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Validation Report

Project Title :

Biogas Recovery From Wastewater Treatment In PT Umbul Mas Wisesa Palm Oil Mill

Report No.: SQAS-CDM-EK06970003

Date : 15 April 2015

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Date of first issue: 26 July 2012	**Report No.:** SQAS-CDM-EK06970003
Client: PT Umbul Mas Wisesa	**Project title:** Biogas Recovery From Wastewater Treatment In PT. Umbul Mas Wisesa Palm Oil Mill

Summary:

SIRIM QAS International Sdn Bhd has performed a validation of the "Biogas Recovery From Wastewater Treatment In PT Umbul Wisesa Palm Oil Mill" 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 the anthropogenic methane emissions from the palm oil mill anaerobic effluent treatment lagoons and utilizing it in the biomass boiler for heat and electricity generation. Any excess biogas captured will be destroyed in an open flare. However, the GHG emissions will only be claimed from methane recovery and not from energy generation component. The total emission reductions from the project are estimated to be on the average of 57,640 tCO_2e per year over the selected fixed 10 years crediting period.

The overall validation process, from contract review to the validation report ad opinion was conducted using SIRIM QAS Intl.'s internal procedures. The first output of the validation process was a list of corrective action request, clarification request and 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 PP. The latest version of the PDD[42] is version 08 dated 27 March 2015.

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 title: Validation of Biogas Recovery From Wastewater Treatment In PT. Umbul Mas Wisesa Palm Oil Mill

Work carried out by:

Aernida Abdul Kadir	: Validation Team Leader (since July 2013)
Mansor Shah Aziz	: Validation Team Member (until Jan 2013)

Report Reviewed by: Azhar Abdul Raof

Report Approved by: Parama Iswara Subramaniam

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Abbreviations

AMS	Approved Methodology Small Scale
CAR	Corrective Action Request
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
DOE	Designated Operational Entity
DNA	Designated National Authority
EB	Executive Board
GHG	Greenhouse gas(ses)
GSCP	Global Stakeholders Consultation Process
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of Approval
LSC	Local Stakeholders Consultation Process
MoC	Modalities of Communication
MP	Monitoring Plan
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
VVS	Validation and Verification Standard version 7.0

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1.0 INTRODUCTION

SIRIM QAS International has initially entered into contractual agreement with Knowledge Integration Services (Singapore) Pte Ltd., who was one of the PP prior to the validation of the project "Biogas Recovery From Wastewater Treatment In PT. Umbul Mas Wisesa Palm Oil Mill" (hereafter called "the project activity"). During the validation process, Knowledge Integration Services (Singapore) Pte. Ltd. has withdrawn its participation. The Validation Agreement was then transferred to PT Umbul Mas Wisesa who is also the project participant in the project activity.

This report summarizes the findings of the validation of the project, performed on the basis of CDM Validation and Verification Standard version 7.0 (VVS)[1] 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 Validation and Verification Standard (VVS) 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.

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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
Aernida Abdul Kadir (from July 2013)	√				√	√	√
Mansor Shah Aziz (until Jan 2013)	√				√	√	√

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.

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 C to this Report.

1.4 Technical Reviewer :

Azhar Abdul Raof is a Chemical Engineer by qualification. He has extensive experience in the area of wastewater treatment technology including anaerobic waste treatment processes in various industries. He has been trained in the CDM validation and verification processes, and was qualified as a CDM auditor in accordance with SIRIM QAS Intl.'s qualification criteria. He has also been qualified as technical reviewer for sectoral scope 1 and 13.

2.0 METHODOLOGY

SIRIM QAS International's 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 prepared for the project according to the VVS[1] validation requirements. 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 completed validation protocol is enclosed in Appendix A of this report.

During the validation, non-fulfillment of the validation protocol criteria or identified risks to the fulfillment of project objectives were raised as either CAR or 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.

2.1 Document Review of PDD and Other Documents

The first PDD version[/2/] submitted by the project participant and additional backgrounds documents related to the project design and baseline were reviewed as an initial step of the validation process.

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

Main changes between the version published for the 30 days stakeholder commenting period and the final version submitted for registration are as follow:

i) Knowledge Integration Services (Singapore) Pte Ltd has been removed as project participant;
ii) Changed from option 1(e) to option 1(f) of the AMS-III.H. version 16.
iii) Land application to discharge to the river in the project description and project boundary of tertiary treatment process in accordance to AMDAL report.
iv) Boiler specification where a co-fired boiler which will be installed that can use both biomass and biogas as fuel.
v) Changed of start date of the crediting period to 6 January 2015 (i.e. the expected operational start date of the project activity).
vi) Changed of contact person in Annex 1.
vii) PDD changed to VVS documentation

2.2 Follow-up interviews

SIRIM QAS Intl. conducted visits to the project site from 10 January 2012 to 12 January 2012 to confirm the 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
K. R. Raghunath	Knowledge Integrated System (Singapore) Pte. Ltd.	• General information about the project & the PDD • Financial Analysis, Project barriers and additionality • Stakeholder consultation • Baseline determination • Training requirement • Monitoring and management • Project planning and design • Potential risk and emergency

		procedure • Relevant legal approvals • Environmental impact and sustainable development
Rahul Kar	KPMG, CDM Consultant	• CDM early consideration • Baseline determination • Monitoring and management • Operation and maintenance procedures Training requirements • Equipment specifications • Approvals from authority, calibration and maintenance requirements for the equipment
Hasan Ansari Halim Suprianto Atai Rin Tambunan	Engineering Manager, PT. Umbul Mas Wisesa Local contractor Local village representative Local village representative	• 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, three (3) CARs and twelve (12) CLs 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 detail in Table 3 of the Validation Protocol in Appendix A. All the corrective actions have been incorporated into the PDD (version 08) and ER calculation spreadsheet (dated 27 March 2015).

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 and the final 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.

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3.0 VALIDATION FINDINGS

3.1 Participation requirements

The project participant is PT Umbul Mas Wisesa of Indonesia. Indonesia ratified the Kyoto Protocol on 3 December 2004. The ratification date to Kyoto Protocol was further confirmed in the UNFCCC website. http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php.

The Letter of Approval (LoA) from the DNA of Indonesia/7/ was issued on 6 March 2012 and was provided to the validation team by the PP. The validation team had further obtained confirmation through emails/40/ from the representative of the DNA of Indonesia on the issuance of LoA. The validation team does not doubt the authenticity of the LoA.

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

- Indonesia is party to the Kyoto protocol;
- Indonesia participates voluntarily in this proposed CDM activity;
- the project proposed is in compliance with the national criteria for the CDM activities and will assist Indonesia to achieve sustainable development;
- 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 39 to 52 of the VVS version 7.0.

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

3.2 Modalities of Communication

A revised statement of Modalities of Communication (MoC)/41/ with the EB and UNFCCC secretariat has been issued and signed by an authorized person of PT Umbul Mas Wisesa dated 10 December 2014. The MoC was using the latest template version 02.1 and it has clearly defined the responsible parties for communicating with EB and UNFCCC regarding the issuance of CER of the proposed CDM project.

The MoC was validated as per paragraph 54(b) of the CDM VVS as the PP was also the signatory party to the CDM project agreement – Deed of Novation made with SIRIM QAS. It can be confirmed that this MoC addressed the requirement of paragraph 59 and 60 of the CDM VVS.

3.3 Project Design Document

The project document uses the latest CDM-PDD-SCC-FORM version 5 which is currently applicable. The corresponding sections of the PDD were correctly filled and followed the guidelines specified in CDM-PDD-SCC-FORM version 5.

3.4 Description of Project Activity

The proposed project activity is a Greenfield palm oil mill located at Labuhan Batu, North Sumatra, Indonesia. The GPS coordinates of the project activity which have been confirmed during the on-site validation, are 2°12'50.55"N and 100°16'15.14"E. These coordinates have been cross checked with the http://mapper.acme.com/[18a] and was found to be correct.

The Greenfield palm oil mill is owned by PT. Umbul Mas Wisesa ("UMW"), and is expected to be fully operational in the second half of 2013. The palm oil mill has been designed to process 65 tonnes/hour of fresh fruit bunches (FFB).

The processing of fresh fruit bunches (FFB) into crude palm oil and palm kernels, will generate large amounts of organic rich wastewater known as the palm oil mill effluent (POME) which is commonly treated in the open anaerobic lagoon 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 open lagoons 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 recovered biogas will be combusted together with other biomass (such as palm kernel shell and fibre) in a boiler in the palm oil mill and any excess biogas will be flared in an open flare system. The use of biogas for energy generation is not considered as a part of the proposed CDM project activity.

