this component.

The exclusion of biomass boiler from the CAPEX is found reasonable</td></tr>
</table>

<table>
<tr><td></td><td>as it will further elevate the capital cost and lower the IRR. Additionally, PKS is available freely as a waste product in the mill. The PKS does not have any commercial sales values as the mill is located in remote location and would incur high transportation cost. The PKS has never been sold at this mill previously and crossed checked with the mill ledger. Hence, the validation team concluded that this is conservative</td></tr>
<tr><td>Operation and maintenance cost (O&M cost) of RM 744,295</td><td>The O&M cost consists of salaries, accommodation and maintenance costs. The structure of these costs are as presented in the Financial Module spreadsheet[/50/].

The salaries of workers and staff, quoted in the financial analysis were estimated based on company salary rates. The number of staff required for the plant operations was based on PP's experience in operation of palm oil mill and the technology provider's advice. The twelve staff[/29/] was considered reasonable as the plant will be operating in three shifts, 24 hours per day. The salary range applied has been cross checked with the 'Employment Outlook and Salary Guide, Malaysia'[/67/] and found to be within the range specified in the guide.

<table>
<tr><th colspan="2">Overall Expenditure</th></tr>
<tr><th>Account Description</th><th>Cost (RM)</th></tr>
<tr><td>Workers Salary</td><td>207,116</td></tr>
<tr><td>Staff Salary</td><td>24,711</td></tr>
<tr><td>Workers Accommodation</td><td>7,800</td></tr>
<tr><td>Staff Accommodation</td><td>15,600</td></tr>
<tr><td>General Charges</td><td>59,166</td></tr>
<tr><td>Plant Machinery Upkeep (5% of Capex)</td><td>429,900</td></tr>
<tr><td>Total Overall Expenditure</td><td>744,295</td></tr>
</table>

The operational costs are plausible as Carotino projected overhead (salaries, insurance, medical, accommodation and other general charges) based on the existing Carotino accounting practice[/29/]. The maintenance cost was based on estimation by technology provider[/30/]. The O&M cost is approximately 5.35% of the total CAPEX cost. This is considered conservative as it is consistent with the standard practice[/53/] in estimating the annual maintenance cost. In conclusion, the budgeted costs submitted, it is deemed reasonable and appropriate.</td></tr>
<tr><td>Diesel Cost of 2.74 RM/liter</td><td>The price was based on PP actual invoices[/68/]. The price used was based on highest purchase price of diesel in 2010-2011[/69/].

The diesel price was realistic and conservative since it was the highest price in the preceding two years[/69/] and it was supported by the invoices[/68/].

The diesel price is found as reasonable as the values used are the most recent figures. The diesel price stated in other registered CDM projects in Figure 3 are relatively lower compared to this project since the diesel price used is most recent.</td></tr>
<tr><td>Diesel consumption displaced of 345,623</td><td>The volume of diesel consumption that would be displaced is based on the maximum historical diesel consumption data[/22/] from July 2010 – Jun 2011. The highest consumption was during the period from July 2010 to Jun 2011 which was equal to 172,811.47 liters/year and the</td></tr>
</table>

liters/year	corresponding mill's FFB processing capacity was 118,322 tonnes/year[43]. The estimated FFB to be processed in the project activity is 216,000 tonnes/year, hence a conservative increment of 100% in diesel consumption was used to accommodate assumption that the FFB process will increase approximately 100% in the processing capacity..
Income tax rate: 25%	The income tax rate was based on Lembaga Hasil Dalam Negeri Malaysia (the Malaysian Inland Revenue Board); (http://www.hasil.gov.my/goindex.php?kump=5&skum=2&posi=5&unit=1&sequ=1) applied is found reasonable.
General Plants and Equipment Depreciation 15 years	The validation team confirmed that the general plants and equipment depreciation of 15 years was based on the "Malaysian Accounting Standards Board, based on Property, Plant & Equipment, paragraph 50-62 of the Financial Reporting Standards, FRS 116" (http://www.masb.org.my/index.php?option=com_content&view=article&id=142:frs116-pg4&catid=6:masb-exclude-private) and the equipment life time designed by technology provider[30] applied is found reasonable.
Initial allowance General Plants and Equipment 20%	The validation team confirmed that initial allowance rate for General Plant and Equipment was based on Lembaga Hasil Dalam Negeri Malaysia (Malaysia Inland Revenue Board) under category of plant and machinery; http://www.hasil.gov.my/goindex.php?kump=5&skum=1&posi=6&unit=1&sequ=1 applied is found reasonable.
Annual allowance General Plants and Equipment 14%	The validation team confirmed that annual allowance rate for General Plant and Equipment was based on Lembaga Hasil Dalam Negeri Malaysia (Malaysia Inland Revenue Board) under category of plant and machinery; http://www.hasil.gov.my/goindex.php?kump=5&skum=1&posi=6&unit=1&sequ=1 applied is found reasonable.
Fair Value = 0	The fair value of the equipment was justified and applied according to paragraph 3 & 4, "Guidelines on the Assessment of Investment Analysis" (Version 05; EB 62). With initial allowance of 20% and annual allowance of 14%, the fair value will be considered zero at the end of the project life span of 15 years, which is in line with the equipment lifetime assured by technology provider[30],. The application of zero at the end of project lifetime is reasonable as the system is not transferable and does not have any ability to generate any revenue independently.
Sale price of Palm Kernel Shell (PKS) at RM80/ton	The price of the PKS was based on PP's actual PKS quotation[9] which was submitted to the validation team. The sales price of PKS of RM 80/t was referred to Letter of Offer for PKS Purchase by Chin Wood Industries Sdn Bhd to Carotino Palm Oil Mill dated 15/06/2012[9]. The sales price used was not at the time of investment decision because PP never decided to utilize methane in their boilers at time of decision making and has never sold PKS in the past; as the mill is located in a remote location which will incur high transportation cost. The publically available reference on PKS price is RM70/ton [70]. Hence

	the price of RM80/ ton was considered reasonable. The price of PKS is also found reasonable compared to other registered CDM projects as indicated in Figure 3. Since this parameter was decided after the investment decision time, a separate financial spreadsheet on the inclusion of this parameter was established. A sensitivity analysis was also been carried out. It was established that even with the increment of +10% of the price, the IRR without the CDM revenue was still below the selected benchmark and with that, it can be concluded that the applied price can be considered as appropriate and acceptable
Amount of PKS Displaced by Biogas 4,167 ton/year	The amount of PKS displaced was calculated based on the PKS production and the estimated biogas generation. It was assumed 6% by weight of the tonnages of the 216,000 tonnes/year fresh fruit bunches (FFB) consumed is PKS. The validation team confirmed that formula in the spreadsheet/91//50/ in estimating PKS was correct as the following publicly available values used was appropriate: 1. 6% PKS/ FFB was derived from public references/71// 2. PKS Net Calorific Value of 15.90 GJ/ton correctly converted from 3.800Kcal/Kg/71/ to GJ/Ton 3. Methane Net Heating Value 11946 kcal/kg = 50,016 kJ/kg = 50 MJ/kg, http://www.engineeringtoolbox.com/gross-net-heating-values-d_420.html

Calculation and conclusion

The cost of project activity is within the range of new projects. Thus, based on Figure 3, it can be established above that the financial input parameters for the project activity are reasonable and conservative.

It is also noted that comparison on the investment cost is not straightforward considering the availability of different types of treatment technologies in the market, ranging from a simple covered pond to more complex technologies such as actively managed pond/tank system, and each mill would have different treatment requirements. Additionally some systems only require modification of existing systems (i.e. open ponds/tanks to covered ponds/tanks) while some involve introduction of a new treatment system and subjected to inflation factor/86/ . http://www.indexmundi.com/malaysia/inflation_rate_(consumer_prices).html

The IRR calculations over 15 years of operation/38/ period were provided in a spreadsheet/50/.
With the above input values, the project activity without the CER revenue was demonstrated to have a non-significant return (i.e. the equity IRR is a negative value compare to the benchmark default expected return on equity, of 10.9% for 'Waste Handling and Disposal' (Group 1, Sectoral Scope 13)) in the Host Country, Malaysia as defined in the Guidelines/65/ on the Assessment of Investment Analysis version 05, EB 62 Annex 5) The resulting IRR and the values used are all in real terms excluding inflation and the computed IRR is post-tax.

The validation team further compares the critical parameters such as the PKS price, diesel price and ratio of O&M/investment cost amongst the registered projects in the host country Malaysia for the period of 2010 – 2011 as below :

Figure 3: Comparison of Capital Expenditure, PKS price, diesel price and ratio of O&M/investment cost amongst the registered projects using tank technology

Project	UNFCCC Reference	CAPEX (RM/t)	PKS Cost (RM/t)	Diesel Price (RM/l)	Ratio O&M to CAPEX (%)	Technology
Prolific Yield Palm Oil Mill	4285	19,576,000	-	-	5.72%	Digester tank with flexible membrane roof (New Tanks)
KDC Mill 1 and Mill 2 Biogas Project	3639	14,750,200	130	1.70	5.56%	Closed continuous-flow stirred tank reactor (CSTR) (New Tanks)
Felda Chalok and Jerangau Barat Biogas Project (Chalok)	2651	4,014,242	60	2.08	6.46%	Retrofitted from the existing tanks
Felda Chalok and Jerangau Barat Biogas Project (Jerangau)	2651	4,281,274	60	2.09	6.24%	Retrofitted from the existing tanks

It is noted that the project capital investment varies significantly for new projects and retrofitted projects. The cost of project activity is within the range of other registered new projects. Thus, based on Figure 3, it can be established above that the financial input parameters for the project activity are reasonable and conservative.

It can be confirmed that all assumptions were based on appropriate sources and the calculations were verified and found to be correct. Based on the presented information, the project IRR without CDM was determined as below:

IRR without CDM	Benchmark
Negative value	10.9%

From the above, it can be seen that without CDM the IRR calculations showed negative value, which justified that the project as being not attractive financially.

Sensitivity Analysis

In accordance with paragraph 20 and 21 of the Guidelines on the Assessment of Investment Analysis, PP has performed a sensitivity analysis on the parameters which have a bearing of 20% or more on either the project costs or the project revenues. The parameters identified are the project capital cost, O&M cost, diesel price and PKS price.

The results of the sensitivity analysis are as presented in the Table below:

Parameters	% of variation	IRR
Project capital cost	- 100%	0%
O&M Cost	- 100%	0.2%
Diesel price	239%	10.9%
PKS price	860%	10.9%

The Financial analysis[/50/] shows that the project activity is not attractive and project is not additional even if the initial CAPEX or investment is reduced to zero. The diesel cost savings are negligible as electricity is primarily generated from biomass which is available at no cost. Additionally, it is unlikely that the price of diesel will be increased to RM 9.29 as price for diesel is a government controlled price as established by the Ministry of Domestic Trade and Consumer Affairs http://www.statistics.gov.my/portal/index.php?option=com_content&view=article&id=619&Itemid=111&lang=en

The combustion of biogas in the biomass boiler and its installation cost was not accounted in the financial analysis for investment decision. However, an additional sensitivity analysis was conducted (with complete financial model) to demonstrate the scenario if there is no electricity generation and all the generated biogas is combusted in the biomass boiler. This will potentially displace palm kernel shell (PKS) utilization and gives sales revenue for the mill. In this scenario, as all the generated biogas is consumed in the biomass boiler, no displacement of diesel will be accounted. Thus, revenue from diesel saving is zero.

Based on sensitivity analysis, the PKS price will need to increase up to RM 768/ton to hit the benchmark. This is unlikely to happen as the cost is too high for 3rd party purchase and the mill location is isolated. The final sales price of PKS is also determined by transport and handling cost. From cross-check in public domain, the 3rd party sales price by brokers is approximately USD 67 (RM 213) FOB (freight on board) delivery http://globaltraderesources.trustpass.alibaba.com/product/104821914-101707192/Palm... 13/6/2012
The listed sales price is higher as it is inclusive of handling and transportation costs wherelse the PKS cost estimated in project activity is based on ex-mill. This clearly shows that the project is not attractive even if the PKS sales price increases.

Based on the investment analysis and sensitivity analysis carried out, it is concluded that the project activity is unlikely to be the most financially attractive condition using default return on equity of 10.9% for 'Waste Handling and Disposal' (Group 1, Sectoral Scope 13) in the Host Country, Malaysia as defined in the "Guidelines on the Assessment of Investment Analysis version 05 (EB 62 Annex 5) is applied.

In summary, the proposed project could be considered as unlikely to be the most financially attractive option by applying the investment analysis and sensitivity analysis according to VVM (version 01.2) paragraph 111.

The validation team has confirmed the correctness of calculations. The result of the analysis clearly demonstrates that even in event of variation of more then +10% and -10% of project parameters, the project is unable to acquire returns equal to that of benchmark. The analysis showed that for the project cost and O&M cost, even setting each of these to zero will not allow the project IRR to equal, let alone exceed, the benchmark. As for the diesel price, the price must increase by 239% in order for the project IRR to equal the project benchmark. This is not realistic as the diesel price not within PP's control. As for the PKS price, increasing the price by 860% (which is from RM 80 to RM 768) is not realistic in the industry.

The validation team has confirmed the correctness of calculations, which indicate that the proposed project cannot be implemented when undertaken without CDM consideration. It can be concluded that the proposed CDM project activity is unlikely to be the most financially attractive. Therefore, based on the results of the investment analysis, the project is additional.

During the validation in this section, eight (8) CLs were raised as follow :

- CL12 - requesting PP to provide supporting document for the estimation of the contingencies cost in the capital cost section;
- CL 13 – requesting PP to provide supporting document for the justification on salaries, insurance, medical costs etc. in the O & M cost section;

- CL 14 – to clarify on the explanation made by Watermech Engineering on the O & M cost;
- CL 15 – on the discrepancies in the spreadsheet for investment calculations;
- CL 16 – justification on the PKF price and diesel price;
- CL 17 - inconsistency of website link address of Malaysia Inland Revenue Board;
- CL 19 – issues relating to the addition of biomass boiler system in the project activity; and
- CL 20- on the sensitivity analysis which included new parameter on PKS.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.7 Monitoring Plan

The monitoring plan presented in the PDD complies with the requirement of the methodology AMS-III.H (version 16, EB 58) 'Methane recovery in wastewater treatment'/2/, "Tool to determine project emissions from flaring gases containing methane", (version 01, EB 28)/3/ and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01, EB39)/4/. The validation team has checked all the parameters presented in the monitoring plan of the latest version of the PDD against the requirement of the methodology; no deviation relevant to the project activity were found.