The proposed project activity will involve the installation of a sequential stage of anaerobic wastewater treatment system with biogas recovery. The technology used in the project activity comprises of pre-treatment, closed tank anaerobic digester and downstream treatment system. In the pre-treatment, the POME will be stabilized, cooled down and the suspended solids and emulsified oil will be removed from the POME. The pre-treated POME will then be channelled to the anaerobic digester tank where the COD content will be reduced. The digester will be equipped with biogas recovery system to recover the generated biogas. The POME discharged from the digester will be further treated in the downstream treatment system which comprises of aerobic treatment processes. The final treated POME from the treatment plant will be discharged to the nearest river about 3km away from the mill site.

The recovered biogas will be combusted together with biomass in a boiler in the palm oil mill. Any excess of the recovered biogas will be flared in a controlled manner in an open flare. The sludge generated from the digestion process will be used for land application under aerobic condition.

The specification of the anaerobic digester tank to be used in the project activity is as follows:

Model	: LESAR reactor
Digester type	: Continuously Stirrer Tank Reactor
Volume	: 8,495 m^3
Hydraulic retention time	: 10.89 days (780 m^3/day)
Operating temperature	: 36-39^oC
Design COD removal efficiency	: 85 %
Operational lifetime	: 20 years

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 CO_2e 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 funding for the project does not lead to a diversion of official development assistance (ODA). ODA does not contribute to the financing of the project. The validation team had verified that the project is internally financed.

Expected operational lifetime of the project activity is 20 years. This was based on the technical description provided by the technology provider PT. Knowledge Integration Services dated 24 November 2011/20/.

In accordance with paragraph 65 of the VVS, 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, one CAR (CAR 2) and one CL (CL 9) were raised as follow:

- CAR 2 was raised on the description of the final discharge included in the PDD is not correct i.e. not consistent with that described in AMDAL report/32/.
- CL 9 was raised on the information of boiler used for methane destruction.

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

3.5 Baseline and Monitoring Methodology

The baseline and monitoring of this project activity was based on the following approved methodology, guidelines and tools:

(i) AMS-III.H. (version 16): "Methane recovery in wastewater treatment"/3/
(ii) General Guidelines to SSC CDM methodologies (version 20)/5a/
(iii) Project emissions from flaring (version 2)/4a/
(iv) Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 2)/4/
(v) Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 1)/5/

3.5.1 Applicability of the Selected Methodology

The project activity will involve the installation of a Greenfield anaerobic digester wastewater treatment system, which will be built in parallel with a new palm oil mill. The validation team has validated the applicability of methodology AMS-III.H. to the project activity as follow:

Para. No.	AMS-III.H. Applicability Requirements	Project activity
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;	The validation team confirmed that the project fulfills criteria in option (f). Since methodology AMS-III.H. allows for Greenfield projects, the validation team infers that option (f) includes projects that seek to introduce an additional sequential stage of wastewater treatment with biogas recovery

	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 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).	and combustion to a planned anaerobic wastewater treatment system whereby in the baseline scenario such additional treatment would have been absent. In the absence of the project activity, the baseline scenario is the open anaerobic lagoons to treat the POME through following the steps as prescribed in paragraph 31-36 of the General Guidelines to SSC CDM Methodologies[/5a/], requirements pertaining to Greenfield projects. The scenario is also described in a publication[/11a/] which mentioned that the best option to treat POME is the open anaerobic lagoons system.
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. 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.	This is a Greenfield project. The most plausible baseline scenario is an open lagoon treatment system based on the commonly practice of the treatment in palm oil industry in the region[/11a/]. Based on the publicly available article in Pipeline Journal publication[/10/] the typical depth of an anaerobic lagoon is about 2.4 to 4.6 metres. The ambient temperature in Labuhan Batu was estimated using the average temperature of the nearest major city (i.e. Medan). The average annual temperature in this area is 26.2°C[/9/]. Taking into the consideration of the required manpower to carry out de-sludging, the typical interval between two consecutive sludge removal events will be more than 30 days. This was also supported by the Pipeline Journal Publication[/10/] which mentioned that the lagoons were able to properly function without sludge removal for up to 5 to 10 years.
3	The recovered biogas from the above measures may also be utilised 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; or c. Thermal or mechanical, electrical energy	Based on the review of the design detail of the UMW Project Technology[/28/], the validation team confirmed that the the recovered biogas will be combusted in a boiler for energy generation and any excess biogas will be flared in an open flaring system. Although the recovered biogas will be utilized for energy generation, it will not be

	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; 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.	claimed under Type I methodology. It was not included in the calculation for emissions reduction.
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.	Type I is potentially applicable as the biogas will be used to generate steam. However, the PP will not claim any emission reductions from this energy generation.
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.	This project is a Greenfield project that aims to introduce an additional sequential anaerobic treatment with methane recovery to a proposed open anaerobic lagoon system for treating POME. This project activity complies with the "General guidelines to SSC CDM methodologies". The determination of plausible baseline scenario was presented in section B.4. The validation team confirmed through visit to the proposed project site, review of the PDD, interview with the project participant and technology provider, and the review of the project design detail that the project does not involve a change of equipment resulting in capacity addition of the wastewater or sludge 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 proposed mill which serves as the source of the wastewater and the wastewater treatment system has been defined in section A.2.4 of the PDD.
14	Measures are limited to those that result in aggregate emissions reductions of less than or equal to 60,000 tCO2e annually from all Type III components of the project activity.	The project activity is confirmed to be a type III small scale CDM activity with expected annual emission reductions of 57,640 tCO2e per year during the crediting period.

Paragraphs 5 to 11 of the methodology were not applicable as it was confirmed through the site visit and review of the documents that the project does not involve any bottling of biogas. The project activity is new and does not result in any capacity addition of the wastewater or sludge treatment system and the project activity does not involve any distribution of methane via a dedicated piped network to a group of end users.

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 74 to 76 of VVS (version 7.0).

In this section, two CLs (CL 2 and CL 3) were raised as follow:

- CL 2 was raised on the applicability justification to fulfilled paragraph 1 of the methodology for Greenfield project activity.
- CL 3 was raised for explanation to justify the relations of paragraph 28(2)(b) of the methodology to the project activity.

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

3.5.2 Project Boundary

As per paragraph 15 of 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 figure 4 section B.3 of the PDD[/42/] is correct. The project boundary was assessed through physical site inspection, interviews with the project participant and the technology provider, and the evidence received on the design of the project[/28/]. Based on the information provided and reviewed, it can be confirmed that the defined project boundary was found to be in accordance with paragraph 15 of the AMS-III.H. version 16.

The project boundary includes anaerobic digester system, the biogas capturing system, combustion of the biogas in the boiler and the open flare system. Detail schematic diagram of the project boundary is delineated in Figure 4 of the PDD. The project boundary does not include the downstream aerobic treatment prior to discharge as land application in nearby plantation since it is the same in baseline and project scenario.

3.5.3 Baseline Identification

Since the project activity is Type III Greenfield project activity, PP has adopted requirements of paragraph 31 to 36 of the 'General Guidelines to SSC CDM methodologies'[/5a/] to determine the most plausible baseline scenario for the proposed CDM project activity. The following steps were taken:

Step 1: Identify the various alternatives available to the project proponent that deliver comparable levels of service, including the proposed project activity or PoA undertaken without being registered as a CDM project activity or PoA.

Below is the list various alternatives available to PP including the proposed project activity undertaken without being registered as a CDM project activity. The validation team has reviewed and accepted the alternatives. The comparable level of service was defined as 85% COD removal efficiency as per specification of the technology (i.e. anaerobic digester in the CDM project activity)[/28/].

Alternative #	Scenarios	Remarks
1	Use of open anaerobic lagoons for wastewater treatment without methane recovery	It is the most commonly adopted treatment system in most of the palm oil mills and can generally achieve COD removal efficiency of more than 85%/23b/.
2	Use of anaerobic lagoons with sealed covers for wastewater treatment	It is confirmed that the alternative can generally achieve COD removal efficiency of more than 85%/23//23b/.
3	Use of series of aerobic lagoons for wastewater treatment	It is agreed that this is not feasible alternative as POME's organic-loading is too high for direct aerobic treatment/11/.
4	Use of aerobic wastewater treatment using activated sludge	It is agreed that under optimal controlled conditions, the activated sludge system can achieve COD removal efficiency of 89%/21/.
5	Anaerobic digester without methane recovery	It is confirmed that the alternative can generally achieve COD removal efficiency of more than 83-95%/19/.
6	Anaerobic digester with methane recovery but not registered as CDM project	It is confirmed that the alternative can generally achieve COD removal efficiency of more than 83-95%/19/.