The monitoring methodology has been described and applied in a transparent way which will give opportunity for real measurements of emission indicators and emission reductions can be calculated out of the measured parameters. PP has described in section B.7.2 of the PDD the overall monitoring plan with regards to the following:

- The authority and responsibility of the project operational and management structure for monitoring
- The hierarchy of the responsible authority with delegated responsibilities for the registration of monitoring measurement and reporting
- The flow of day-to-day operation including the records handling
- The calibration of all monitoring equipment according to the manufacturer's recommendation or at least once in three years to ensure accuracy of measurement

3.7.1 .Parameters Determined Ex-Ante

The following parameters were available during validation :

Parameter	Value applied	Description
$MCF_{ww,treatment,BL}$	0.8	Methane correction factor for the baseline anaerobic wastewater treatment system. Default value for anaerobic deep pond specified in Table III.H.1 of AMS-III.H. version 16 is used.
$MCF_{ww,treatment,aerobic}$	0.0	Methane correction factor for the baseline aerobic wastewater treatment system. Default value for aerobic treatment, well managed specified in Table III.H.1 of AMS-III.H. version 16 is used.
$\eta_{COD,BL}$	99%	COD removal efficiency of the baseline treatment system, determined as per the paragraphs 26, 27 or 28 in AMS-III.H (version 16). The data/40/ for COD was based on 10-day measurement campaign.
$\eta_{COD,aerobic}$	61%	COD removal efficiency of the baseline aerobic treatment system, determined as per the paragraphs 26, 27 or 28 in AMS-III.H (version 16). The data/40/ for COD was based on 10-day measurement campaign.

$B_{o,ww}$	0.25tCH_4/ tCOD	Methane producing capacity of the wastewater. Default value specified in AMS-III.H version 16 is used.
UF_{BL}	0.89	Model correction factor to account for model uncertainties in the baseline emission calculations. Default value specified in AMS-III.H version 16 is used.
$MCF_{ww,treatment,PJ}$	0.8	Methane correction factor for project activity equipped with biogas recovery in the year y. Default value specified in in Table III.H.1 of AMS-III.H version 16 is used.
$MCF_{ww,treatment,PJ,aerobic}$	0.0	Methane correction factor for project activity not equipped with biogas recovery in the year,y. Default value specified in in Table III.H.1 of AMS-III.H version 16 is used.
$MCF_{ww,BL,discharge}$, $MCF_{ww,PJ,discharge}$	0.0	Methane correction factor of baseline and project wastewater treatment system sent to plantation for irrigation purpose in the year y. Default value specified in in Table III.H.1 of AMS-III.H version 16 is used.
GWP_{CH4}	21tCO_2e/ tCH_4	Global Warming Potential (GWP) of methane. IPCC default value specified in AMS III.H version 16.
UF_{PJ}	1.12	Model correction to account for model uncertainties. Default value specified in AMS-III.H version 16 is used.
CFE_{ww}	0.9	Capture efficiency of the biogas recovery equipment in the wastewater treatment system. Default value specified in AMS-III.H version 16 is used.

It was confirmed that the *ex-ante* values for methane correction factor, methane producing capacity and uncertainty factor above were based on the Table III.H.1 of AMS-III.H (version 16). The COD removal efficiency for baseline treatment system is based on the sample COD analysis results of 10-days measurement campaign carried out from 13/08/2011-22/08/2011[/44/].

3.7.2 Parameters Determined Ex-Post

The baseline and project emissions parameters that are to be monitored ex-post are indicated in Section B.7.1. of the PDD and as follow :

Parameter (unit)	Description	Source of data	QA/QC applied
$Q_{ww,i,y}$ (m^3/month)	Flow of wastewater entering anaerobic digester system of the project activity	Measured continuously (at-least hourly) using calibrated cumulative flow meters	Calibration will be done according to manufacturer specifications, or at least once in three years.
$COD_{ww,untreated,y}$ ($tCOD/m^3$)	COD of wastewater entering the anaerobic digester system	COD samples will be tested every two weeks by accredited laboratory.	Samples and measurement will ensure a 90/10 confidence and precision level.
$COD_{ww,treated,y}$	COD of wastewater	COD samples will be	Samples and

($tCOD/m^3$)	exiting the anaerobic digester system	tested every two weeks by accredited laboratory.	measurement will ensure a 90/10 confidence and precision level.
$COD_{ww,discharge,PJ,y}$ ($tCOD/m^3$)	COD of wastewater leaving the final discharge point	COD samples will be tested every two weeks by accredited laboratory.	Samples and measurement will ensure a 90/10 confidence and precision level.
$BG_{burnt,y}$ (Nm^3)	Amount of biogas fuelled or flared in year y	Calculated as the sum of $BG_{fuelled,y}$ and $BG_{flared,y}$	
$BG_{fuelled,y}$ (Nm^3)	Amount of biogas fuelled in the gas engine and/or boiler in year y	Measured continuously using flowmeter	Calibration will be done according to manufacturer specifications, or at least once in three years
$BG_{flared,y}$ (Nm^3)	The quantity of biogas flared in the project activity in the year y	Measured continuously using flowmeter	Calibration will be done according to manufacturer specifications, or at least once in three years
$w_{CH4,y}$ (%)	Methane content in the biogas in year y	Measured continuously using gas analyzer	Calibration will be done according to manufacturer specifications, or at least once in three years
T_{flare} (^0C)	Temperature in the exhaust gas of the flare	Measured using thermocouple Type N	Thermocouples will be replaced or calibrated annually
$\eta_{flare,h}$ (%)	Flare efficiency in hour *h*	Calculated	Default flare efficiency of 90% for enclosed flare is applied.
$S_{lfinal,PJ,y}$	End use of the final sludge from the digester system	Monitoring records of the end use of sludge	In any event of removal of sludge and soil application, the process will be monitored to ensure the conditions are aerobic.

The GHG indicators, parameters, monitoring methods, frequencies and the measurement equipment were considered to be reasonable and appropriate. The information for each parameter regarding the sources of data, measurement methods, calibration procedures, responsible personnel, measurement interval and QA/QC procedures were adequately described as per the guidelines for completing the SSC-PDD.

The project will be equipped with a monitoring system. The monitoring system was reviewed by the validation team through document review and interviews with relevant personnel. This information together with the physical inspection of the project site allowed the validation team to conclude that

the proposed monitoring plan defined in the PDD is feasible within the project activity and the PP should be able to implement the monitoring as planned. The monitoring data will be archived electronically and be kept for two years after the end of the last crediting period. Details of the data to be collected and frequency of data recording were also described in the monitoring plan.

In this section, one (1) CAR and one (1) CL were raised as follow:

- CAR 4 - on the monitoring of T_{flare} against "Tool to determine project emissions from flaring gases containing Methane;
- CL 18 - on the description of sample size and measurement for $COD_{inflow,y}$, $COD_{treated,PJ,y}$, and $COD_{ww,discharge,PJ,y}$ to ensure 90/10 confidence/ precision level;

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report

3.8 Calculation of GHG Emissions

During the on-site audit, it was confirmed that details of direct and indirect emissions discussed in the PDD were appropriate and covers all aspects of the project activity. The validation team confirmed that details of direct and indirect emissions discussed in the PDD were appropriate and covered all aspects of the project activity. Methane (CH_4) and carbon dioxide (CO2) emissions have been considered as the GHG emissions.

The validation team has assessed the calculations of the project emissions, baseline emissions, and leakage and emission reductions. It was confirmed that the calculation for emission reductions are in accordance with the methodologies AMS-III.H (version 16). The parameters and formulae presented in the PDD and CER spreadsheet[6], as well as other applicable documents have been compared with the information and requirements presented in the methodology and respective tools.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked and confirmed. Based on the information reviewed, it can be confirmed that the sources used are correctly quoted and interpreted in the PDD. The values presented in the PDD are considered reasonable based on the documentation and references reviewed, as well as, the result of the interviews. The baseline methodology has been correctly applied according to requirements. The estimate of the baseline emissions can be confirmed as the same that have been replicated by the audit team using the information provided. Detailed information on the validation of the parameters used in the equations can be found in Appendix A of this report.

The validation team has assessed the calculations of the project emissions, baseline emissions, and emission reductions. It was confirmed that the calculation for the emission reductions is in accordance with methodology AMS III.H Version 16.

3.8.1 Baseline Emissions

In accordance with equation (1) in paragraph 18 of AMS-III.H. version 16, the baseline emissions are calculated based on the following formula:

$$BE_y = \{BE_{power,y} + BE_{ww,treatment,y} + BE_{s,treatment,y} + BE_{ww,dischage,y} + BE_{s,final,y}\}$$

Where,

BE_y	Baseline emissions in year *y* (tCO_2e)
$BE_{power,y}$	Baseline emissions from electricity or fuel consumption in year *y* (tCO_2e)
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the project activity in year *y* (tCO_2e)

$BE_{s,treatment,y}$ Baseline emissions of the sludge treatment systems affected by the project activity in year *y* (tCO_2e)

$BE_{ww,discharge,y}$ Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake in year *y* (tCO_2e).

$BE_{s,final,y}$ Baseline methane emissions from anaerobic decay of the final sludge produced in year *y* (tCO_2e)

Applicability of baseline emissions

Emissions	Remarks/ Justification
$BE_{power,y}$	Not applicable as in the *ex-ante* baseline emissions calculation, BE_{power} was considered as zero as the electricity consumed for the baseline wastewater treatment is supplied by the electricity generated by steam powered turbine generated from biomass boiler. This was confirmed during the on-site audit and review of the electricity license issued by the Malaysia Energy Commission /21/ and power generation data history/34/. Thus, in the *ex-ante* baseline emissions calculation, the $BE_{power,y}$ was considered as zero.
$BE_{ww,treatment,y}$	Applicable as this is the major component in the generation of biogas from the anaerobic wastewater treatment system in the baseline.
$BE_{s,treatment,y}$	Not applicable as the baseline scenario does not involve the use of a sludge treatment system. The validation team confirmed this in the license issued by the Department of Environment for the operation of the Carotino Palm Oil Mill/12/
$BE_{ww,discharge,y}$	Not applicable as the baseline is considered as 'zero' as the baseline scenario involves well-managed wastewater discharge for plantation irrigation purpose. This requirement is one of conditions in the license issued by the Department of Environment for the operation of the Carotino Palm Oil Mill/12/
$BE_{s,final,y}$	Not applicable as in the baseline scenario the sludge removed as from the anaerobic open ponds was sent to the plantation for soil applications.. The validation team confirmed that this is one of conditions in the license issued by the Department of Environment for the operation of the Carotino Palm Oil Mill/12/ and the approval for desludging/19/. .

Therefore, the baseline emission is as follow:

$BE_y = BE_{ww,treatment,y}$

For the calculation of the $BE_{ww,treatment,y,}$ equation (2) in paragraph 20 of AMS-III.H. was applied The baseline emissions for the wastewater treatment system, $BE_{ww,treatment,y}$ consist of the anaerobic and aerobic conditions. From the review of the existing POME treatment system drawing/17/ and the on-site audit, it can be confirmed that the aerobic pond is with depth of 2.65m since they are aerated and they are well managed/20/. The MCF value as per Table III.H.1, the MCF value is zero. Hence, the baseline emission from the aerobic ponds is zero. All other assumptions were mainly made based on default values. As an example, the methane producing capacity of the wastewater $B_{o,ww}$ = 0.25 which is derived from the IPCC default value as provided in AMS-III.H (Version 16)/2/ is considered as conservative assumptions.

For the calculation of the $BE_{ww,treatment,y,}$ equation (2) in paragraph 20 of AMS-III.H. was applied.

$$BE_{ww,treatment,y} = \sum_i (Q_{ww,i,y} * COD_{\inf low,i,y} * \eta_{COD,BL,i} * MCF_{ww,treatment,BL,i}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$$

Where,

$Q_{ww,\ i,y}$	is the volume of wastewater treated in baseline wastewater treatment system i in year y (m^3).
$COD_{inflow,i,y}$	Chemical oxygen demand of the wastewater inflow to the baseline anaerobic treatment system in year y (t/m^3).
$\eta_{COD,BL,i}$	COD removal efficiency of the baseline treatment system i. determine as the paragraphs 26, 27 or 28 of AMS III.H version 16.
$MCF_{ww,\ treatment,\ BL}$	Methane correction factor for baseline wastewater treatment systems i (value as in Table III.H.I of AMS III.H version 16
$B_{o,ww}$	Methane producing capacity of the wastewater (IPCC value of 0.25 $kgCH_4$/ kgCOD)
UF_{BL}	Model correction factor to account for model uncertainties (0.89)
GWP_{CH4}	Global Warming Potential for methane (value of 21)

The key data used in calculations of the ex-ante baseline emissions are as below table. For full details refer to Section B.4 of PDD.

Parameter	Value	Justification
$Q_{ww,\ i,y}$	140,400 m^3/year	This parameter was estimated based on the mill projected processing capacity multiplied with an effluent conversion factor. The validation team confirmed the mill has approved annual FFB processing capacity from MPOB as 144,000[/12/] and the mill is in the process of applying for capacity upgrading to approximately 216,000 tons[/46/] from year 2013 onwards. As the MPOB approval on the capacity upgrading is pending; the validation team assessed the approval issued by the Department of Environment on the effluent treatment plant[/47/]. The approval was obtained on 27 December 2011[/47/] to upgrade the mill wastewater treatment plant from current 30 t/hr system (30 t/h * 16 h/d * 300 d/y = 144,000 t/y) to 45 t/hr (45 t/h * 16 h/d * 300 d/y = 216,000 t/y), Thus it is confirmed that the mill annual processing capacity will not exceed 216,000 tonnes per year. An effluent conversion factor of 0,65m^3 of POME for each tonne of FFB processed was used. This factor was based on a publication[/13/] This factor is was accepted by the validation team as through research in various publications[/81/82/83/], the reported values were ranging from 0.5 to 0.7m^3 per ton of FFB.
$COD_{inflow,i,y}$	0.05850 tonnes/m^3	The COD value was based on a 10-day measurement campaign[/44/] of the wastewater entering the baseline wastewater system. In accordance with paragraph 27, the average values determined during this campaign were multiplied by 0.89 to account for the uncertainty.
$\eta_{COD,BL,i}$	99%	The COD removal efficiency was calculated based on the difference of COD_{inflow} and $COD_{outflow}$. over the total $COD_{inflow.}$ The values for COD_{inflow} and $COD_{outflow}$ was based on a

		10-day measurement campaign[44] of wastewater entering and leaving the baseline wastewater treatment system. In accordance with paragraph 27, the average values determined during this campaign were multiplied by 0.89 to account for the uncertainty.
$MCF_{ww,treatment,BL}$	0.8	Methane correction factor of anaerobic baseline wastewater treatment system
$B_{o,ww}$	0.25	Methane producing capacity of the wastewater
UF_{BL}	0.89	Model correction factor to account for model uncertainties
GWP_{CH4}	21	Global Warming Potential of methane

The COD of the wastewater was based on a 10-day measurement campaign as there were no history records on the monitoring of this parameter prior to the project implementation. There was no regulatory limit provided in the conditions set by the Department of Environment[18] for the wastewater discharge. The current environmental standards[60] only specifies that the final discharge of the treated POME shall be within 500 mg BOD/litre[12]. Hence, the use of the measurement campaign which is also in accordance with paragraph 27 is acceptable. Default values from the IPCC 2006 and from AMS III.H, where applicable were also used in the calculations. These values were selected based on the methodology requirements and found to be correctly applied.

The validation team has reviewed the respective documents submitted and deemed appropriate. The values applied are conservative and plausible.

With the above input values and the relevant default values, the ex-ante BEy which was calculated as $BE_{,treatment,y}$ = 30,485 tonnes tCO2e/yr

In this section, one CAR and one CL was raised as follow :

- CAR 3 - justification on how the requirement in paragraph 27 (a) and (c) of AMS-III.H (Version 16) were assessed in the determination of the baseline emission;
- CL 7 – value used for the $MCF_{ww,treatment,PJ}$ was incorrect

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.8.2 Project Emissions

The project emission is determined based on the equation in paragraph 29 of AMS III.H. version 16, which is as follow :

$$PE_y = \{PE_{power,y} + PE_{ww,treatment,y} + PE_{s,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{biomass,y} + PE_{flaring,y}\}$$

Where,

PE_y	*ex ante* project activity emissions due to methane recovery in the year y (tCO_2e).
$PE_{power,y}$	CO_2 emissions from electricity or fuel consumption by the project activity (tCO_2e).
$PE_{ww,treatment,y}$	Methane emissions from wastewater treatment systems affected by the project activity and not equipped with biogas recovery in the project scenario (tCO_2e).
$PE_{s,treatment,y}$	Methane emissions from sludge treatment systems affected by the project activity and not equipped with biogas recovery in the project situation (tCO_2e).
$PE_{ww,discharge,y}$	Methane emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated

wastewater (tCO_2e).

$PE_{s,final,y}$	Methane emissions from the decay of the final sludge generated by the project activity treatment system (tCO_2e).
$PE_{fugitive,y}$	Methane fugitive emissions due to inefficiencies in capture systems (tCO_2e).
$PE_{flaring,y}$	Methane emissions due to incomplete flaring (tCO_2e).
$PE_{biomass,y}$	Methane emissions from biomass stored under anaerobic conditions which would not have occurred in the baseline situation (tCO_2e).

Applicability of project emissions

Emissions	Remarks/ Justification
$PE_{power,y}$	In the project activity, the main source of the electricity for the auxiliary equipment will be from the biogas engine and the biomass boiler. In the event that the biogas engine generates less electricity than the requirement for power of the auxiliary equipment, the remaining requirement will be supplied by the biomass boilers from the Mill. PP had carried out an analysis in the event that the back up diesel generator set is used (i.e. during start up, shut down and emergency situation), the amount of CO_2 emitted from the fossil fuel was less than 1% of baseline emission based on the mill electricity supply history/34/. The validation team also confirmed that the Emission Factor for diesel used in the analysis was derived from "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" Version 01, EB39. The validation team also confirmed that auxiliary power consumption/60/ for the project activity was provided by technology provider. Hence, it can be concluded that $PE_{power,y}$ is zero
$PE_{ww,treatment,y}$	From the project design/15/ and approval by the Department of Environment/47/ for the construction and operation of the new wastewater treatment plant (i.e. the project activity) it can be confirmed that there will be no more anaerobic open ponds system. Only digester tanks and the existing aerobic treatment system will be in place. The project activity will not change the operational characteristic of the aerobic ponds system. Hence, $PE_{ww,treatment,y}$ is zero.
$PE_{s,treatment,y}$	Not applicable as the project activity does not involve any sludge treatment system.
$PE_{ww,discharge,y}$	As in the baseline scenario, treated wastewater is discharge to the plantation for irrigation purpose. This requirement is one of conditions in the license issued by the Department of Environment for the operation of the Carotino Palm Oil Mill/12/. Hence, $PE_{ww,discharge,y}$ is zero.
$PE_{s,final,y}$	As in the baseline scenario sludge is used for soil application under aerobic condition in the nearby plantation. The validation team confirmed that this is one of conditions in the license issued by the Department of Environment for the operation of the Carotino Palm Oil Mill/12/ and the approval for desludging/19/. Hence, $PE_{s,final,y}$ is zero. .
$PE_{fugitive,y}$	Applicable. The emission due to inefficiency of capture system in anaerobic digesters will contribute to methane emission to the atmosphere.
$PE_{flaring,y}$	Applicable. The emission due to incomplete flaring system will contribute to methane emission to the atmosphere. For *ex-ante* estimation, this emission is assumed to be zero. However, for *ex-post* estimation, in the case when flaring system is activated, such emissions will be accounted accordingly

	and will be calculated in accordance with the Tool to determine project emissions from flaring gases containing methane" (Version 1, EB28) for an enclosed flaring system.
$PE_{biomass,y}$	No storage of biomass involved in the project activity, this is confirmed by the validation team during site visit, process diagram review, and interview the project proponent. Hence $PE_{biomass,y}$ is zero.

Hence, for *ex-ante* project emissions the following applied:

$$PE_y = PE_{fugitive,y} + PE_{flaring,y}$$

For the calculation of the $PE_{fugitive,\ y}$ equation (9) in paragraph 30 of AMS-III.H version 16 was applied. The calculation were found documented in a complete and transparent manner and parameters validated as following;

Parameter (unit)	Value	Description	Justification of value applied
UF_{PJ}	1.12	Model correction factor to account for model uncertainties	Default value provided in AMS-III.H. Ver 16.
$COD_{removed,PJ}$	0.04680/44/	The chemical oxygen demand removed by the project wastewater treatment system (System-biogas) which is equipped with biogas recovery digester in year y.	Based on 10 days COD measurement campaign. The COD testing was carried out by an accredited laboratory/34/
$MCF_{ww,treatment,PJ}$	0.8	Methane correction factor for project wastewater treatment system (System-biogas) which is equipped with biogas recovery digester.	Default value as per AMS IIIH (version 16) Table III.H.1. IPCC default values for anaerobic reactor without methane recovery.
CFE_{ww}	0.9	Capture efficiency of the biogas recovery equipment in the wastewater treatment systems	Default value as per AMS IIIH (version 16).
GWP_{CH4}	21	Global Warming Potential of methane	Default value as per AMS IIIH (version 16)
h	4,800	Hours of operation per year (h/y)	Based on Historical Mill Processing (July 2008 - June 2011)..
$TM_{RG,h}$	0.00	Mass flow rate of methane in hour h (kg/h)	No biogas flared for ex-ante estimation
$\eta_{flare,h}$	0.9	Flare efficiency in hour y	Design specification document/76//77/ by Watermech

For $PE_{flaring,y}$ the equation as defined in the tool for flaring/3/ is used.

$$PE_{flare} = \sum_{h=1}^{8760} TM_{RG,h} * (1-\eta_{flare,h}) * (GWP_{CH4}/1000)$$

Where:

PE_{flare} Project emission from flaring of methane in the residual gas in year y
$TM_{RG,h}$ Mass flow rate of methane in hour h
$\eta_{flare,h}$ Flare efficiency in hour h
GWP_{CH4} Global warming potential of methane

The mass flow rate of methane is estimated as following

$$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n}$$

Where:

$FV_{RG,h}$ Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m^3/h)
$fv_{CH4,RG,h}$ Volumetric fraction of methane in the residual gas on dry basis in hour h
$\rho_{CH4,n}$ Density of methane at normal conditions (0.716)

In the proposed project activity, biogas will be typically combusted in the gas engines and/or biomass boiler system. In emergency situations biogas will be combusted in the enclosed flare system.

For *ex-ante* PE_{flare} since in the project activity flaring is only used during emergency situation, the estimation as zero is found to be appropriate.

The methodologies of calculations were found in compliance with existing good practice. It was referred to relevant tools applicable to the project activity as well. The calculations as described in Section B.6.3 of the PDD were found complete according to the methodologies chosen. The actual calculations done in the Excel spread sheet file were found accurate with correct formula accordingly.

In accordance with paragraph 30 of AMS III.H version 16, $PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$;

Where,

$PE_{fugitive,ww,y}$	is the fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment system
$PE_{fugitive,s,y}$	is the fugitive emissions through capture inefficiencies in the anaerobic sludge treatment system. Since the project activity does not involved any sludge treatment, this project emission is not applicable.

In accordance with equation 10 of AMS III.H version 16, $PE_{fugitive,s,y}$ is calculated as follow :

$PE_{fugitive,ww,y} = (1-CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$.

Where

CFE_{ww},	Is the capture efficiency of the biogas recovery equipment in the wastewater treatment systems. Accordingly, a default value of 0.9 shall be used..
$MEP_{ww,treatment,y}$	Is the methane emission potential of wastewater treatment systems equipped with biogas recovery system. This parameter is determined using equation 11 of AMS III.H version 16.

GWP_{CH4}	Is the global warming potential and a default value of 21 is used.

According to equation 11 of AMS III.H version 16, $MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ} * \sum_k COD_{removed,PJ} * MCF_{ww,treatment,PJ,k}$

Where,

$Q_{ww,y}$	Is the volume of wastewater treated in project wastewater treatment system
$B_{o,ww}$	0.25 $kgCH_4/kgCOD$ in AMS-III.H paragraph 20.
UF_{PJ}	Model correction factor to account for model uncertainties =1.12 as in AMS-III.H paragraph 30 (a).
$COD_{removed,PJ}$	The chemical oxygen demand removed by the treatment system k of the project activity equipped with biogas recovery in the year. For this *ex-ante* estimate, the $COD_{inflow,y}$ which was based on a measurement campaign multiplied with the design value of digester removal efficiency (90%).
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for project wastewater treatment system (System-biogas) which is equipped with biogas recovery digester. (not equipped with biogas recovery) (MCF values as per Table III.H.1) = 0.8

Based on the above, the $PE_{fugitive,ww,y}$ is calculated to be 3,091 ton CO_2e/year.

In this section, CL 9 was raised on the following :

1. Emission Factor (EF) of electricity from Diesel engines
2. Auxiliary power consumption for project

3.8.3 Leakage Emissions

There is no leakage in the project activity as the technology used will not involve equipment transferred from another project activity or the existing equipment transferred to another project activity.

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3.8.4 Emission Reductions

In accordance with paragraph 32 of AMS.III.H version 16, for the determination of the *ex-ante* emission reductions, equation 14 shall be used as follow

$ER_{y,ex\ ante} = BE_{y,ex\ ante} - (PE_{y,ex\ ante} + LE_{y,ex\ ante})$

where,

$ER_{y,ex\ ante}$	*ex- ante* emission reduction in year y (tCO2e)
$LE_{y,ex\ ante}$	*ex-ante* leakage emissions in year y (tCO2e) = 0 for no transfer of equipment from another project activity
$PE_{y,ex\ ante}$	*ex- ante* project emissions in year y calculated as paragraph 29 of AMS III.H version 16 (tCO2e)
$BE_{y,ex\ ante}$	*ex-ante* baseline emissions in year y calculated as paragraph 18 of AMS.III.H version 16 (tCO2e)

The validation team has assessed the calculations of the project emissions, baseline emissions, leakage and emission reductions in the ER spreadsheet[73]. The parameters and equations presented in the PDD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology AMS-III.H (version 16) and the related tool. Since most estimates for the prognosis of emission reductions were derived from accepted international sources and justified values, it is reasonable to assume that they are accurate and

deemed to be conservative.

Based on the input values, the annual *ex- ante* GHG emissions reduction over the crediting period are estimated to be :

$ER_{y,ex\ ante} = BE_{y,ex\ ante} - PE_{y,ex\ ante}$
= 30,485 tCO2e/yr – 3,091 tCO2e/yr
= 27,394 tCO2e/yr

This estimated emission reductions will be imposed over a fix crediting period of 10 years. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the revised PDD. Detailed information on the validation of the parameters used in the equations is as in Table 2 of Appendix A.

For *ex post* emissions reduction, according to paragraph 33 of AMS.III.H version 16, it shall be based on the lowest value of the following:

a) the amount of biogas recovered and fuelled or flared (MD_y) during the crediting period, that is monitored *ex post*;
b) Ex post calculated baseline, project and leakage emissions based on actual monitored data for the project activity.

In accordance with paragraph 34 of AMS.III.H version 16, formula in equation 15 is to be applied as follow :

$$ER_{y,ex\text{-}post} = \min((BE_{y,ex\text{-}post} - PE_{y,ex\text{-}post} - LE_{y,ex\text{-}post}), (MD_y - PE_{power,y} - PE_{biomass,y} - LE_{y,ex\text{-}post}))$$

Where:

$ER_{y,ex\text{-}post}$	Emission reductions achieved by the project activity based on monitored values for year y (tCO_2e)
$BE_{y,ex\text{-}post}$	Baseline emissions calculated using ex post monitored values (tCO_2e)
$PE_{y,ex\text{-}post}$	Project emissions calculated using ex post monitored values (tCO_2e)
MD_y	Methane captured and destroyed/gainfully used by the project activity in year y (tCO_2e)

In case of flaring/combustion MD_y will be measured using the conditions of the flaring process in accordance with AMS-III.H. (Version 16, EB 58), paragraph 35, as follows:

$$MD_y = BG_{burnt,y} * w_{CH4,y} * D_{CH4} * FE * GWP_{CH4}$$

Where:

$BG_{burnt,y}$	Biogas flared/combusted in year y (m^3)
$w_{CH4,y}$	Methane content in the biogas in the year y (volume fraction)
D_{CH4}	Density of methane at the temperature and pressure of the biogas in the year y (tonnes/m^3)
FE	Flare efficiency in year y (fraction). In the case that biogas is destructed for gainful purpose, e.g., fed to the engine, an efficiency of 100% is to be applied.