Alternative 3 is agreed to be eliminated due to the fact that aerobic lagoons could not treat the high organic content of POME. The remaining Alternative #1, 2, 4, 5 and 6 were evaluated in the next step.

Step 2: List the alternatives identified in Step 1 that are in compliance with local regulations. If any of the identified baselines is not in compliance with local regulations, then exclude that alternative from further consideration).

The compliance status of the alternatives is checked, where those alternatives which are non-compliance are to be eliminated. It has been confirmed through the review of the CDM Country Guide for Indonesia – Laws and Regulations/43/, that there is no legal framework, laws or regulations that specified the type of treatment or technology to process the POME. Further to that, all of the remaining alternatives is able to treat the POME and meet the local regulations. As such, it can be concluded that Alternative #1, 2, 4, 5 and 6 were in-compliance with the applicable laws and regulations of the host country.

Step 3: Eliminate and rank the alternatives identified in Step 2 taking into account barrier tests specified in the "Guidelines on the demonstration of additionality of small-scale project activities"/5c/.

In accordance with paragraph 1 of the Guidelines on the demonstration of additionality of small-scale project activities/5c/, the project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers: investment barrier, technological barrier, barrier due to prevailing practice and other barrier. The summary of barriers faced for each alternatives as discussed in the PDD were tabulated as follows:

NO. 1, PERSIARAN DATO' MENTERI, SECTION 2,
40700 SHAH ALAM, SELANGOR DARUL EHSAN
MALAYSIA
Tel.: 603-55446479
Fax: 603-55445673
www.sirim-sqas.com.my

Alternative #	Type of barrier			Remarks
	Investment	Technological	Prevailing practice	
1	-	-	-	Low capital and operating cost, best option to treat POME[/11a/], cost effective technology[/23/], comply with the limit of final discharge stipulated by the regulatory body[/11a/]. Apart from the above, the CDM Country Guide for Indonesia – Laws and Regulations[/43/], has confirmed that there is no legal framework or policy that can prevent PP to opt for high emission treatment system as in this Alternative #1.
2	√	-	√	Several project activities that applied this alternative had been registered as CDM project[/13-18/] which indicate that the alternative is feasible. However, this alternative involved higher investment in the installation of the sealed cover, and faces problems relating to the maintenance of the sealed covers due to weather; and wear and tear.
4	√	√	-	High capital, operating and maintenance cost. . The alternative also faces microbiological problems in activated sludge operation[/21/] which may cause failure in the treatment system.
5	√	√	-	Higher capital and operational cost as compared to Alternative #1[/24a/]. It faced risk of breakdown due to the complexity in handling different types of bacteria in the methanogenesis process[/44/]. Further to that an additional safety measures are required in the handling of highly flammable biogas and the presence of hydrogen sulphide in the biogas[/24/].
6	√	√	-	Alternative 6 faces the same barriers as Alternative 5.

Based on the validation team experience in the palm oil mill, and the reviewed documentations, it has been confirmed that Alternatives #2 to #5 faced at least one of the barriers. This information was also indicated in the referred guidelines[/5c/]. In accordance with the CDM Country Guide for Indonesia – Fiscal and Financing Issues[/43/], there is a noteworthy risk in financing CDM potential projects which proved that the investment barrier is real in the host country. With the limited financing institutional, CERs generated income becomes an importance factor with significant impact to the potential financer i.e. private banks, private investors, and insurers; while considering the investment required. With all the information, it is agreed that Alternative 1 is the most plausible baseline scenario as it does not faced technological barriers and low investment cost. Alternatives 2, 4, 5 and 6 are not plausible baseline scenarios for the project activity due to lack of incentive, high capital cost and high level of anticipated technological risks. In addition, the absence of policy encouraging methane recovery technology will prevent project owner from selecting this option, thus avoiding higher cost and technological risk incurred.

Step 4: Comparison of baseline emission of remaining alternatives

Elimination process in Step 3 has resulted in Alternative #1 as the only alternative remains. Alternative #1 – Use of open anaerobic lagoons for wastewater treatment without methane recovery, is the best option POME treatment system, the most economical as it requires minimum maintenance cost and complied with the applicable laws and regulations of the host country. It can also be confirmed that this is the only alternative that needed the least investment and faced

minimum technological barriers in comparison with the others.

In accordance with the requirement given in the General Guidelines for SSC CDM Methodologies[/5a/], the remaining alternative;
(a) is not the proposed project activity undertaken without being registered as a CDM project activity; and
(b) corresponds to the baseline scenarios provided in the methodology i.e. AMS-III.H. version 16, anaerobic lagoon has been stated as the baseline system.

Therefore, it can be concluded that the most plausible baseline is the "Installation of open anaerobic lagoons for wastewater treatment without methane recovery".

3.6 Additionality

The project additionality has been demonstrated through:

- demonstration of prior consideration of CDM and continuing actions to secure CDM status, as per Guidelines on the demonstration and assessment of prior consideration of the CDM.
- Guidelines on the demonstration of additionality of small-scale project activities.

During the validation process, five (5) CLs were raised as follow:

- CL 3 was raised on the applicability of paragraph 28 (2) (b) on the linkages of the top 20% of registered CDM project with similar or identical plant and with the lowest emission reduction rate per ton COD removal.
- CL 5 was raised on additional information needed on the link to the UNFCCC registered project for Alternative #2 – Installation of anaerobic lagoons with sealed covers for wastewater treatment.
- CL 6 was raised on the inclusion of Alternative #5 – Anaerobic digester without methane recovery and Alternative #6 – Anaerobic digester with methane recovery but not registered as CDM project with the reference of journal for the investment barrier.
- CL 7 was raised on inclusion of the references on technological barrier for Alternative #2 – Installation of anaerobic lagoons with sealed covers for wastewater treatment.
- CL 8 was raised on referred footnote 19; the journal on Agricultural Anaerobic Digestion.

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

3.6.1 Prior Consideration of the CDM

The starting date of the project activity was taken as 10 February 2011, following the date of letter to proceed with the execution of the project[/31/]. With the issuance of the letter, the PP had committed to expenditures related to the implementation of the project. Hence, the starting date was in accordance with the "Glossary of CDM Terms"[/5b/].

In accordance with the CDM EB "Guidelines on the demonstration and assessment of prior consideration of the CDM", the project activity is categorized as a "new project activity" which requires project participant to notify the UNFCCC secretariat and the host country DNA in writing of their intention to seek CDM status. The project participant had notified the UNFCCC Secretariat and the DNA of Indonesia of the intention to start a CDM project through an email dated 21 February 2011[/27/27a/]. The notification was also available at the UNFCCC website http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html. The records of this communication were made available to the validation team. The notification was made within six months of the project activity start date.

With the above justification, the validation team concluded that the project activity conforms to the requirement defined in the referred guideline and fulfilled the requirement under paragraph 112 of the VVS.

3.6.2 Barrier Analysis

Investment barrier

As reported and justified through Step 3 in the baseline identification process (addressed in Section 3.5.3 of this report), the installation of an open anaerobic lagoons is the best option for POME treatment system with the most economical as it requires least investment with minimum maintenance[/11a/]. This is considered as the opposite of the project activity which required high capital investment for the installation of an anaerobic digester system equipped with methane recovery system. As reported in the CDM Country Guide for Indonesia – CDM Cost Components[/43/], the typical average of CDM cost component for a CDM project in Indonesia will be at EUR150000. Referring to the same guide under section of Fiscal and Financing Issues, it was also reported that there are noteworthy risks in financing CDM potential projects hence, according with paragraph 125 of the VVS, this is a barrier related to the unavailability of sources of finance for the project activity and it proved that the investment barrier is real in the host country.

With the limited financing institutional and the identified financial risk by the host country, it would have been preferable for the PP to go for a financially more viable alternative which is maintaining the existing baseline scenario against the project activity. This option is deemed preferred although the implementation of the baseline will definitely led to higher emissions. Therefore, it can be concluded that due to the investment barrier, implementation of the project activity would have been prevented.

Technological barrier

It has been reported in academic presentation titled "Ponding System for Palm Oil Mill Effluent Treatment"[/23a/] that the anaerobic ponding system has been:

- proven to be stable, absorbing well widely fluctuating organic contents in POME,
- simple and practical method for POME treatment,
- operation is easy, requiring little skill and maintenance.

It was also described in the "Industrial Processes and The Environment (Handbook no.3) Crude Palm Oil Industry – Treatment Technologies for Palm Oil Mill Effluent"[/23b/] that;

- the energy requirement of the anaerobic-facultative lagoon system is minimal where gravity flow is exploited throughout the system,
- limited pumping is needed mainly for sludge transfer only,
- a part-time attendant is sufficient to maintain the treatment system.

The anaerobic ponding treatment method requires less technology advanced and the implementation would have led to higher emission reductions as compared to the project activity but it has been established that there is no particular barriers that prevents the continuity of the existing open lagoons system.

It is agreed that the performance of anaerobic digester is complex and uncertain[/43/]. There are many variables or factors (e.g. temperature, pH value, retention time, COD load of wastewater and etc) that will affect the growth and activity of the bacteria. These may affect the methanogenesis process in the anaerobic digester[/23/]. It is agreed that improper operation of the digester and incorrect application of chemical substances would lead to the collapse or underperformance of the reactor system and could lead to high COD at discharge point. PP has to design and introduce controls of the digester parameters to provide best conditions for the bacteria.

The introduction of anaerobic digester system will contain or keep the generated biogas in the tank and pipeline. Apart from methane[/], there will also be hydrogen sulphide (H_2S) in the biogas. The accumulation in high concentration of these two gases is highly hazardous[/24/]. Leakage in the piping and distribution system might lead to catastrophic consequences. PP has to construct the gas storage and piping system in accordance to the high standard of engineering practice.

It is expected from the registration of the project as a CDM project activity will alleviate the barriers from the CER revenue. It is also expected from this CER revenues PP will recover the capital cost for the project as well as the operation and maintenance cost. The unavailability of skilled labour could be overcome by engaging experience engineering to handle the maintenance of the project activity. Therefore, it is agreed that the revenues from the CER will alleviate the barriers and allow the implementation of the project activity.

Barrier due to prevailing practice
Currently, the use of open lagoon system to treats POME from the palm oil mills was widely applied in Indonesia and the neighboring countries like Malaysia and Thailand. It has been confirmed through the CDM Country Guide for Indonesia that there is no legal framework, laws or regulations that specified the type of treatment or technology to process the POME. As it has also been proven that the baseline method i.e. the open lagoon system is able to comply with the final discharge limit as discussed in the PDD. Hence, because of these reasons there is no barrier for the continuity of the baseline scenario. Even with lower emissions and provides cleaner environment, the implementation of the project activity would have been less ideal option.

Other barrier
As mentioned above, although the quality of POME discharged from palm oil mills is regulated, it has been confirmed via CDM Country Guide for Indonesia that there is no legal framework, laws or regulations that specified the type of treatment or technology to process the POME. So, as the existing open lagoons system is able to comply with the final discharge limit, There is no need for the PP to consider any other type of treatments.

In accordance with paragraph 126 of the VVS, it has been confirmed that the presented barriers namely investment barrier, technological barrier and prevailing practice due to existing regulatory were real. These barriers prevented the implementation of the project activity. However, PP has no restriction to continue implementing the identified baseline scenario which is the existing open lagoons system with no methane recovery. With this, it can be concluded that the project activity is additional.

3.7 Monitoring Plan

The monitoring plan presented in the PDD conforms to the approved baseline and monitoring methodology AMS-III.H. version 16[/3/]. The validation team has confirmed that all parameters as required by the methodology have been correctly presented in the monitoring plan and no deviation relevant to the project activity was 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.
$\eta_{COD,BL,i}$	85%	The 85% has been provided by the manufacturer of the project activity and applied as the COD removal efficiency of this project. The validation team has accepted this value as PP had clearly demonstrated that this value is in accordance with paragraph 28 (2)(b) of AMS-III.H. version 16. Further to that, PP has analysed all of the CDM registered projects of similar nature with the project activity in Indonesia i.e. biogas capturing in palm oil mill effluent in Indonesia, within the 5 years period before December 2011 The analysis is as demonstrated in Appendix 4 of the PDD. The emission rate per ton COD removed among these plants was determined based on the information available in the registered PDDs. From the total listing, PP had only selected the project which is within the COD values ranging between ± 20% of the COD value of the project activity. This is found to be acceptable since it will reflect similarity with the project activity. In accordance with para 28(2)(b) of AMS III.H, the lowest emission rate per ton COD removed among the plants installed was selected. In this case project with ref, no. 3702 was chosen. This project has the COD removal efficiency of 87.13%. For this project activity, the manufacturer of the project activity had provided a value of 85%. Hence, based on the comparison with project 3702, and following para 28 (2)(b) of AMS-III.H. version 16, the validation team agreed that PP had demonstrated the value applied of 85% is conservative.
$\eta_{COD,PJ,j}$	85%	COD removal efficiency of the project activity. The COD removal efficiency is obtained from the manufacturer of the anaerobic digester./28/
$B_{0,ww}$	0.25 $tCH_4/tCOD$	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.
$MCF_{ww,treatment,PJ,k}$	0.8	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.
$MCF_{ww,PJ,discharge}$	0.1	Methane correction factor of baseline and project wastewater treatment system discharge to the river.

		Default value specified in in Table III.H.1 of AMS-III.H. version 16 is used.
GWP_{CH4}	25 tCO_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.
$EF_{EL,j,y}$	1.3 tCO_2/MW	Emission factor for electricity generation for source *j* in year *y,* where *j* is the source of electricity consumption in the project[5]
η_{flare}	0.5 if flare is detected for at least 20 minutes during an hour and = 0, if otherwise	Flare efficiency determine as per Tool for flaring[4]
R_u	8,314 $Pa.m^3/kmol.K$	Universal ideal gas constant as per Tool for flaring[4]
MM_i	16.04 kg/kmol	Molecular mass as per Tool for flaring[4]

The validation team confirmed that the COD removal efficiency for the baseline and the project activity which has been provided by the manufacturer is appropriate. Other values for the identified parameters were either chosen from IPCC default values and default values from Table III.H.1 of AMS-III.H. version 16. The justification on the use of the values were validated and found to be appropriate, transparent and conservative.

3.7.2 Parameters Determined Ex-Post

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

- Volume of untreated wastewater entering (inflow) the anaerobic digester in project activity, $Q_{ww,i}$, m^3/month
- Chemical Oxygen Demand of the wastewater entering the Anaerobic Digester, $COD_{untreated,i,y}$, tCOD/m^3
- Chemical oxygen demand of the treated wastewater leaving the anaerobic digester, $COD_{ww,treated,y}$, tCOD/m^3
- Chemical oxygen demand of the treated wastewater discharged into the sea, river or lake in the project scenario in year *y,* $COD_{ww,discharge,PJ,y}$, tCOD/m^3
- The final sludge produced from the project system will be applied as land application
- Methane content in the biogas, W_{CH4},y, %
- Biogas flared/combusted, BG_{burnt}, m^3/year
- Flare efficiency, $\eta_{flare,h}$, percentage
- Volumetric fraction of greenhouse gas *i* in a time interval t on a dry basis, $v_{i,t,db}$, m^3 gas i/m^3 dry gas
- Volumetric flow rate of the gaseous stream in time interval t on a dry basis, $V_{t,db}$, m^3 dry gas/h
- Flame detection of flare in the minute m, $Flame_{,m}$
- Quantity of electricity consumed by the project activity consumption source in year *y,* $EC_{PJ,y}$
- Temperature of the gaseous stream in time interval t, T_t, K
- Pressure of the gaseous stream in time interval t, P_t, Pa

- Average technical transmission and distribution losses for providing electricity to source, $TDL_{i,y}$

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. The monitoring was as provided in AMS-III.H version 16.

The procedures relating to the monitoring system were reviewed by the validation team through document review and interviews with relevant personnel. This information together with a physical inspection to the project site allowed the validation team to conclude that the proposed monitoring plan defined in the PDD was feasible within the project activity and that 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. The parameters defined above will allow the calculation of the baseline and project emissions in a proper manner. In the project assessed, leakage emissions are expected not to occur.

In this section, three CLs were raised as follow;

- CL 10 was raised on the calibration requirement in the QA/QC section of data to be monitored.
- CL 11 was raised on the method used on analysis of COD samples (internal lab with method used, frequency, etc.) and cross checking with the external accredited lab.

- CL 12 was raised on monitoring of energy consumed by project activity in accordance with paragraph 9 of the methodology.

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

3.8 Calculation of 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 the emission reductions is in accordance with methodology AMS-III.H version 16. The formulae used in the calculations of the emission reductions were correct and have been transparently documented in the UMW ER Excel Sheet[6].