In the proposed project activity, biogas will be typically combusted in the gas engines. Excess biogas will be utilized in the biomass boiler system. A default value of 100% flare efficiency will be used for biogas combusted in gas engines or biomass boiler system.The determination of the ex-post emission reductions has been included in the PDD.

The use of Excel spreadsheets for the calculation of GHG emissions has been verified by the validation team. Carotino CER spreadsheet[/6/] were referred to in the calculation of ER. All changes to the figures resulting from the comments made in CARs and CLs have been rectified accordingly. The revised Carotino CER spreadsheet [/73/] has been checked. The figures and data were revised

accordingly in the revised PDD[/2/] and the spreadsheets. The calculations of the project baseline emissions and project emissions were found to be reasonable and transparently carried out.

In line with the requirement in para 92 of the VVM, the validation team cross-checked the emissions reduction calculation process against all reference data sources and the requirements of the methodology and the tool. It is confirmed that:

a) All data sources and assumptions and data used by the project participants are listed and referenced in the PDD, ;
b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;
c) All values used in the PDD are considered reasonable in the context of the proposed CDM project activity;
d) The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;
e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD and the financial spreadsheet.

3.9 Environmental Impacts

No significant environmental impacts are expected from the project activity. The validation team has reviewed the Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order 1987[/72/], and confirms that the activities are not listed in the list of 'Prescribed Activities'. Further confirmation from the Department of Environment[/80/] that no EIA is required for this project activity has been obtained.

The project will not have any adverse environmental impacts but instead will result in the following environmental benefits:

- reduce odour;
- reduction in greenhouse gas emissions
- promote the use of renewable energy generation;

Detail finding and the resolution is as in Table 3 of Appendix A of this report.

3.10 Crediting Period

The PP had selected a fixed ten-year (10) crediting period. The starting date of the crediting period is 1 January 2013 or the date of registration of the project activity, whichever is later.

3.11 Comments by Local Stakeholders

A formal consultation process with the local stakeholders was held on 2 November 2011 at Zenith Hotel, in Kuantan, Malaysia[/41/]. Invitations to the local stakeholders to the consultation were made through advertisement in the Star newspaper (English) and Utusan Malaysia (Malay Language) from 24 – 27 October 2011. For local authorities, villages and government agencies, invitations were made through personal invitation letters.

The meeting was attended by 30 participants of which included representatives from the Malaysian Palm Oil Board (MPOB), Department of Occupational, Safety and Health Malaysia (DOSH), neighbouring palm oil plantation workers and contractors, and neighbouring mining workers and contractors.

During the consultation process, the participants were briefed on the CDM and the project activity. Apart from the open forum with the participants, the participants' comments were recorded and summarized. There were no adverse comments received. Comments received at the meeting were mainly concerned on the safety of biogas in the system and PP responded by clarifying the enhanced safety features build in the system. PP has presented clear and concise briefing of CDM and its benefits. A summary of the comments and responses are provided in Section E of the PDD.

SIRIM QAS Intl. was able to verify through follow-up interviews with the stakeholders that there were no negative comments received. The local stakeholder consultation process is deemed appropriate, thus concluded that the local stakeholder consultation carried out adequately.

In general, it can be concluded that the communication method was appropriate as invitations were made through both public media as well as personal invitations. The local stakeholder consultation process had covered most of the stakeholders and it can be concluded that the stakeholders have been adequately consulted on the proposed CDM project. Hence, the consultation process was adequately performed according to the CDM requirements.

4.0 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOs

SIRIM QAS Intl. uploaded the first version of the PDD[/2/] on the UNFCCC's website on 6 January 2012 for the period 7 January 2012 to 5 February 2012. The PDD was made publically available on the CDM website at:
http://cdm.unfccc.int/Projects/Validation/DB/Y4787OIFYRIX84KEYAQREG4F8CB6K3/view.html
There were no comments received.

5.0 VALIDATION OPINION

SIRIM QAS Intl. performed a validation of the proposed CDM project "Methane Capture And Utilization Project At Carotino Palm Oil Mill, Malaysia" located at 23km off Sri Jaya Town, Maran, Pahang, in Peninsular Malaysia. The GPS coordinates are +3° 49' 01" N, +102° 49' 04" E. The validation was performed on the basis of the UNFCCC criteria for the Clean Development Mechanism and the host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting. Using a risk based approach, the review of the project design documentation and the subsequent follow-up interviews provided SIRIM QAS Intl. with sufficient evidence to determine the fulfillment of the stated criteria

The project participants are Carotino Sdn. Bhd. and Perenia Pty. Ltd.. Malaysia, as the host party, and Australia, as the Annex 1 country, meet the requirements to participate in the CDM. The LoA issued by the DNA of Malaysia[/55/] has confirmed that the project will assist in achieving sustainable development. The DNAs of both parties have approved the project and have authorized the project participants to request the project to be considered for registration with the UNFCCC

The project is aiming to reduce the GHG emissions by capturing and utilizing the methane in the

biogas that would have been emitted to the environment from the open ponds anaerobic treatment system. The project activity involves the installation of new closed tank anaerobic digesters equipped with a biogas capture and collection system. The captured biogas will be used as fuel in the biogas engine to generate electricity. Any excess biogas will be utilized in the biomass boiler or combusted in and enclosed flare system. The project will reduce GHG emissions by capturing this methane and combusting it in the biogas engine, boiler or flare.

The project applies AMS-III.H "Methane recovery in waste water treatment" (version 16). The demonstration of the applicability of the methodology and the determination of the baseline was justified. It was demonstrated that the project is not likely the baseline scenario. Emission reductions from the project are hence additional to any that would occur in the absence of the project activity.

The project will result in the reduction of GHG emissions that is real, measurable and gives long-term benefits and that are additional to what would have occurred in the absence of the project. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions as specified in the final version of PDD. The total emission reductions from the project are estimated to be 273,940 tCO_2e over the selected 10 years fixed crediting period. The proposed CDM project is eligible as a type III small-scale CDM project activity (Sectoral scope 13) as the emission reductions is below 60 $ktCO_2e$ per year.

The monitoring plan is in line with the approved monitoring methodology AMS-III.H "Methane recovery in waste water treatment" (version 16). The plan adequately addresses all necessary information for monitoring and reporting of emissions reductions due to the project activity. Responsibilities and authorities for project management, monitoring and reporting, and the data quality control and quality assurance procedures have been described in the PDD. These procedures will be implemented before the start of the crediting period.

There is no requirement for an EIA by the host country[/80/]. The project is not likely to create any significant adverse environmental impacts. The project complies with the applicable environmental regulations in Malaysia.

In summary, it is the opinion of SIRIM QAS Intl.'s that the proposed project "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia", as described in the PDD, version 2.3, dated 4 September 2012[/48/], meets all relevant UNFCCC requirements for the CDM, and correctly applies the approved methodology AMS-III.H "Methane recovery in wastewater treatment" (version 16). As such, SIRIM QAS Intl. recommends the registration of the project as a CDM project activity.

Prepared by :	Approved by:
(Mansor Shah Aziz)	(Parama Iswara Subramaniam)
Validation Team Leader	DOE Representative

6.0 REFERENCES

Information Reference List

Ref. No.	Document or Type of Information
/1/	Project Design Document version 1.0
/2/	AMS-III.H (version 16)
/3/	Tool to determine project emissions from flaring gases containing methane (EB 28, Annex 13).
/4/	Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01, EB39)
/6/	Carotino CER Estimate (06 01 2012)
/7/	Carotino FM (06 01 2012)
/8/	Carotino Analysis of Energy Supply By Biogas to Displace PKS in Biomass
/9/	Letter of Offer_PKS
/10/	PKS Production
/11/	Business Registration Form
/12/	Malaysian Palm Oil Board (MPOB) & DOE Licenses
/13/	LudinN, Bakri MM, HashimM, SawillaB, MenonN, MokhtarH. "Palm Oil Biomass for Electricity Generation in Malaysia"; 2004.p.1–6. Pusat Tenaga Malaysia, Malaysia Palm Oil Board, SIRIM Berhad
/14/	National Green Technology Policy (http://www.kettha.gov.my/en/content/national-green-technology-policy-objective)
/15/	General Specification of System & Project Process Flow by Watermech
/16/	http://www.watermech.com/p_anaerobic_digester_tank.php
/17/	"Effluent Treatment Plant Drawing Layout drawing of the existing wastewater treatment system as stated in Jadual Pematuhan"
/18/	Malaysia average temperature is 27.5 °C (82 °F). http://www.climatetemp.info/malaysia
/19/	Desludging Approvals from Department of Environment (1999 - 2008)
/20/	"Description of Effluent Tertiary Plant Operation condition of post anaerobic ponds in the mill. "
/21/	"Boiler and Diesel Generator Approvals Electrical Installation by Suruhanjaya Tenaga"
/22/	Diesel Consumption Data from July 2008 – Sep 2011
/23/	Letter of Acceptance of Offer – Watermech – 09/08/2011
/24/	Prior Consideration Form – 21/10/2011
/25/	Notification of Receipt by UNFCCC – 21/10/2011
/26/	Notification of Receipt by Malaysian DNA – 15/12/2011
/27/	Board approving development of the proposed project activity as a CDM project - 14/04/2011
/28/	Term sheet signed between Perenia and Carotino on the purchase of CERs – 10/06/2011
/29/	Operation and Maintenance Expenses
/30/	Watermech Engineering Sdn. Bhd; Life Span, Operation & Maintenance Cost of Equipment
/31/	http://www.pwc.com/my/en/assets/publications/pwctaxbbooklet_08-09.pdf (Page 22)
/32/	Total Capital Expenditure
/33/	Reference: FCCC/SBSTA/2003/10/Add.2, page 25 (AMS IIIH).
/34/	Historical Power Generation Turbine and Genset (July 2010 – Jun 2011)
/35/	Power Generation Information
/36/	Prior consideration sent to Malaysian DNA for the proposed biogas activity – 21/10/2011
/38/	Watermech Engineering Sdn. Bhd; Life Span, Operation & Maintenance Cost of Equipment (15/12/2011)

/39/	Project Implementation Schedule
/40/	http://www.doe.gov.my/v2/files/legislation/a0127.pdf
/41/	Stakeholder Meeting Report – 09/11/2011
/42/	Operation Hours (Historical 3-years Data)
/43/	FFB Processed (Historical 3-years Data)
/44/	COD (10-days Measurement)
/45/	BOD (Final Discharge)
/46/	MPOB Application Form for Mill Expansion
/47/	Approval from Department of Environment for the installation and operation of the Biogas Plant
/48/	Project Design Document version 2.3
/49/	Board meeting presentation
/50/	Carotino FM Version 2.1
/51/	Watermech Quotation dated 11 April 2011
/52/	Global trade resources
/53/	Contingency cost – Goodman & Hastak
/54/	Signed Modalities of Communication
/55/	Malaysia DNA Letter of Approval (Host Party), 14/08/2012
/56/	Australia DNA Letter of Approval (Annex 1 Party), 23/07/2012
/57/	Email confirmation on authenticity of Australia DNA Letter of Approval
/58/	Email confirmation on authenticity of Malaysia DNA Letter of Approval
/59/	Confirmation on non ODA
/60/	Environmental Quality (Prescribed)(Crude Palm Oil) Regulations 1977
/61/	General Guidelines to SSC CDM methodologies
/62/	Attachment A to Appendix B of "Simplified modalities and procedures for small-scale Clean Development Mechanism project activities
/63/	Glossary of CDM Terms, ver. 06
/64/	ERPA signed between Perenia and Carotino Sdn Bhd – 18/10/2011
/65/	Guidelines on the Assessment of Investment Analysis (Version 05; EB 62)
/66/	Non-binding best practice examples to demonstrate additionality for SSC project activities; EB 35, Annex 34
/67/	http://eprise6.kellyglobal.net/res/content/my/services/en/docs/my_salary_guide2011_2012.pdf
/68/	Diesel Purchased Invoices
/69/	Carotino's Diesel Purchased Price 2010 - 2011
/70/	Anders Evald and others, "Renewable Energy Resources", February, 2005, Integrated Resource Planning
/71/	Page 277, Palm Kernel Shell (PKS) is More Than Biomass for Alternative Fuel After 2005 by Mohammad Dit . Proceedings of the PIPOC 2007 International Palm Oil Congress (Chemistry & Technology)
/72/	Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order 1987
/73/	Carotino CER version 02.1
/74/	Validation and Verification Manual version 1.2 (EB 62 Annex 5)
/75/	http://mapper.acme.com/
/76/	Carotino Enclosed Flare System Specification
/77/	Carotino Enclosed Flare System Drawing
/78/	Biogas Layout Plan
/79/	Guidelines on the demonstration and assessment of prior consideration of CDM Version 03
/80/	Approval on Carotino EIA not needed
/81/	'Pollution control technologies for the treatment of palm oil mill effluent (POME) through end of pipe processes by Ta Yeong Wu a, Abdul Wahab Mohamadb,' Jamaliah Md Jahim b Nurina

	Anuar (Journal of Environment Management 91 (2010) 1467e1490
/82/	'Effect of palm oil mill effluent (POME) anaerobic sludge from 500 m^3 of closed anaerobic methane digested tank on pressed-shredded empty fruit bunch (EFB) composting process' (African Journal of Biotechnology Vol 9(16), pp. 2427-2436, 19 April 2010)
/83/	'Treatability of Palm Oil Mill Effluent (POME) using Black Liquor in an Anaerobic Treatment Processing by LING YU LANG Thesis submitted in fulfillment of the requirement for the degree of Master of Science July 2007.
/84/	Agreement of Earthwork at Carotino biogas plant dated 11 April 2011
/85/	Agreement for piling works at Carotino biogas plant dated 11 April 2011
/86/	http://www.indexmundi.com/malaysia/inflation_rate_(consumer_prices).html
/87/	Approval License for Turbine and Gen-set Capacity
/88/	http://www.carotino.com/rspo-production-unit-17.aspx
/89/	Agreement with contractor on earthwork at Melewar Palm Oil Mill biogas project
/90/	Agreement with contractor on pilling at Melewar Palm Oil Mill biogas project
/91/	Carotino FM – Biomass Boiler