The parameters and equations presented in the PDD and further documentation were compared with the information and requirements presented in the methodology and respective tools. The equation comparison was made explicitly following all the formulae presented in the spreadsheet. 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. Detailed information on the validation of the parameters used in the equations can be found in Appendix A.

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:

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

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	Justification
$BE_{power,y}$	Not applicable as in the *ex-ante* baseline emissions calculation, BE_{power} is considered negligible.
$BE_{ww,treatment,y}$	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.
$BE_{ww,discharge,y}$	Not applicable as the baseline scenario involves well-managed wastewater discharge to the river.
$BE_{s,final,y}$	Not applicable as under the most plausible baseline scenario, sludge is used for land application under aerobic condition.

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 as follow :

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

Where,

$Q_{ww,i,y}$	is the volume of wastewater treated in baseline wastewater treatment system i in year y (m^3).
$COD_{untreated,i,y}$	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 25)

The key data used in calculations of the *ex-ante* baseline emissions are as below table. For full details refer to Section B.6 of PDD.

Parameter	Value	Justification of values applied
$Q_{ww,\,i,y}$	284,700 m^3/year	*Ex-ante* estimation in the PDD, design wastewater generation volume of the project activity[23].
$COD_{untreated,i,y}$	0.0650 tonnes/m^3	Design value from third-party consultant (Global Palm Consultancy Sdn Bhd) for the palm oil mill[23].
$\eta_{COD,BL,i}$	85%	Justification as provided in Section 3.7.1 of this report.

Apart from values provided by the manufacturer of the project activity i.e. Global Palm Consultancy Sdn Bhd., the 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 BE_y which was calculated as:
BE_y (tCO_2e) = $BE_{ww,treatment,y}$
= 69,997 tCO_2e

3.8.2 Project Emissions

All aspects related to direct and indirect project emissions have been taken into consideration in the calculation. It was confirmed during the site audit that all aspects of direct PE have been included in the calculation with relevant GHG i.e. CH_4 and CO_2 and its sources, wastewater from palm oil mill were evaluated.

As per paragraph 29 of AMS-III.H. (version 16), the project activity emissions from the systems affected by the project activity is calculated using the following formula:

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

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).
$PE_{biomass,y}$	Methane emissions from biomass stored under anaerobic conditions which would not have occurred in the baseline situation (tCO_2e).

$PE_{flaring,y}$ Methane emissions due to incomplete flaring (tCO_2e).

Applicability of project emissions

Emissions	Justification
$PE_{power,y}$	Applicable as in the project activity. However, since the main source of the electricity for the auxiliary equipment will be from the steam turbine generated from the boiler that uses the biogas and biomass, the *ex-ante* estimation was considered as zero. For *ex-post* the actual monitoring will be carried out in case electricity is generated by back-up generator is used.
$PE_{ww,treatment,y}$	Not applicable as the project is a Greenfield project.
$PE_{s,treatment,y}$	Not applicable as the project activity does not involve any sludge treatment system.
$PE_{ww,discharge,y}$	Applicable as in the project activity, the treated wastewater going to be discharged to the nearby river.
$PE_{s,final,y}$	Not applicable as in the project activity as the sludge will be used for land application under aerobic condition in the nearby plantation.
$PE_{fugitive,y}$	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 for flaring[/4/] for an open flaring system.
$PE_{biomass,y}$	Not applicable as no storage of biomass involved in the project activity.

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

$$PE_y = PE_{power,y} + PE_{ww,discharge,y} + PE_{fugitive,y} + PE_{flaring,y}$$

The calculations were found documented in a complete and transparent manner, and parameters validated as following:

Parameter (unit)	Value	Description	Justification of value applied
$Q_{ww,y}$	284,700 m^3/year	Amount of wastewater to be treated in the wastewater treatment system equipped with biogas recovery	*Ex-ante* estimation in the PDD, design wastewater generation volume of the project activity[/23/].
$COD_{ww,discharge,PJ,y}$	0.00035 tCOD/m^3	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the project situation in the year y (t/m^3).	Based on the wastewater discharge standards applicable[/32/] in the region of the project activity (where discharge is to a river).
$COD_{removed,PJ,y}$	0.05525 t COD/m^3	The chemical oxygen demand removed by the project wastewater treatment system (System-biogas) which is equipped with biogas recovery digester in year y.	Calculated based on the COD removal efficiency of the project activity, given by the technology provider.

$MCF_{ww,PJ,discharge}$	0.1	Methane correction factor for the project wastewater treatment system k equipped with biogas recovery equipment	Default value as per AMS-III.H. (version 16) Table III.H.1. discharge to river
CFE_{ww}	0.9	Capture efficiency of the biogas recovery equipment in the wastewater treatment systems	Default value as per AMS-III.H. (version 16) Table III.H.1.
$MCF_{ww,treatment,PJ,k}$	0.8	Methane correction factor for the project wastewater treatment system k equipped with biogas recovery equipment	Default value as per AMS-III.H. (version 16) Table III.H.1.

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[/6/] was found accurate with correct formula accordingly.

The *ex-ante* PE_y result as calculated is as follows:

$$PE_y\ (tCO_2e) = PE_{power,y} + PE_{ww,discharge,y} + PE_{fugitive,y} + PE_{flaring,y}$$
$$= (678 + 70 + 8{,}809 + 2800)\ tCO_2e/yr$$
$$= 12{,}357\ tCO_2e/yr$$

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.

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[/6/]. 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 :

$ER_{y\ ex\ ante} = BE_{y\ ex\ ante} – (PE_{y\ ex\ ante} + LE_{y,\ ex\ ante})$
$= 69,997\ tCO_2e – (12,357\ tCO_2e + 0\ tCO_2e)$
$= 57,640\ tCO_2e$

This estimated emission reductions will be imposed over a fixed 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.

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

i) the amount of biogas recovered and fuelled or flared (MD_y) during the crediting period, that is monitored ex post;
ii) *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 (tCO2e)
$BE_{y,ex\text{-}post}$	Baseline emissions calculated using ex post monitored values (tCO2e)
$PE_{y,ex\text{-}post}$	Project emissions calculated using ex post monitored values (tCO2e)
MD_y	Methane captured and destroyed/gainfully used by the project activity in year y

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), 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 boiler, an efficiency of 100% is to be applied

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

In this section, one CL (CL6) was raised as follow:

- CL 6 was raised on the use of 65,000 ppm of COD_{inlet} to ensure that emission reduction calculation was conservative and falls under small scale emission reduction limit.

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

3.9 Environmental Impacts

The environmental approval for the project activity along with that of the palm oil mill and plantations was obtained as a common and combined approval on 31 December 2008[/32/]. There is no requirement for an EIA for the biogas project by the host country. However, PP has conducted an environmental impact assessment as evident in the AMDAL[/32/] report. In the report PP has identified a number of significant environmental impacts from the operation of palm oil mill where the project activity is located. These include the impacts to the air quality, water quality, noise generation, soil fertility and biodiversity. In anticipation of any environmental impact that may arise from construction and post-construction (operation) of the project activity, PP has developed action plan for monitoring and management as documented in Environmental Monitoring Plan (RPL) and Environmental Management Plan (RKL).

PP had obtained environmental approval for the entire palm oil plantation and palm oil mill project including the proposed CDM project activity on 31 December 2008.

During the validation process one (1) CAR was raised as follow:

- CAR 3 - was raised on statements in section D of the PDD which was not in accordance to AMDAL report[/32/].

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

3.10 Crediting Period

The PP had selected a fixed ten (10)-years crediting period starting from 6 January 2015 or on the date of registration of the project activity, whichever is later.

During the validation process, one CL (CL 4) was raised as follow:

- the start date of the crediting period indicated in the PDD was 31 August 2012. However, according to the project schedule, the commissioning date of the plant will be in June 2013.

Details of the finding and the resolution areas in Table 3 of Appendix A of this report.

3.11 Comments by Local Stakeholders

A formal consultation process with local stakeholder was held on 5 May 2011 at PT. Umbul Mas Wisesa project site meeting room, Desa Tanjung Mulia, Kecamatan Kampung Rakyat, Kabupaten South Labuhan Batu, North Sumatra, Indonesia. Invitations to the local stakeholders to the consultation were made through advertisement in a national newspapers, the Jakarta Post[/36/] on 18 April 2011 and Harian Analisa[/35/] and also through letter of invitation to local village head dated 28 April 2011[/36a/].

The meeting was attended by 40 participants who included the representatives from the Ministry of Environment Jakarta, Board of Environment South Labuhan Batu, local government and local community. This was evident through the attendance list signed by the attendees and further confirmation by three stakeholders who were interviewed by the validation team.