APPENDIX A
VALIDATION PROTOCOL
Project No. SQAS-CDM-EP10850002

Table 1 Mandatory Requirement for Small Scale Clean Development Mechanism (CDM) Project Activities

REQUIREMENT	REFERENCE	COMMENT	CONCLUSION
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art. 12.2	Section A.3 – Australia identified as Annex 1 Party. Australia ratified to the Kyoto Protocol on 12 December 2007.	OK
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a VVM para 45 & 126	Section A.3 – Malaysia as Non-Annex I party. Malaysia ratified to the Kyoto Protocol on 4 September 2002.	OK
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art. 12.2. VVM para 45	The Letters of Approval from the DNA of Malaysia and the Annex I party have yet to be obtained.	~~CAR1~~
4. The project shall have written approval of voluntary participation from the designated national authorities of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a VVM para 53	The Letters of Approval from the DNA of Malaysia and the Annex I party have yet to be obtained.	~~CAR1~~
5. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	The monitoring plan provided in the PDD was based on AMS-III.H. ver.16 The continuous monitoring of methane recovered and combusted in gas engine will give opportunity for real measurements of emission	OK

REQUIREMENT	REFERENCE	COMMENT	CONCLUSION
		reduction.	
6. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	The investment analysis was conducted for the project activity, but there was no description on the alternative financially more viable alternative to the project activity that would led to higher emission, and its analysis.	OK
7. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Marrakech Accords (Decision 17/CP.7) VVM para 47	No public funding for this project as stated in section A.4.4 and Annex 2 of the PDD. This project is self- funded.	OK
8. Parties participating in the CDM shall designate a national authority for the CDM	Marrakesh Accords (CDM modalities§ 29) VVM para 45	Ministry of Natural Resources and Environmental is the designated DNA of Malaysia	OK
9. The host country shall be a Party to the Kyoto Protocol	Marrakesh Accords (CDM modalities§ 30) VVM para 60	Yes, Malaysia ratified the protocol on 4 September 2002.	OK
10. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	The proposed project activity meets the eligibility criteria for small scale under Type III as it does not exceed the threshold values for this category. The project was also not a debundled component of a larger project activity.	OK
11. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e VVM para 60	The project activity confirms to the category Type III- other project activity. The applied baseline methodologies of AMS-III.H ver. 16 were found to be appropriate to the project	OK

REQUIREMENT	REFERENCE	COMMENT	CONCLUSION
12. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d VVM para 40, 41 & 42	PDD was uploaded on 6/01/2012. The global stake holder process was from 7/01/2012 until 5/02/2012. There were no comments received for this project.	OK

Table 2 Requirements Checklist

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. Project Description					
A.1. Small scale project activity It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	VVM para 136 (a)	DR	The project qualifies as a small scale CDM activity as the project activity. The estimated annual emission reduction, 26,680 tCO_2e was less than 60,000 tCO_2e for Type III component. This was calculated based on the projected Qy,ww = 155,060 m^3eff/year based on FFB production 216,000 tonnes/yr. To check the maximum/license capacity or historical of the wastewater treatment plant. Noted that Qy,ww is used in BE and PE calculation.		
		SV/I	The projection of Qy,ww was actually based on the average FFB processing per year where 216,000 tonnes/yr projected for year 2013 was already at its maximum capacity. Application for increased capacity to 45tonnes/yr was submitted for approvals. Each tonne of FFB processed resulted in approximately 0.65 m^3 of POME produced as per write-up journal 'Effect of New Palm Oil Processes on the EFB and POME Utilization. Projection of estimated annual emission reduction for type III using the wastewater treatment license capacity or maximum design capacity was justified.	OK	OK
A.1.2. Does proposed project activity conform to one of the project categories defined for small scale	VVM para	DR	Yes, the proposed project activity confirms to the project categories defined for small scale CDM project activities,		

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
CDM project activities?	136 (b)		Type III : other project activities *To verify on-site*		
		SV/I	The site visit confirmed that the proposed project activity confirmed to the categories as defined above. It was found that the processing rate of FFB estimated and used (Table B.4. of PDD) in ex ante estimation of CER consistent with the projection data, Malaysia Palm Oil Board approval and Department of Environment approval; hence volume of wastewater was representative in the calculation. PP to change acidification pond in Figure B3 of the PDD as per existing practice where only one acidification pond was used at one time.	OK ~~CL1~~	OK OK
A.1.3. The small scale project activity is not a debundled component of a larger project activity?	VVM para 136 (c)	DR	As stated in Section A.4.5 of PDD, the project activity is not a debundled component of a larger project activity. There are no similar projects implemented by the same project proponent with the same technology within 1km of the project location registered within the previous 2 years. To confirm on-site.		
		SV/I	It was confirmed that this project was not a debundled component of a larger project activity.	OK	OK
A.1.4. Is an analysis of the environmental impacts of the project activity required by the host country?	VVM para 136 (d)	DR	The host country does not require an EIA for the proposed project activity. *To confirm on-site.*		
		SV/I	It was confirmed that the project activity is not listed under	~~CAR 1~~	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the prescribed activities that required EIA by Department of Environmental Malaysia. However, the project is still pending with its approval by local DNA		
A.2. Project Design & Project Description					
A.2.1. Is the PDD in accordance with the applicable CDM requirements for completing the PDD?	VVM para 56	DR	The latest PDD version 3 template being used conforms to the Small Scale CDM PDD format and in accordance with the applicable CDM requirement for completing PDD.	OK	OK
A.2.2. Is the description of the proposed CDM project activity as contained in the PDD sufficiently cover all relevant elements, accurate and provides the reader with a clear understanding of the nature of the proposed CDM project activity. it	VVM para 59	DR	The PDD described all relevant elements including the projects spatial and system boundaries with the detailing of components and facilities used to mitigate GHGs. The description of baseline sufficiently provides clear understanding of the nature of the proposed project activity. *The accuracy of baseline and project description will be assessed further on-site.*		
		SV/I	It was confirmed that the project engineering reflect good practices. However, PP needs to provide the enclosed digester tank system, enclosed flare general specification and gas engine specification. In section A.2, PP has yet to clarify the source of technology transfer employed for this project. PP description on sustainable development policies in page 4, section A.2 of PDD version 1, was not quite matching the objectives of National Green Technology Policy objectives and host country national CDM criteria.	~~CL2~~ ~~CL3~~ ~~CL4~~	OK OK OK
A.2.3. The description in the PDD reflects the	VVM	DR	Assessment of whether the description in the PDD reflects		

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
proposed CDM project activity for the following types of CDM project activities unless other means are specified in the methodology a) Large scale projects; b) Non-bundled small scale projects with emission reductions exceeding 15,000 tonnes per year; c) Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes per year; in such case the number of physical site visits may however be based on sampling, if the sampling size is appropriately justified through statistical analysis.	para 60		the proposed CDM project activity is to be confirmed during the physical site inspection.		
		SV/I	The physical site inspection was conducted during site visit. The site located at Carotino Palm Oil, 23 km off Sri Jaya Town, Maran, Pahang. a) The proposed CDM project activity not reflecting large scale project activity since it is described in the PDD that the specified methodology for the project is AMS.III-H v16. It is also confirmed by the estimation of the ex-ante CER calculation which is within the threshold limit of small scale project activity. b) Referring to section A.1.3 of this table, it was confirmed that the proposed project activity is a non-bundled small projects with emission reductions exceeding 15,000tonnes/year. c) Not applicable since the project is not a debundled component of a larger project activity.	OK	OK
A.2.4. For other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, was a physical site inspection conducted?	VVM para 61	DR	Not applicable.	OK	OK
A.2.5. For all other proposed CDM project activities not referred to in paragraphs 59 – 61, was a physical site inspection conducted? And justify if a physical site inspection is not undertaken.	VVM para 62	DR	Not applicable.	OK	OK
A.2.6. Is the proposed CDM project activity involves	VVM	DR	Not applicable.	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
the alteration of an existing installation or process? If yes, project description clearly states the differences resulting from the project activity compared to the pre-project situation?	para 63				
A.2.7. Are the project's starting date and operational lifetime clearly defined?		DR	As stated in Section C.1.1 of the PDD, the starting date of the project is 04/08/2011, considering the "Letter of Acceptance of Offer" with Watermech Engineering Sdn. Bhd. Operational lifetime of the project as stated in Section C.1.2 of the PDD is 15 years. To obtain and verify: 1) the evident to support the use of the project starting date and operational lifetime. The operational lifetime shall also in-lined with the relevant guideline. 2) the evident of CDM consideration.		
		SV/I	The starting date of the project was not same as date of acceptance by the project proponent in the Letter of Offer by technology provider.	~~CAR2~~	OK
B. Baseline and monitoring methodology					
B.1. Applicability of the selected methodology to the project activity					
B.1.1. Is the methodology correctly quoted and applied, and consistent with the actual text of the applicable version of the methodology available on the UNFCCC CDM website?	VVM para 70	DR	The selected AMS-III.H version 16 methodology is correctly quoted and applied for the project activity, and consistent to the actual text of the applicable version of the methodology available on the UNFCCC CDM website.		

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
			To review further at site.		
		SV/I	Part of the description in Table B.2, project scenario item 2(c) was not corresponded to the requirement. .	~~CL5~~	OK
B.1.2. Have the project participants shown that the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein?.	VVM para 71	DR	PP had justified the choice of the project category with the review of applicability conditions as required under paragraph 71 of VVM. The baseline methodology being considered for the project meets the conditions of the baseline methodology AMS-III.H version 16. *Further assessment to be done on site.*		
		SV/I	It can be confirmed that the aerobic treatment is well managed and justified the use of MCF = 0.0. Effluent polishing plant was a good effort done by PP where BOD level was maintained below 10ppm. Effluent treatment drawing was furnished during site audit. Desludging record was presented together with approvals from DOE.	OK	OK
B.1.3. Has the choice of methodology justified in the PDD and the each applicability conditions of the methodology or tool being justified? (cross check the PDD against the other sources to confirm that the project activity meets the applicability conditions of the methodology)	VVM para 71	DR	The 10 days measurement campaign result under normal operation from 12th August – 21st August 2011 confirmed and correctly applied. And uncertainty factor 0.89 was multiply to average values from the measurement campaign. However, PP has yet to show how paragraph 27 (a) and (c) of AMS-III.H were assessed in the determination of the baseline emission	~~CAR3~~	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.2. Project boundary					
B.2.1. Has the PDD correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity?	VVM para 78	DR	Yes, as described in Section A.4.1.4 of the PDD the project's spatial boundaries are clearly defined. The project is located at Carotino Palm Oil Mill, 23km off Sri Jaya Town, Maran, Pahang Darul Makmur, Malaysia. GPS coordinates of $+3^0$ 49' 1.20", $+102^0$ 49' 4.44" E *Further confirmation to be carried out at site.*		
		SV/I	The coordinates were consistent with that verified at the site. PP to standardize coordinates of longitude and latitude as per the one submitted in the prior consideration to UNFCCC.	~~CL6~~	OK
B.2.2. Are all sources and GHGs required by the methodology have been included within the project boundary?	VVM para 79	DR	Refer to Section B.3 of the PDD. The PP has defined the project boundary according to AMS-III.H ver.16 *Further assessment of the proposed project activity boundary will be carried out on site.*		
		SV/I	The site visit confirmed that the project activity was consistent with that presented in the PDD for type III.	OK	OK
B.3. Baseline Identification					
B.3.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	VVM para 81	DR/ SV/I	The baseline scenario for treating the wastewater from palm oil mill (POME) is open lagoon anaerobic treatment plant without the biogas recovery system. It is demonstrated that the project activity itself is not a likely baseline scenario due to this prevailing practice barriers which would resulted in less attractive return of investment without CDM for the proposed project activity when comparable analysis conducted.	OK	OK
B.3.2. Is selected methodology requires use of tools to establish the baseline scenario? If yes, has the	VVM para	DR/ SV/I	The selected methodology requires the use of tools to establish baseline scenario for this proposed project	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
application of the tools been followed?	82		activity. The demonstration of the most plausible baseline scenario is done in accordance to "General guidelines to SSC CDM methodologies"		
B.3.3. If the methodology requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario, has it been determined based on financial expertise and local and sectoral knowledge, determine whether all scenarios that are considered by the project participants and are supplementary to those required by the methodology, are reasonable in the context of the proposed CDM project activity and that no reasonable alternative scenario has been excluded.	VVM para 83	DR/ SV/I	The assessment as required by the methodology to demonstrate the most plausible baseline scenario for the proposed project activity is done based on the General Guidelines to SSC CDM methodologies for Greenfield projects. PP demonstrated that the determined scenarios considered are reasonable in the context of the proposed CDM project activity. It was found that except for the most plausible scenario, other scenarios being listed involved methane recovery. With reference to Para 19 of General Guidelines to SSC CDM methodologies, corresponds to the baseline scenarios provided in the methodology.	OK	OK
B.3.4. Are the documents and sources referred to in the PDD are correctly quoted and interpreted?. Has a cross check of the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if avaialble been carried out?	VVM para 84	DR/ SV/I	References made in PDD has been cross checked with publicly available data.	OK	OK
B.3.5. Are relevant national and/or sectoral policies and circumstances taken into account?	VVM para 85	DR/ SV/I	The proposed project activity is in-line with the national sustainable policies set by the government of Malaysia.	~~CL4~~	OK
B.3.6. Has the PDD provides a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	VVM para 86	DR/ SV/I	It has been described in the PDD that the most plausible identified baseline scenario would be employed is the open lagoon treatment system for POME. This system comprises of a series of open acidification, anaerobic, aerobic and settling lagoons which would take place in the absence of the proposed CDM project activity.	OK	OK
B.4. Algorithms and/or formulae used to determine emission reductions					