No adverse comment was received. Comments received at the meeting were mainly request for clarification relating to CDM, the project operation and safety measures, its benefits and the technology to be applied in the project activity.

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[/1/] on the UNFCCC's website on 6 December 2011 available at http://cdm.unfccc.int/Projects/Validation/DB/TGDMIZ67YZQTNI13LLH03S51HNL97W/view.html. The global stakeholder consultation process began on 7 December 2011 to 5 January 2012. No comments were received.

5.0 VALIDATION OPINION

SIRIM QAS Intl. performed a validation of the proposed CDM project "Biogas recovery from wastewater treatment in PT. Umbul Mas Wisesa Palm Oil Mill" on the basis of UNFCCC criteria for the CDM and host party criteria as well as criteria given to provide for consistent project operations, monitoring and reporting. The project is located at Labuhan Batu, North Sumatra, Indonesia with the GPS coordinates of 2°12'50.55"N and 100°16'15.14"E.

The project participant is PT Umbul Mas Wisesa of Indonesia. Indonesia, as the host party meets the requirements to participate in CDM. The LoA[/7/] issued by the DNA of Indonesia, has confirmed that the project will assist in achieving sustainable development. The DNA has approved the project and has authorized the project participant 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 lagoons anaerobic treatment system. The project activity involves the installation of new anaerobic CSTR equipped with a biogas capture system. The captured biogas will be used as fuel in the boiler. Any excess biogas will be combusted in an open flare system. The project will result in the reduction of greenhouse gas emissions that are real, measurable and give long term benefits to the mitigation of climate change.

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 576,400 tCO_2e over the selected 10 years crediting period. The proposed CDM project is eligible as a type III small-scale CDM project activity 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 for the biogas project by the host country. However, since it is a Greenfield project, a common and combine EIA on biogas and palm oil mill has been conducted, documented, identified and approved on 31 December 2008[/8/]. Significant adverse environmental impacts have been anticipated from the project activity. Action plan for monitoring and

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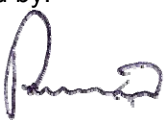
management as documented in Environmental Monitoring Plan (RPL) and Environmental Management Plan (RKL) have been developed. The project complies with the applicable environmental regulations in Indonesia.

In summary, it is the opinion of SIRIM QAS International's that the proposed project "Biogas recovery from wastewater treatment in PT. Umbul Mas Wisesa Palm Oil Mill", as described in the PDD, version 08, dated 27 March 2015[/42/], 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:
	
(Aernida Abdul Kadir) Validation Team Leader	(Parama Iswara Subramaniam) DOE Representative

6.0 REFERENCES

Information Reference List

Ref. No.	Document or Type of Information
/1/	Validation and Verification Standard version 7.0
/2/	Project Design Document version 01 dated 11/08/2011
/3/	AMS-III.H version 16 "Methane recovery in wastewater treatment"
/4/	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 2)
/4a/	Project emissions from flaring (version 2)
/5/	Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 1)
/5a/	General Guidelines to SSC CDM methodologies (version 21).
/5b/	Glossary of CDM Terms
/5c/	Guidelines on the demonstration of additionality of small scale project activity
/6/	UMW ER Excel Sheet
/7/	LoA for Biogas Recovery From Wastewater Treatment in PT Umbul Mas Wisesa Palm Oil Mill
/8/	Keputusan Menteri Negara Lingkungan Hidup
/9/	Weather Indonesia; http://www.climatetemp.info/indonesia/medan-sumatra.html
/10/	PIPELINE – Small Community Wastewater Issues, Spring 1997 vol. 8, No. 2; http://www.nesc.wvu.edu/pdf/WW/publications/pipline/PL_SP97.pdf
/11/	Effect of new palm oil mill processes on EFB and POME Utilisation http://www.utec-bremen.com/userfiles/file/pdf/paper_C2_Schuchardt_PIPOC_2007.pdf
/11a/	A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of POME
/12/	Pollution control technologies for the treatment of palm oil mill effluent (POME) through end of pipe process; http://www.eng.monash.edu.my/adminpanel/publication/upload/pub_532.pdf
/13/	"Harapan Biogas Project", PDD version 3.11, 13/01/2011
/13a/	"Methane Recovery and Utilisation at PT Pinago Utama Sugihwaras Palm Oil Mill, Sumatra Indonesia (Ref: 3702, PDD Version 9, 27/06/2012)"
/14/	"Methane Recovery and Utilization at PT. Musim Mas Palm Oil Mill In Pangkalan Lesung, Riau, Indonesia", PDD version 11, 07/10/2009
/15/	"ID08-WWP-14, Methane Recovery in Wastewater Treatment, Riau Province, Indonesia", PDD version 11, 07/10/2009
/16/	"ID08-WWP-09, Methane Recovery in Wastewater Treatment, Aceh, Indonesia", PDD version 13, 07/10/2009
/17/	"ID08-WWP-11, Methane Recovery in Wastewater Treatment, Jambi, Indonesia", PDD version 12, 19/10/2009
/18/	"ID08-WWP-10, Methane Recovery in Wastewater Treatment, West Sumatera, Indonesia", PDD version 9, 11/11/2009
/18a/	http://mapper.acme.com/
/19/	Journal of Environmental Management – Development of anaerobic digestion methods of POME
/20/	Bioresource Technology – Development of anaerobic digestion method of POME
/21/	Activated Sludge Microbiology Problems And Their Control
/22/	WASTE Infosheet (Anaerobic Digestion)
/23/	Baseline Study of Method Emission From Anaerobic Ponds of POME
/23a/	Ponding System for Palm Oil Mill Effluent Treatment
/23b/	Industrial Processes and The Environment (Handbook no.3) Crude Palm Oil Industry
/24/	Anaerobic Digesters Safety
/24a/	Agricultural Anaerobic Digestion Fundamental for Understanding, Evaluating and Applying
/25/	Equipment Lifespan Letter (20 years)

/26/	Expanded Market Study For Indonesia Sustainable Energy Finance
/27/	Prior Consideration Of The CDM to UNFCCC
/27a/	Prior Consideration of the CDM to Indonesia DNA
/28/	UMW Project Technology – Design Detail
/29/	Project Implementation Schedule
/30/	PT UMW C & S Tender – Global Palm Consultancy
/31/	Agreement Between PT Umbul Mas Wisesa & Knowledge Integration Services
/32/	Report of AMDAL
/33/	Report of CDM Project to KOMNAS
/34/	Local Stakeholder Presentation Material
/35/	Local Newspaper Advertisement – Harian Analisa
/36/	Local Newspaper Advertisement – The Jakarta Post
/36a/	Letter of Invitation to stakeholder meeting
/37/	http://www.cets-uii.org/BML/Air/BMLC/kepmen5195/
/38/	http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html
/39/	Email by DNA Indonesia to PP on awarding of LoA
/40/	Email by DNA Indonesia to DOE confirming the issuance of LoA
/41/	Modalities of Communication
/42/	Project Design Document version 08 dated 27/03/2015
/43/	CDM Country Guide for Indonesia
/44/	Information Sheet on Anaerobic Digestion, pg 4, http://www.waste.nl/page/419

APPENDIX A
VALIDATION PROTOCOL
Project No. SQAS-CDM- EK06970003

TABLE 1 : VVS VERSION 7.0 REQUIREMENT CHECKLIST

	REQUIREMENT	REFERENCE	COMMENTS	DRAFT CONCLUSION	FINAL CONCLUSION
1.	**Approval** **Validation requirements** The DOE shall determine whether the designated national authority (DNA) of each Party indicated as being involved in the proposed CDM project activity in the PDD has provided a written letter of approval.				
1.1	The following shall be determined whether each letter confirms that: (a) The Party is a Party to the Kyoto Protocol; (b) Participation is voluntary; (c) In the case of the host Party, the proposed project activity contributes to the sustainable development of the country; (d) It refers to the precise proposed project activity title in the PDD being submitted for registration.	**VVS para 39**	Indonesia ratified to the Kyoto Protocol on 3 December 2004. The LoA have yet to be obtained.	OK ~~CAR1~~	OK OK
1.2	Determine whether the letter(s) of approval is unconditional with respect to 39 (a) to (d) above.	**VVS para 40**	The LoA have yet to be obtained.	~~CAR 1~~	OK
1.3	Determine whether the letter(s) of approval has been issued by the respective Party's DNA and is valid for the proposed project activity under validation. (A list of DNAs is available on the UNFCCC CDM website.)	**VVS para 41**	The LoA have yet to be obtained.	~~CAR 1~~	OK
1.4	If the validation team doubts the authenticity of the letter of approval, the validation team shall verify with the DNA that the letter of approval is authentic.	**VVS para 42**	Refer to CAR 1.	~~CAR 1~~	OK
2.	**Authorization** **Validation requirement** The DOE shall determine whether each project participant has been authorized by at least one Party involved in a letter of approval				
2.1	The project participants shall be listed in tabular form in section A.3 of the PDD, and this information shall be consistent with the contact details provided in	**VVS para 46**	Available – PT Umbul Mas Wisesa.	OK	OK