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.4.1. Determine whether the equations and parameters in the PDD have been correctly applied by comparing them to those in the selected approved methodology. If the methodology provides for selection between different options for equations or parameters, the validation team shall confirm that adequate justification has been provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided) and that the correct equations and parameters have been used, in accordance with the methodology selected.	VVM para 90	DR	Yes. All aspects to the project emission were considered. However to confirm the followings at site; To clarify COD removal efficiency of 99% of the baseline through measurement campaign. To confirm on ex-ante project design of $Q_{ww,l,y}$ = 140,400 m^3/year. To clarify MCF = 0.8 Anaerobic deep lagoon depth more than 2m. To clarify MCF = 0.0 Aerobic well managed pond.		
		SV/I	It was confirmed that the COD removal efficiency of 99% in accordance to the technology description provided. $Q_{ww,l,y}$ = 140,400 m^3/year was confirmed based on 216,000 FFB t/yr x 0.65 MCF = 0.8 based on existing scaled depth of the ponds. MCF = 0.0 based on sufficient aeration of the ponds.		
			PP has yet to correct MCF values of $MCF_{ww,treatment,PJ}$ to 0.0	~~CL7~~	OK
			PP has yet furbished the document to claim 100% combustion efficiency of biogas in the gas engine	~~CL8~~	OK
			PP has yet to substantiate document to support claim for Emission factor for diesel engine.	~~CL9~~	OK
			PP has yet to substantiate document to support claim for auxiliary power consumption for project.	~~CL10~~	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.4.2. Verify the justification given in the PDD for the choice of data and parameters used in the equations.	VVM para 91	DR/ SV	Justification given in the PDD for the choice of data and parameters used in the equations has been verified as per requirements of AMS.III-H.	OK	OK
B.4.3. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, validation team shall assess all data sources and assumptions are apporiate and calculations are correct, applicable to the proposed project activity and will result in a conservative estimate of emission reductions.	VVM para 91	DR/ SV	Yes, the project will result in fewer GHG emissions. However, PP has yet provide further explanation on the how the equation (page 29 of PDD) below was derived and to be used: $MD_y = [Q_{biogas,\ combusted} \times fm_{CH4,RG} \times CFE_{ww} \times GWP_{CH4}] + [TM_{RG,h} \times \eta_{flare,h} \times GWP_{CH4}]$	~~CL11~~	OK
B.4.4. If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, the validation team shall confirm that the estimates provided in the PDD for these data and parameters are reasonable.	VVM para 91	DR/ SV/I	The ex-ante calculation of emission reductions has been described in section B.6.3 of the PDD with the estimated values of monitored parameters listed in section B.7.1 of the PDD.	OK	OK
B.5. Additionality of a project activity					
B.5.1. Has the PDD describe how the proposed CDM project activity is additional?	VVM Para 94	DR	By means of Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the additionality of the proposed project is demonstrated and assessed by the Invesrment Barrier analysis	OK	OK
B.5.2. Has the PP provide reliable, credible data, rationales, assumptions, justifications and documentation in the PDD to support the demonstration of additionality?	VVM Para 95	DR/ SV/I	Referring to section B.3.3 of this checklist above, PP need to demonstrate that the determined scenarios considered are reasonable in the context of the proposed CDM project activity to support the demonstration of additionality.	~~CAR3~~	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.5.3. The validation team shall consider tools and documents provided by the CDM Executive Board to demonstrate the additionality of proposed CDM project activities, as well as specific complementary or alternative requirements included in approved CDM methodology.	VVM para 96	DR/ SV/I	The additionality has been established in accordance with "tool for the demonstration and assessment of additionality version 5.2". The establishment is deemed appropriate with the consideration of this tool.	OK	OK
B.5.4. Prior consideration of the clean development mechanism		DR/ SV/I	PP has described in section B.5 of the PDD that the decision to implement the project is mainly prior to the consideration of income from CDM. PP submitted the form of prior consideration to UNFCCC on 21 October 2011 as per copy of email provided.	OK	OK
B.5.4.1. Is the start date of the project activity reported in the PDD in accordance with the Glossary of CDM terms?	VVM Para 99	DR/ SV/I	Yes, the project starting date defined in the PDD as per the Glossary of CDM terms.	OK	OK
B.5.4.2. Determine whether it is a new project activity (a project activity with a start date on or after 02 August 2008) or an existing project activity (a project activity with a start date before 02 August 2008).	VVM para 100	DR/ SV/I	The project is a new project activity (a project activity with a start date after 02 August 2008).	OK	OK
B.5.4.3. In case of new project activity has the PP provided the following: • informed the host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status? • has such a notification been provided by the project participants within six months of the project activity start date?	VVM para 101	DR/ SV/I	PP has provided the following: • Response received from Malaysian DNA dated 15 December 2011 • Email copy of prior consideration form to UNFCCC dated 21 October 2011 b) The prior consideration notification to UNFCCC is confirmed to be within six months of the project activity start but the letter to host country DNA will only be	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
			confirmed upon the availability of the actual notification letter		
B.5.4.4. For an existing project activity, for which the start date is prior to the date of publication of the PDD for GSCP, the validation team shall assess the PP's prior consideration of the CDM through document reviews and shall satisfy following requirements: a) Evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent of the PP, to undertake the project as a proposed CDM project activity.. b) reliable evidence (Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new	VVM para 102	DR/ SV	Not applicable as this project is a new project activity.	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat.					
B.5.5. Identification of alternatives					
B.5.5.1. Has the PDD included list of alternatives and ensure that the following are addressed: • The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity;	VVM para 106	DR/ SV/I	Not applicable.	OK	OK
• The list contains all plausible alternatives that the DOE, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity; • The alternatives comply with all applicable and enforced legislation.		DR/ SV/I	Not applicable.	OK	OK
B.5.6. Investment Analysis					
B.5.6.1. If investment analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall provide evidence that the project proposed CDM project activity would not be:	VVM Para 108	DR/ SV/I	The investment analysis has been used to demonstrate the additionality of the proposed CDM project activity.	OK	OK

CHECKLIST QUESTION		VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
	• The most economically or financially attractive alternative; or • Economically or financially feasible					
B.5.6.2.	Has the PP demonstrate the investment analysis using the following approaches: a) The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income and document the costs associated with the proposed CDM project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity; b) The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative; c) The financial returns of the proposed CDM project activity would be insufficient to justify the required investment	VVM Para 109	DR/ SV/I	PP has demonstrated item a), b), and c) through benchmark analysis, calculation and comparison of financial indicators and sensitivity analysis.	OK	OK
B.5.6.3.	Has the PP's apply the latest version of the Guidance on the Assessment of Investment Analysis as provided by the CDM Executive Board and with other relevant guidance including the latest guidelines on plant load factors guidelines for the reporting and validation of plant load factors in the PDD?	VVM Para 110	DR/ SV/I	PP has applied the "tool for the demonstration and assessment of additionality version 5.2". The tool been used is not the latest version, however it is still valid at the time of the baseline study conducted.	OK	OK
B.5.6.4.	Has PP provided authentic, accurate and	VVM	DR/	Referring to the calculation spread sheet and comparison		

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
suitable sources for all parameters and assumptions used in calculating the relevant financial indicator?	Para 111 (a)	SV	of financial indicators PP has yet to furnished document on contingencies cost in the capital cost section. PP has yet to provide justification on salaries, insurance, medical costs etc. in the O & M cost section. PP has yet to provide explanation made by Watermech on the O & M cost figure. PP has yet to use LHDN benchmarking on depreciation of 10% in 10 years rather than PWC write-up of 20% in 5 years. PP has yet to use higher diesel price to appear conservativeness in the financial analysis. PP has yet to correct website link address of Malaysia Inland Revenue Board. Additional of the biomass boiler system in the project activity along with enclosed flare system in project boundary, Section B.3. of PDD version 2.1. However, no justification was made on the changes, the investment analysis was not revised accordingly.	~~CL12~~ ~~CL13~~ ~~CL14~~ ~~CL15~~ ~~CL16~~ ~~CL17~~ ~~CL19~~	OK OK OK OK OK OK OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
			In Section B.5, Table B.7 of PDD version 2.2, sensitivity analysis included new parameter: PKS selling price, the PKS price used was not at time of decision making	~~CL20~~	OK OK
B.5.6.5. The validation team shall cross-check the parameters against third-party or publicly available sources, such as invoices or price indices.	VVM Para 111 (b)	DR/ SV	References were made available by PP with relevant evidences required for cross check are listed in section via footnote provided.	OK	OK
B.5.6.6. The validation team shall review feasibility reports, public announcement and annual financial reports related to the proposed CDM project activity and the project participants.	VVM Para 111 (c)	DR/ SV	Reference made available by PP with regards to the proposed CDM project activity.	OK	OK
B.5.6.7. Assess the correctness of computations carried out and documented by the PP.	VVM para 111 (d)	DR/ SV	The final correctness of computations carried out and documented by the PP will be finalized.	OK	OK
B.5.6.8. Has PP carried out the sensitivity analysis to determine what conditions variations in the result would occur, and the likelihood of these conditions?	VVM para 111 (e)	DR/ SV	PP had carried out a sensitivity analysis for the proposed project activity by evaluating changes in the following parameters: i) PKS price ii) methane production iii) capital cost iv) operation & maintenance cost Based on the investment analysis and sensitivity analysis carried out, it is concluded that the project activity is unlikely to be the most financially attractive condition.	OK	OK
B.5.6.9. Is the type of benchmark applied suitable for the type of financial indicator presented?	VVM para	DR/ SV	Using default return on equity of 10.9% for 'Waste Handling and Disposal' (Group 1, Sectoral Scope 13) in the Host Country, Malaysia as defined in the "Guidelines	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
	112 (a)		on the Assessment of Investment Analysis" is applied.		
B.5.6.10. Is the risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity?	VVM para 112 (b)	DR/ SV	Yes, the risk premium applied is associated with the project activity.	OK	OK
B.5.6.11. Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants involved and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark.	VVM para 112 (c)	DR/ SV	The benchmark analysis clearly demonstrates that the proposed project activity is unlikely to be considered a financially attractive course of action without revenue from sale of CER's.	OK	OK
B.5.6.12. In cases where the PP rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activity, please ensure that : a) The FSR has been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed;	VVM para 113		Not applicable	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
b) The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the DOE should validate the appropriateness of the values; c) On the basis of its specific local and sectoral expertise, confirmation is provided, by cross-checking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision.					
B.5.7. Barrier analysis					
B.5.7.1. Does the proposed CDM project activity faces barriers that a) Prevent the implementation of this type of proposed CDM project activity; b) Do not prevent the implementation of at least one of the alternatives.	VVM para 115	DR	The proposed CDM activity does not face barriers that Prevent the implementation of this type of proposed CDM project activity.	OK	OK
B.5.7.2. Issues that have a clear direct impact on the financial returns of the project activity cannot be considered barriers and shall be assessed by investment analysis. This does not refer to either: a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance; or b) Barriers related to the unavailability of	VVM para 116	DR	Not applicable since PP used levelled cost (investment comparison analysis) for the demonstration of additionality.	OK	OK

CHECKLIST QUESTION		VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
	sources of finance for the project activity					
B.5.7.3.	Has the PDD provide the evidence to determine whether the barriers listed in the PDD are real and whether it is assessed by means of available evidence and/or interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) that the barriers listed in the PDD exist?	VVM para 117 (a)	DR	Not applicable since PP used levelled cost (investment comparison analysis) for the demonstration of additionality.	OK	OK
B.5.7.4.	Are the existence of barriers substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics?	VVM Para 117 (a)	DR	Not applicable since PP used levelled cost (investment comparison analysis) for the demonstration of additionality.	OK	OK
B.5.7.5.	Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives	VVM para 117 (b)	DR	Not applicable since PP used levelled cost (investment comparison analysis) for the demonstration of additionality.	OK	OK
B.5.8.	Common practice analysis					
B.5.8.1.	Assess whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type. For certain technologies the relevant region for assessment will be local and for others it may be transnational/global. If a region other than the entire host country is	VVM para 120 (a)	DR	The defined region i.e. for this proposed project activity as the host country, Malaysia is deemed appropriate in terms of the geographical scope of the common practice analysis. In about 444 palm oil mills throughout Malaysia, 85% operated with the most commonly used open lagoon systems of the treatment of POME.	OK	OK

CHECKLIST QUESTION		VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
	chosen. Please explain why this region is more appropriate.					
B.5.8.2.	Using official sources and local and industry expertise, determine to what extent similar and operational projects (e.g. using similar technology or practice), other than CDM project activities, have been undertaken in the defined region;	VVM Para 120 (b)	DR	Referring to the publicly available documents supplied by PP entitled "Study on Clean Development Mechanism Potential in the Waste Sectors in Malaysia, out of all biogas CDM project developed in the palm oil mill throughout Malaysia, only two similar biogas project implemented without the support of CDM. These too were the only projects being implemented in the early 1980's and no longer in operation.	OK	OK
B.5.8.3.	If similar and operational projects, other than CDM project activities, are already widely observed and commonly carried out in the defined region, assessed whether there are essential distinctions between the proposed CDM project activity and the other similar activities.	VVM Para 120 (c)	DR/ SV/I	Not applicable since the only two similar projects other than CDM project activity is no longer in operation.	OK	OK
C. Monitoring Plan						
C.1.1.	Has the PDD include a monitoring plan that is in accordance with the approved monitoring methodology applied to the proposed CDM project activity?	VVM para 122	DR/ SV	PP has includes in the PDD a monitoring plan that is in accordance with the approved monitoring methodology applied to the proposed CDM project activity.	OK	OK
C.1.2.	Has the monitoring plan includes all relevant parameters required by the selected methodology?	VVM para 122 (a)	DR/ SV	PP to re-word the description on sample size and measurement for $COD_{inflow,y}$, $COD_{treated,PJ,y}$, and $COD_{ww,discharge,PJ,y}$ to ensure 90/10 confidence/ precision level.	~~CL18~~	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
			For T_{flare} , the "Description of measurement methods and procedures to be applied", and "QA/QC procedures to be applied" defined in PDD did not comply to *"Tool to determine project emissions from flaring gases containing Methane"*	~~CAR4~~	OK
C.1.3. Has the monitoring plan contains all necessary parameters that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the methodology?	VVM para 122 (a)	DR/ SV	The measurement/ sampling points for $Q_{ww,i,y}$, $COD_{inflow,I,y}$ were indicated in the Figure B.2 & B.3 of PDD.	~~OK~~	OK
C.1.4. Are the monitoring arrangements described in the monitoring plan are feasible within the project design?	VVM para 122 (b)	DR/ SV/I	The arrangements of the monitoring described in the monitoring plan are found feasible with the structure of the monitoring team complete with their designated roles and respective responsibilities. The arrangements also made provision for the training to be provided to the all monitoring operators by an appointed consultant and the technology provider.	OK	OK
C.1.5. Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from	VVM para 122 (b)	DR/ SV	In section B.7.2, of the PDD mention of emergency preparedness for cases where emergencies can cause unintended emissions.	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
the proposed CDM project activity can be reported ex post and verified.					
D. Local stakeholder consultation					
D.1.1. Have relevant stakeholders been consulted?	VVM Para 128	DR	Refer to Section E of the PDD. Local stakeholders' meeting was held on 02/11/2011 at Zenith Hotel, Kuantan, Malaysia. To get the attendance list, presentation materials, invitation letter, reason for holding the meeting and to conclude whether the stakeholder meeting is sufficient. *Detail discussion on this process will be carried out during on-site audit.*		
		SV/I	All evident and supporting documents provided. The meeting was held accordingly. Two of the stakeholders were interviewed and the knowledge of GHG emission and the CDM project deemed sufficient.	OK	OK
D.1.2. Have comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity, have been invited?	VVM para 129 (a)	DR/ SV/I	It was confirmed during the interview that all meeting attendances have been invited to comments whatever issues that can reasonably be considered relevant for the proposed project activity.	OK	OK
D.1.3. Is the summary of the comments received as provided in the PDD complete?	VVM para 129 (b)	DR	Yes, summary of the comments is documented in Section E.2. of the PDD.	OK	OK
D.1.4. Have the project participants taken due account of any comments received and described this process in the PDD?	VVM para 129 (c)	DR/ SV/I	Yes, there were no negative comments received.	OK	OK