	annex 1 of the PDD.				
2.2	The validation team shall confirm that no entities other than those authorized as project participants are included in these sections of the PDD.	**VVS para 47**	This has been confirmed.	OK	OK
2.3	The validation team shall confirm that the approval of participation has been issued from the relevant DNA and if in doubt shall verify with the DNA that the approval of participation is valid for the proposed CDM project participants.	**VVS para 48**	Refer to CAR 1.	~~CAR 1~~	OK
3.	**Contribution to sustainable development** **Validation requirement** The DOE shall confirm that the DNA has considered whether the proposed CDM project activity assists the host Party in achieving sustainable development.				
3.1	The validation team shall determine whether the letter of approval by the DNA of the host Party confirms the contribution of the proposed CDM project activity to the sustainable development of the host Party.	**VVS para 51**	Refer to CAR 1.	~~CAR 1~~	OK
4.	**Modalities of communications** **Validation requirement** The DOE shall validate the corporate identity of all project participants and focal points included in the Modalities of Communication (MoC) statement, as well as the personal identities, including specimen signatures and employment status, of their authorized signatories.				
4.1	The validation team shall validate paragraph 53 above through: (a) Directly checking evidence for corporate, personal identity and other relevant documentation; (b) Notarized documentation; or (c) Written confirmation from the project participant or the coordinating/managing entity that submits to it the MoC statement that all corporate and personal details, including specimen signatures, are valid and accurate	**VVS para 54**	This has been verified through notarized documentation - The focal points for both PPs were also the signatory parties to the CDM project agreement made with SIRIM QAS.	OK	OK
4.2	When the validation team validates identity by applying paragraph 54 (c) above, the validation team	**VVS para 55**	Not applicable.	OK	OK

	shall ensure that the MoC statement is received from a project participant with whom the DOE has a contractual relationship. For CDM PoAs, the DOE shall ensure that the MoC statement is received from the coordinating/managing entity.				
4.3	When the validation team validates identity by applying paragraph 54 (c) above, the validation team shall ensure that the official who submits the MoC statement to the validation team and the official who signed the written confirmation (if a different person) is/are duly authorized to do so on behalf of the respective project participant or coordinating/managing entity.	**VVS para 56**	Not applicable.	OK	OK
4.4	If the validation team is unable to validate the requirements by applying paragraph 54 (a), (b) or (c) above, then the DOE may perform further validation activities in order to confirm that the corporate and personal details, employment status and specimen signatures included in the MoC statement are valid and accurate and comply with the requirements of this section.	**VVS para 57**	Not applicable.	OK	OK
4.5	The validation team shall validate that the MoC statement has been correctly completed and duly authorized.	**VVS para 59**	Yes.	OK	OK
4.6	The validation team shall check that: (a) The latest version of the form "Modalities of Communication statement" (F-CDM-MOC) has been used; (b) The information required as per the F-CDM-MOC, including its annex 1, is correctly completed; (c) The project participant's authorized signatories signing the F-CDM-MOC correspond to the project participant's authorized signatories included in F-CDM-MOC, annex 1.	**VVS para 60**	Yes.	OK	OK
5.	**Project design document** **Validation requirement** The DOE shall determine whether the PDD was completed using the latest version of the PDD form appropriate to the type of project activity.				

5.1	The validation team shall provide a statement regarding the compliance of the PDD with relevant forms and instructions.	**VVS para 63**	Yes.	OK	OK
6.	**Description of project activity** **Validation requirement** The DOE shall determine whether the description of the proposed project activity in the PDD is accurate, complete, and provides an understanding of the proposed CDM project activity.				
6.1	Unless other means are specified in the methodology, the validation shall conduct a physical site inspection for the following proposed project activities in existing facilities or utilizing existing equipment: (a) Large-scale projects; (b) Non-bundled small-scale projects with emission reductions exceeding 15,000 tonnes/year; (c) Bundled small-scale projects, each with emission reductions not exceeding 15,000 tonnes/ year; in such cases the number of physical site visits may, however, be based on sampling, if the sampling size is justified through statistical analysis.	**VVS para 65**	The physical site inspection was conducted at the project activity which is located at Labuhan Batu, North Sumatra, Indonesia with latitude of (2^0 12' 50.55" N) and longitude (100^0 16' 15.14" E). 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) It has been 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
6.2	For other individual proposed small-scale CDM project activities with emission reductions not exceeding 15,000 tonnes/year, the validation team should conduct a physical site visit as appropriate. For proposed CDM project activities for which the validation tea does not undertake a physical site inspection this shall be justified. The validation team may apply a sampling approach in accordance with the "Standard for sampling and surveys for CDM	**VVS para 66**	Not applicable.	OK	OK

	project activities and programme of activities".				
6.3	For all other proposed CDM project activities not referred to in VVS paragraphs 65-66 , the DOE shall undertake the validation of project description by reviewing available designs and feasibility studies and should conduct comparison analysis with equivalent projects, as appropriate.	**VVS para 67**	Not applicable.	OK	OK
6.4	If the proposed CDM project activity involves the alteration of an existing installation or process, the validation team shall ensure that the project description states the differences resulting from the project activity compared to the pre-project situation.	**VVS para 68**	Not applicable.	OK	OK
6.5	In case that the project has been implemented during the on-site validation, ensures that the PDD had described the following: • Implementation status of the project • Details of the equipment involved in the project activity. This should include the technical specification of the equipment.		Not applicable. The land clearing has just started. Effluent treatment drawing was furnished during site audit.	OK	OK
			Noted that the description of the final discharge reported in the PDD is not consistent with that described in the project AMDAL.	~~CAR 2~~	OK
			Noted that the starting date of the first crediting period indicated in the PDD was 31/08/2012 or project registration date. However, since the project schedule commissioning date of the plant would be in June 2013, PP has yet to change the starting date based on the appropriate date.	~~CL 1~~	OK
7.	**Application of selected baseline and monitoring methodology and selected standardized baseline** **Applicability of the selected baseline and monitoring methodology to the project activity** **Validation requirement** The DOE shall validate that the selected baseline and monitoring methodology is applicable to the project activity and that the selected version is valid at the time of submission of the proposed project activity for registration.				

7.1	The DOE shall determine whether the methodology is correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology.	**VVS para 74**	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. *To review further at site.*		
			Referring to Table 2 section B.2 in the PDD; PP to justify the applicability requirement chose for the Greenfield project which relates to introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment to an untreated wastewater stream. PP to include explanation on applicability of para 28 (2) (b) on the linkages on the top 20% of registered CDM project with similar or identical plant and with the lowest emission reduction rate per ton COD removal.	~~CL 2~~ ~~CL 3~~	OK OK
7.2	If the PDD of a proposed project activity is based on a previous version of a methodology and was published for global stakeholder consultation but was not submitted for registration within the grace period, the validation team shall request the project participants to provide a revised PDD in accordance with the Project cycle procedure.	**VVS para 75**	Not applicable.	OK	OK
7.3	The validation team shall determine whether the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein. This shall be done by validating the documentation referred to in the PDD and by verifying that the documentation content is correctly quoted and interpreted in the PDD. If the validation team, based on local and sectoral knowledge, is aware that comparable information is available from credible sources other than that used in the PDD, then the	**VVS para 76**	The applicability of the meth against the project activity has been verified as below. Para 5 to 11 were not applicable to this project.		