CHECKLIST QUESTION	VVM 1.2	MoV*	COMMENTS	Draft Concl.	Final Concl.
E. Environmental impacts					
E.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	VVM para 131	DR/ SV	The Malaysia environmental law under its Department of Environmental (DOE) requires the report of impact on environment resulting from prescribed activities under Section 34A of Environmental Quality Act 1974. The project activity however does not included in the schedule of prescribed activities as per Appendix 2 of Section 34A of the act i.e. the Environmental Qualtiy (Prescribed Activities) (Environmental Impact Assessment) Order 1987.	OK	OK
E.1.2. Does the project comply with environmental legislation in the host country?	VVM para 132	DR/ SV	As above. PP has already obtained the written approvals on the construction of the proposed palm oil mill including its anaerobic digester with methane capture system from the DOE.	OK	OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR1 The Letters of Approval from the DNA of Malaysia and the Annex I party have yet to be obtained.	Table 1 A.1.4.	Letter of Approval (LoA) from Malaysian DNA dated 14/08/2012 and Australian DNA dated 23/07/2012 submitted to validation team as following: Attachment : *< Carotino_Approved Annex 1 LoA>* *< Carotino_Host Approved LoA>*	Both LoA from Malaysia DNA and Australia DNA have been furnished and verified the authenticity of the LoA via email confirmation by the both DNA Malaysia /58/ and DNA Australia /57/ CAR1 closed.
CAR2 The start date of the project was not same as date of acceptance by the project proponent in the Letter of Offer by technology provider.	A.2.7.	The date of signing by the PP is 09/08/2011, while the letter itself was dated 04/08/2011. The date of letter signed will be used as project start date as from that date onwards the agreement became valid. Attachment: *< "Letter of Acceptance" with Watermech Sdn. Bhd.>*	As per the CDM Guidance (Glossary of CDM Terms, ver. 06) /63/, the start date shall be considered to be the earliest date at which either the implementation or construction or real action of a CDM project activity begins. For this project activity, the start date was taken as 09 August 2011, following the date of signing the "Letter of Acceptance of Offer" /23/ by the PP. With the issuance of the letter, PP had committed to expenditures related to the implementation of the project. Hence, the start date was in accordance with the "Glossary of CDM Terms" /64/, and fulfills the requirements of paragraph 99 of VVM. This is deemed acceptable as the earliest of financial commitment

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			decision for the project activity as the other financial commitments, i.e. the project site clearing and earthwork is signed in 01 October 2011[/51/] and project implementation schedule[/39/]. The validation team also able to confirm at site inspection that only the land clearance work been carried out at the project site during the time of visit. CAR2 closed.
CAR3 The 10 days measurement campaign result under normal operation from 12th August – 21st August 2011 confirmed and correctly applied. And uncertainty factor 0.89 was multiply to average values from the measurement campaign. However, PP has yet to show how paragraph 27 (a) and (c) of AMS-III.H were assessed in the determination of the baseline emission.	B.1.3. B.5.2.	In the updated PDD, the 10 days measurement campaign under normal operation sampling dates was edited from 12th August – 21st August 2011 to 13/08/2011 to 22/08/2011 as reflected in the analysis reports. The COD analysis results for 18/08/2011 was edited as following: i) after acidification pond, the COD data was corrected from 66,687mg/l to 66,867 mg/l and; ii) Final discharge, the COD data was corrected from 202 mg/l to 176 mg/l. The following text was added to updated PDD: *Other types of data are not available for determination of COD removal efficiency as*	PDD has been updated accordingly as per analysis report. DOE licence for year 2011/2012 with licence no. 00897 was furnished on the final effluent. CAR3 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		indicated in paragraph 27 (a). *Based on the existing Compliance Schedule issued by Department of Environment, the only effluent parameter to be monitored is BOD of the final discharge. Thus, the mill did not monitor effluent COD in the past and could not provide any data for validation purpose.* *Attachment <Carotino_Department of Environment Licence>* Comparison of baseline emissions between Para. 27 (a) and Para. 27 (b) cannot be made since there is no other types of data available that can be used to determine COD removal efficiency as in paragraph 27 (a). Thus results obtained from measurement campaign in paragraph 27 (b) has been adopted.	

<table>
<tr><th>Draft report clarifications and corrective action requests by validation team</th><th>Ref. to checklist question in table 2</th><th>Summary of project owner response</th><th>Validation team conclusion</th></tr>
<tr><td><u>CAR 4</u>
For T_{flare} , the “Description of measurement methods and procedures to be applied”, and “QA/QC procedures to be applied” defined in PDD did not comply to “Tool to determine project emissions from flaring gases containing Methane”</td><td>C.1.2.</td><td>In the Section B.7.1 updated PDD, T_{flare} has been edited as per “Tool to determine project emissions from flaring gases containing Methane” as following:
<table><tr><td>Description of measurement methods and procedures to be applied:</td><td>Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500 ºC indicates that a significant amount of gases are still being burnt and that the flare is operating.</td></tr><tr><td>QA/QC procedures to be applied:</td><td>Thermocouples should be replaced or calibrated every year.</td></tr></table></td><td>Description on flare measurement has been updated in section B.7.1 of the PDD.

<u>CAR4 closed.</u></td></tr>
<tr><td><u>CL1</u>
PP to change acidification pond in Figure B3 of the PDD as per existing practice where only one acidification pond was used at one time.</td><td>A.1.2.</td><td>The acidification pond flow line in figure B3 in updated PDD has been changed according to actual mill practice.</td><td>Figure B.3 of the PDD has been amended as per actual practiced at site.

<u>CL1 closed.</u></td></tr>
</table>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL2 It was confirmed that the project engineering reflect good practices. However, PP needs to provide the enclosed digester tank system, enclosed flare general specification and gas engine specification.	A.2.2.	The specification the enclosed digester tank system, enclosed flare general specification and gas engine specification has been provided to validation team. Please refer to the following document. *Attachment:* *< Watermech Quotation – COM >* *<Carotino Enclosed Flare System Specification>* *<Carotino Enclosed Flare System Drawing>*	Enclosed flare system specification and drawings together with general specifications for enclosed digester tank and gas engine has been adequately furnished. CL2 closed.
CL3 In section A.2, PP has yet to clarify the source of technology transfer employed for this project.	A.2.2.	Updated in section A.2 of the PDD on source of technology transfer employed inserting information on Criterion 3 of National CDM Criteria as following: *Criterion 3: The project leads to adoption of local technology with higher energy efficiency and increases the deployment of energy resources in the palm oil mil. The project activity also enhances the indigenous capacity of Malaysians to apply, develop and implement environmentally sound technology that leads to less carbon intensive emission;* http://cdm.greentechmalaysia.my/cdm-malaysia/cdm-criteria.aspx http://www.watermech.com/p_anaerobic_digester_tank.php	Improvement in technology employed for this project is sufficient to meet criterion 3 of CDM Genentech Malaysia. CL3 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL4 PP description on sustainable development policies in page 4, section A.2 of PDD version 1, was not quite matching the objectives of National Green Technology Policy objectives and host country national CDM criteria.	A.2.2.	Description on sustainable development policies in page 4, section A.2 was rephrased as following: *The project activity contributes towards sustainable development of the agricultural sector in the region and will increase reuse of wastes from palm oil processing. The project activity contributes the National Green Technology Policy, assists towards sustainable development of the Host Country and in line with the four key policy pillars:* http://www.greentechmalaysia.my/index.php/green-technology/green-technology-policy/national-green-techology-policy.html The 4 pillars of National Green Technology Policy were cross checked and found consistent.	Section A.2 of the PDD has been updated as per National Green Technology Policy on sustainable development policies. CL4 closed.
CL5 Part of the description in Table B.2, project scenario item 2(c) was not corresponded to the requirement.	B.1.1.	Description Table B.2, project scenario item 2(c) in updated PDD been corrected as following: Deleted text "*The loading rate of COD is above 0.1 kg COD.m^3.day^{-1} (see Section B4)"* as it does not reflect item 2 (c) requirement.	The non-relevant text has been deleted and Table B.2 of the PDD has been updated. CL5 closed.
CL6	B.1.3.	The coordinates of project site	The coordinates has been updated as

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
The coordinates were consistent with that verified at the site. PP to standardize coordinates of longitude and latitude as per the one submitted in the prior consideration to UNFCCC.		standardized as per submitted Prior Consideration Form, converted to degrees, minutes & seconds as following: 3°49' 1"N, 102.°49'4"E	per existing practice of using degrees, minutes, seconds, longitude and latitude. CL6 closed.
CL7 PP has yet to correct MCF values of $MCF_{ww,treatment,PJ}$ to 0.0	B.4.1.	The Methane correction factor (MCF) values for project wastewater treatment system consist of: a. $MCF_{ww,treatment,PJ}$: Refers to System-biogas, which is equipped with biogas recovery digester. This parameter is used to calculate $PE_{fugitive,ww,y}$. As per methodology AMS-III.H, Table III.H.1.; IPCC default values for anaerobic deep lagoon (depth more than 2 meters) is 0.8. b. $MCF_{ww,treatment,PJ,Aerobic}$: Refers to System-Aerobic, which is not equipped with biogas recovery digester (encompassing the aerobic pond and polishing plant). This parameter is used to calculate $PE_{ww,treatment,y}$. As per methodology AMS-III.H, Table III.H.1.; IPCC default values for aerobic treatment, well managed is 0.0. Thus, the applied values in the PDD is correct.	Both MCF values applied correctly as per methodology where $MCF_{ww,treatment,PJ}$ is 0.8 from the scaled depth and $MCF_{ww,treatment,\ PJ\ Aerobic}$ is 0.0 on the aeration equipment installed in the pond and polishing plant from site visit at Carotino wastewater treatment plant. CL7 closed.
CL8	B.4.1.	Paragraph 35 of methodology AMS IIIH	Methodology para 35 stipulates clearly

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
PP has yet furbished the document to claim 100% combustion efficiency of biogas in the gas engine		(Version 16) clearly stipulates that flare efficiency for biogas combusted for gainful purposes e.g. fed to an engine, an efficiency of 100% is applied. Thus, no document needed to support further the claim.	that flare efficiency for biogas combusted for gainful purposes. CL8 closed.
CL9 PP has yet to substantiate document to support claim for Emission factor for diesel engine.	B.4.1.	1. The project emission from electricity and fuel used by the project activities, $PE_{power,y}$ is determined as per "Tool to calculate baseline, project and/or leakage emissions (Version 01, EB39)". The main source of auxiliary electricity for the project activity is from the biogas engine itself. Only during emergencies, a small portion of total electricity generated by the mill will be used for project activity. As described in the PDD, the mill depends on an off-grid captive power plant for electricity generation. The primary source of electricity for the mill is biomass boiler system and being a renewable source, the emission factor for electricity generated from biomass turbine is zero. Approximately 12.93% (based on historical data July 2010 – June 2011) of total electricity consumed by the mill uses diesel. The emission	Calculation for PE_{power} using historical data on diesel consumption is acceptable using emission factor of 1.3 tCO_2/Mwh. CL9 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		factor for diesel is 1.3 tCO_2/Mwh; a default value as stated in Option B2, Page 8 of Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01, EB39).	
CL10 PP has yet to substantiate document to support claim for auxiliary power consumption for project.	B.4.1.	Document to support claim for auxiliary power consumption from technology supplier attached: *Attachment:* *< Power Generation Information>*	Clarification on auxiliary power consumption by technology provider was adequate. CL10 closed.
CL11 PP has yet provide further explanation on the how the equation (page 29 of PDD) below was derived and to be used: $MD_y = [Q_{biogas,\ combusted} \times fm_{CH4,RG} \times CFE_{ww} \times GWP_{CH4}] + [TM_{RG,h} \times \eta_{flare,h} \times GWP_{CH4}]$	B.4.3.	In the updated PDD, the equation been deleted as the equation is not reflected in methodology AMS IIIH.	The equation was irrelevant as per methodology and has been deleted in section B.6 of the PDD CL11 closed.
CL12 PP has yet to furnish document on contingencies cost in the capital cost section.	B.5.6.4.	The document for Contingency Cost (10% of EPC Cost. Goodman & Hastak, 'Infrastructure Planning Handbook', Page 3.12, Table 3.4 & 3.5) is made available to validation team. *Attachment:* *<COM - Contingency Cost_Goodman & Hastak*	Justification on contingency cost has been furnished as per write-up by Goodman & Hastak, Infrastructure Planning Handbook[/53/]. CL12 closed.
CL13 PP has yet to provide justification on salaries,	B.5.6.4.	The document on O&M expenditures with justification is made available to	Documents furnished for the justification of the cost was adequate.

<table>
<tr><th>Draft report clarifications and corrective action requests by validation team</th><th>Ref. to checklist question in table 2</th><th>Summary of project owner response</th><th>Validation team conclusion</th></tr>
<tr><td>insurance, medical costs etc. in the O & M cost section.</td><td></td><td>validation team. The summary of cost is as following:

<table><tr><td colspan="2">Overall Expenditure</td></tr><tr><td>Account Description</td><td>Cost (RM)</td></tr><tr><td>Workers Salary</td><td>207,116.34</td></tr><tr><td>Staff Salary</td><td>24,711.92</td></tr><tr><td>Workers Accommodation</td><td>7,800.00</td></tr><tr><td>Staff Accommodation</td><td>15,600.00</td></tr><tr><td>General Charges</td><td>59,166.87</td></tr><tr><td>Plant Machinery Upkeep (5% of Capex)</td><td>429,900.00</td></tr><tr><td>Total Overall Expenditure</td><td>744,295.13</td></tr></table>
*Note: Insurance & Medical costs are included in General Charges.

The O&M cost details edited in Carotino FM Version 02.1 & updated PDD based on available data source.

Attachment:
< Operational Cost>
< Life Span and Maintenance Cost></td><td>CL13 closed.</td></tr>
<tr><td><u>CL14</u>
PP has yet to provide explanation made by Watermech on the O & M cost figure.</td><td>B.5.6.4.</td><td>The O&M cost made by Watermech was estimated based on 5% of the capital cost:
5% * RM 8,598,000 = RM 429,900

Attachment:
< COM - Life Span and Maintenance Cost>
< Letter of Acceptance with Watermech Sdn. Bhd. ></td><td>Documents furnished for the justification of the cost was adequate in accordance to Goodman and Hastak write up on Infrastructure Planning Handbook[53]

CL14 closed.</td></tr>
</table>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL15 PP has yet to use LHDN benchmarking on depreciation of 10% in 10 years rather than PWC write-up of 20% in 5 years.	B.5.6.4.	There is no indication of depreciation rate in Malaysia Inland Revenue Board (IRB). According Malaysian Accounting Standards Board, paragraph 50-62 of the Financial Reporting Standards, FRS 116; accounting practices use the lifetime of equipment/plant as the depreciation rate based on straight-line basis. http://www.masb.org.my/index.php?option=com_content&view=article&id=142:frs116-pg4&catid=6:masb-exclude-private The financial model in Carotino FM Version 02.1 & updated PDD has been edited based on the following approach: The reference used is the capital allowances (CA) rate given by IRB. This CA is not representative of the asset depreciation as it is mere a deduction method for the taxation purpose only. *<www.kpmg.com.my/kpmg/publications/tax/tm/chapter3.pdf>* *www.kpmg.com.my/kpmg/publications/tax/tm/chapter4.pdf* The Internal Revenue Board gives CA rates of 14% for general plants and machinery as annual allowances (AA). The initial allowances (IA) given is 20% <http://www.hasil.gov.my/goindex.php?kump=5&skum=1&posi=6&unit=1&sequ=1]>	Benchmarking on using Malaysian Accounting Standard Board for depreciation rate was justifiable and approach made to the financial model was in line with the criteria. CL15 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Hence, we could not directly apply the CA as depreciation rate for the asset. The more practical approach and standard practice would be based on the equipment/plant lifetime and apply straight-line depreciation on it (as stated in paragraph 50-62 of the Financial Reporting Standards, FRS 116 published by Malaysian Accounting Standards Board. This assessment is conducted to proof that the fair value is equivalent to zero at the end of project life. <http://www.masb.org.my/index.php?option=com_content&view=article&id=142:frs116-pg4&catid=6:masb-exclude-private>	
CL16 PP has yet to use higher diesel price to appear conservativeness in the financial analysis.	B.5.6.4.	The highest purchase price of diesel @ RM 2.74/liter was used in the updated PDD and Carotino FM Version 02.1. Associated changes in IRR and Sensitivity analysis reflected in the update PDD. *Attachment:* < Mill Diesel Prices> < Mill Diesel Invoice> < Mill Diesel Credit Note>	Higher diesel price has been used to remain conservative since savings on diesel consumption contributes to higher IRR in the calculation and the FM and PDD has been updated. CL16 closed.
CL17 PP has yet to correct website link address of Malaysia Inland Revenue Board.	B.5.6.4.	In the updated PDD and Carotino FM Version 02.1, the tax rate source been corrected as following: Lembaga Hasil Dalam Negeri Malaysia;	The web link to the Malaysia Inland Revenue Board has been corrected.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		(http://www.hasil.gov.my/goindex.php?kump=5&skum=2&posi=5&unit=1&sequ=1)	CL17 closed.
CL18 PP to re-word the description on sample size and measurement for $COD_{inflow,y}$, $COD_{treated,PJ,y}$, and $COD_{ww,discharge,PJ,y}$ to ensure 90/10 confidence/ precision level.	C.1.2.	Samples and measurements for $COD_{inflow,y}$, $COD_{ww,treated,PJ,y}$, $COD_{ww,discharge,PJ,y}$ to ensure a 90/10 confidence/precision level was determined according to Para. 96 – 109, Best Practices Examples focusing on Sample Size and Reliability Calculations (Version 01.0, Annex 6, EB67) The appropriate sample size was estimated based on ex-ante 10 days measurement campaign. The calculation is reflected in the CER spread-sheet; tab: "90-10 Point A", $COD_{inflow,y}$ = 9 "90-10 Point B", $COD_{ww,treated,PJ,y}$ = 18 "90-10 Point C", $COD_{ww,discharge,PJ,y}$ = 8 To be consistent, 20 samples per-year will be tested annually according to national or international standards. The average of the COD measurement readings will be used. The following text added in updated PDD: *Samples and measurement shall ensure a 90/10 confidence precision level.*	The description in the monitoring plan has been revised. The samples taken once in every two weeks are adequate to achieve the requirement for 90/10 precision level. CL18 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Attachment *<27 03 12 Carotino CER _Version 02.1>* Based on the sampling method; as in Best Practices Examples focusing on Sample Size and Reliability Calculations (Version 01.0, Annex 6, EB67) and (General Guidelines for Sampling and Surveys (Version -1, Annex 30, EB 50 for Small-scale CDM Project Activities), a random sampling method is applicable. The samples will be taken once every two weeks to achieve the statistically representative 90/10 level.	
CL19 Additional of the biomass boiler system in the project activity along with enclosed flare system in project boundary, Section B.3. of PDD version 2.1. However, no justification was made on the changes, the investment analysis was not revised accordingly.	B.5.6.4.	The investment decision for project activity was made based on installation of anaerobic digester system c/w biogas engines and enclosed flare system. The combustion of biogas in biomass boiler and the associated capital cost was not included in the project costing at the time of investment decision making. However, the project proponent might have a future provision to incorporate biogas combustion in new biomass boiler/modify existing biomass boiler with biogas burner. Thus, the biomass	The validation team agreed on the justification that the cost of biomass boiler was not included in the investment analysis based on conservativeness, that any further increase in project cost will deteriorate project equity IRR, and make the project unattractive. CL19 closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		boiler was included in project boundary. The cost related to biomass boiler cannot be added to investment analysis according to the "Guidelines for assessment on investment analysis" as input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant. Additionally inclusion of cost related to biomass boiler will escalate the project capital cost (CAPEX). Thus, with additional CAPEX, the IRR would only go down further. The following text is added in the Section B.3 of PDD version 2.3 to describe further on inclusion of biomass boiler in project boundary: *"The combustion of biogas in the biomass boiler and its installation cost was not accounted in the financial analysis for investment decision. However, the biomass boiler was included within the project boundary as a future provision if the project proponent decides to use biogas in new biomass boiler or modify existing biomass boiler with biogas burner."*	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Attachment: *< Watermech Quotation – COM>* *< Board Meeting - (b) Presentation>* *<28 03 12 Carotino FM - Version 02.1>*	
CL20 In Section B.5, Table B.7 of PDD version 2.2, sensitivity analysis included new parameter: PKS selling price, the PKS price used was not at time of decision making	B.5.6.4	The project activity is designed to generate electricity for mill and downstream uses (default scenario). PKS value and its displacement were not included in the project activity investment decision making. However, a separate additionality analysis was done to evaluate the scenario if there is no electricity generation and all the generated biogas is combusted in the biomass boiler. This will potentially displace palm kernel shell (PKS) utilization and gives sales revenue for the mill. As the mill never sold its PKS in the past, PKS sales price was not available for reference. Carotino mill received a market offer of RM 80/ton for potential PKS sales (15/06/2012). The Financial Model analysis shows that the project activity is not attractive and project is not additional even if all the generated biogas is used to displace PKS.	The validation team confirmed that there was no reference for PKS sales price available during the decision making time since PP never sells PKS. All the generated PKS was kept for internal use for its existing biomass boilers. Based on the public available data price of USD67 (RM213) ton PKS and offer price of RM80 from local market showed that the price was conservative. The validation team also confirmed PKS price against another public reference (Renewable Energy Resources by Anders Evald and others, Integrated Resource Planning, February 2005) was RM70/ton. As the result the PKS price used in sensitivity analysis was acceptable. CL20 closed

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Based on sensitivity analysis, the PKS price will need to increase up to RM 768/ton to hit the benchmark. This is unlikely to happen as the cost is too high for 3rd party purchase and the mill location is isolated. The final sales price of PKS is also determined by transport and handling cost. The available PKS sales prices by mills in the public domains are outdated and the 3rd party sales price by brokers is approximately USD 67 (RM 213) FOB (freight on board) delivery. This clearly shows that the project is not attractive even if PKS sales price increase. The following text is added in the Section B.5 of PDD version 2.3 @ sensitivity analysis discussion: *The combustion of biogas in the biomass boiler and its installation cost was not accounted in the financial analysis for investment decision. However, an additional sensitivity analysis was conducted (with complete financial model) to demonstrate the scenario if there is no electricity generation and all the generated biogas is combusted in the biomass boiler. This will potentially displace palm kernel shell (PKS) utilization and gives sales revenue for the mill.*	

<table>
<tr><th>Draft report clarifications and corrective action requests by validation team</th><th>Ref. to checklist question in table 2</th><th>Summary of project owner response</th><th>Validation team conclusion</th></tr>
<tr><td></td><td></td><td>Table B.7 was updated as following:

<table>
<tr><th>Scenario</th><th>Change at Which Scenario Hits Benchmark</th><th>Percentage Change at Which Scenario Hits Benchmark</th><th>Likelihood of Occurring</th></tr>
<tr><td>Saving from using 100% generated methane to Displace Palm Kernel Shell (PKS)</td><td>PKS cost increase over the years from RM 80 to RM 768</td><td>860%</td><td>It is extremely unlikely that the cost of PKS purchase price will increase by 860% to hit the benchmark as the mill is located in a remote location and this will incur high transportation cost.</td></tr>
</table>

Attachment:
<21 06 12 Carotino FM - Biomass Boiler>
<21 06 12 Carotino_Biogas to Boiler Analysis></td><td></td></tr>
</table>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<Globaltraderesources>	
FAR 1 1) The technology provider will provide training on the operation and maintenance of the installed equipment. PP however needs to verify the training required for each personnel involved. 2) PP to ensure the establishment of the training procedure for the monitoring personnel. 3) PP needs to ensure the availability of day-to-day records handling procedure.		1. The procedures for training on the operation and maintenance of installed equipment will be provided to verification DOE during the 1st Verification. 2. The procedures for training of monitoring personnel will be provided to verification DOE during the 1st Verification. 3. The procedures for handling day-to-day records will be provided to verification DOE during the 1st Verification.	FAR 1 remains open and will be closed during first verification. FAR1 open

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APPENDIX B
AUDITOR'S CERTIFICATE

SIRIM QAS INTERNATIONAL

Sijil
Certificate

This is to certify that

MANSOR SHAH BIN AZIZ

has been qualified as

LEAD AUDITOR
FOR
CDM VALIDATION AND VERIFICATION SCHEME

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure

Sectoral Scopes No.: 3 - Energy Demand

TA 3.1 - Energy Demand

Sectoral Scopes No.: 4 - Manufacturing Industries

TA 4.4 - Refinery

Sectoral Scopes No.: 13 - Waste Handling

TA 13.1 - Waste handling

Parama Iswara Subramaniam
Chairman
Auditor Evaluation Panel
Management System Certification Department
SIRIM QAS International Sdn. Bhd.

Qualification Date : **12 June 2012**

SIRIM QAS INTERNATIONAL

Sijil
Certificate

This is to certify that

AERNIDA ABDUL KADIR

has been qualified as

LEAD AUDITOR
FOR
CDM VALIDATION AND VERIFICATION SCHEME

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure

Sectoral Scope No: 1 – Energy industries (renewable/non-renewable sources)
TA 1.1 – Thermal energy generation from fossil fuel and biomass including thermal electricity from solar (COMPLEX)

TA 1.2 – Energy generation from renewable energy sources.

Sectoral Scopes No: 13 – Waste handling and disposal

TA 13.1 Waste handling and disposal.

Parama Iswara Subramaniam
Chairman
Auditor Evaluation Panel
Management System Certification Department
SIRIM QAS International Sdn. Bhd.

Initial Qualification Date : **13 April 2011**

SIRIM QAS INTERNATIONAL

Sijil
Certificate

This is to certify that

SYED ANUAR SHAH BIN SYED MANSOR

has been qualified as

AUDITOR
FOR
CDM VALIDATION AND VERIFICATION SCHEME

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure

Sectoral Scopes No. : 1 – Energy industries (renewable/non-renewable sources)

TA 1.1 – Thermal energy generation from fossil fuel and biomass including thermal electricity from solar (COMPLEX)

TA 1.2 – Energy generation from renewable energy sources.

Sectoral Scopes No. : 13 – Waste handling and disposal

TA 13.1 – Waste handling and disposal.

Parama Iswara Subramaniam
Chairman
Auditor Evaluation Panel
Management System Certification Department
SIRIM QAS International Sdn. Bhd.

Qualification Date : **16 August 2011**