	validation team shall cross-check the PDD against other sources to confirm that the project activity meets the applicability conditions of the methodology.	**VVS para 76**	Para 1 – Refer to CL 2.	~~CL 2~~	OK
			Para 2 - The baseline scenario for this Greenfield project would be the treatment of wastewater through a system of open anaerobic lagoons in accordance with para 10 of AMS-III.H. In accordance with para 19(b) of AMS-III.H for Greenfield projects, baseline emissions were determined through a historical data in a comparable existing wastewater treatment system, treating similar flow and same type of wastewater. The existing wastewater system chosen for this purpose is "Methane Recovery and Utilisation at PT Pinago Utama Sugihwaras Palm Oil Mill, Sumatra Indonesia (Ref: 3702, PDD Version 9, 27/06/2012)". As this is a Greenfield project, the characteristic of the most plausible baseline treatment system (i.e. open anaerobic lagoons without methane recovery) will be based on available information from existing anaerobic lagoons at similar industrial facilities in Indonesia. The information referred is from selected three (3) CDM projects, which are registered, that have implemented biogas recovery measure to their existing POME treatment system (i.e. open anaerobic lagoons without methane recovery) in the projects. All the anaerobic lagoons are of a depth greater than two meters and without aeration. The details of the projects provided in Annex 3 of the PDD are confirmed to be correct.	OK	OK

			The ambient temperature in Labuhan Batu was estimated using the average temperature of the nearest major city (i.e. Medan). The average annual temperature in this area was 26.2°C. Taking into the consideration of the required manpower to conduct de-sludging, the typical interval between two consecutive sludge removal events will be more than 30 days. Further, as per the journal publication "Pipeline"[/10/] the lagoons were able to properly function without sludge removal for up to 5 to 10 years.	OK	OK
			Para 3 - The recovered biogas will be combusted in a boiler for energy generation and any excess biogas will be flared using open flaring system. This is consistent with the project design and hence option (a) is applicable.	OK	OK
			Para 4 – PP may uses the biogas to generate steam. However, ER for this activity will not be claimed under this project activity.	OK	OK
			Para 12 – This project is a Greenfield project that aims to introduce an additional sequential anaerobic treatment with methane recovery to a proposed open anaerobic lagoon system for treating POME. The project activity complies with the SSC Guidelines. The determination of plausible baseline scenario was presented in section B.4 of the PDD. Through review of the PDD, interview of the project participant and review of the project design, it can be confirmed that the project does not involve a change of equipment resulting in capacity addition of the wastewater or sludge treatment system.	OK	OK

			Para 13 – The location of the proposed mill which serves as the source of the wastewater and the wastewater treatment system have been defined in section A.4.1 of the PDD.	OK	OK
			Para 14 – The project activity is confirmed to be a type III small scale CDM activity with expected annual emission reductions of 50,380 tCO2e per year during the crediting period.	OK	OK
8.	**Project boundary** **Validation requirement** The DOE shall determine whether all main GHG emission sources, the physical delineation of the proposed project activity and other relevant project and baseline emission sources covered in the methodology are included within the project boundary for the purpose of calculating project and baseline emissions for the proposed project activity.				
8.1	The project boundary shall be confirmed based on documented evidence and shall corroborate it by a site visit where required.	**VVS para 83**	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 Labuhan Batu, North Sumatra, Indonesia with latitude of (2^0 12' 50.55" N) and longitude (100^0 16' 15.14" E). To confirm at site.		
			The coordinates were deemed correct with that verified at the site.	OK	OK
			The project boundary was assessed through physical site inspection, interviews with the project participant and the technology provider, and the evidence received on the project design. Based on the information provided and reviewed, it can be confirmed that the defined project boundary was found to be in accordance with para 15 of the meth. The project boundary includes anaerobic digester system, the biogas capturing system, combustion of the biogas in the boiler and	OK	OK

			the open flare system. Detail schematic diagram of the project boundary is as in Figure 3 of the PDD. The combustion of biogas in the 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. The project boundary does not include the downstream aerobic treatment prior to discharge as land application in nearby plantation since it is the same in baseline and project scenario.		
8.2	If the methodology allows project participants to choose whether a source or gas is to be included within the project boundary, the validation team shall determine whether the project participants have justified that choice. The validation team shall determine whether the justification provided is reasonable, based on an assessment of supporting documented evidence provided by the project participants and corroborated by observations if required.	**VVS para 84**	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.		
			The site visit confirmed that the project activity was consistent with that presented in the PDD for type III.	OK	OK
9.	**Baseline scenario identification and description** **Validation requirement** The DOE shall determine whether the baseline identified for the proposed project activity is the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed project activity.				
9.1	The validation team shall determine whether any procedure contained in the methodology to identify the most reasonable baseline scenario has been correctly applied. If the selected methodology requires the use of tools (such as the “Tool for the demonstration and assessment of additionality” and the “Combined tool to identify the baseline scenario	**VVS para 89**	The determination of the baseline scenario has been carried out in accordance with that specified in the meth, SSC Guidelines and Guidelines on the demonstration of additionality of SSC project activity. The baseline scenario for treating the	OK	OK

	and demonstrate additionality") to establish the baseline scenario, the validation team shall consult the methodology on the application of these tools. In such cases, the specific guidance in the methodology shall supersede the corresponding requirements of the tool.		wastewater from palm oil mill (POME) as described in section B.4 of the PDD 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 the investment barriers. Moreover, the selected baseline scenario is the most financial viable option with no risk as compared to other available alternatives.		
9.2	If the methodology requires several alternative scenarios to be considered in the identification of the most plausible baseline scenario, the validation team shall, based on financial expertise and local and sectoral knowledge, determine whether all scenarios that are considered by the project participants and any scenarios that are supplementary to those required by the methodology, are realistic and credible in the context of the proposed project activity and that no alternative scenario has been excluded.	**VVS para 90**	Based on steps provided in the para 22 of the SSC Guidelines for Greenfield project, PP has carried out the identification of the alternative scenarios as required which are realistic and credible. Detail verification of this is provided in the additionality assessment of the project activity at section 13 of this checklist.	OK	OK
9.3	The validation team shall determine whether the most plausible baseline scenario identified is reasonable by validating the assumptions, calculations and rationales used in the PDD. It shall determine whether documents and sources referred to in the PDD are correctly quoted and interpreted. The validation team shall crosscheck the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if available.	**VVS para 91**	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 28 of SSC guideline, corresponds to the baseline scenarios provided in the methodology. References made in PDD have been cross checked with publicly available data.	OK	OK
9.4	The validation team shall determine whether the	**VVS para 92**	It has been described in the PDD that the	OK	OK

	PDD provides a 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 project activity.		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.		
9.5	The validation team shall determine whether, drawing on its knowledge of the sector and/or advice from local experts, that all applicable CDM requirements have been taken into account in the identification ofthe baseline scenario for the proposed project activity, as well as relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. Two (2) types of national and/or sectoral policies have to be taken into account: a) National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions-intensive technologies or fuels, otherwise known as policies that increase GHG emissions, and are called type E+. For this type of national and/or sectoral policies or regulations, only those that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997) shall be taken into account when identifying a baseline scenario. If such national and/or sectoral policies were implemented since the adoption of the Kyoto Protocol, the baseline scenario shall refer to a hypothetical situation without the national and/or sectoral policies or regulations in place;	**VVS para 93**	Currently, there are no legislations or policies in recovering methane from wastewater treatment and the utilisation of biogas for energy generation in agroindustry in the host country.	OK	OK
	b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public		As above.	OK	OK

	subsidies to promote the diffusion of renewable energy or to finance energy efficiency programmes), otherwise known as policies that decrease GHG emissions, are called type E-. For this type of national and/or sectoral policies or regulations, those that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in identifying a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place).				
10.	**Algorithms and/or formulae used to determine emission reductions** **Validation requirement** The DOE shall determine whether the steps taken and the equations and parameters applied in the PDD to calculate project emissions, baseline emissions, leakage and emission reductions comply with the requirements of the selected methodology including applicable tool(s).				
10.1	Where the methodology allows for selection between options for equations or parameters, the DOE shall determine whether adequate justification has been provided (based on the choice of the baseline scenario, context of the proposed project activity and other evidence provided) and that the correct equations and parameters have been used, in accordance with the methodology selected including applicable tool(s).	**VVS para 97**	Yes. All aspects to the baseline and project activity emissions in accordance with AMS-III.H version 16' were considered. However to confirm the followings at site; To clarify COD removal efficiency of 85%. To confirm on ex-ante project design of $Q_{ww,l,y}$ = 284,700 m^3/year. To clarify COD of the wastewater inflow to the baseline treatment system $COD_{untreated,i,y}$ of 0.0650 tCOD/$m^{3'}$. To clarify UF_{BL} = 0.89 with reference to the footnote FCCC/SBSTA/2003/10.		
			It was confirmed that the COD removal efficiency of 85% in accordance to the technology description provided. $Q_{ww,l,y}$ = 284,700 m^3/year was confirmed based on 780 m^3/day x 365 days		

			UF_{BL} = 0.89 was clarified as per methodology. PP to clarify on the use of 65,000 ppm of $COD_{untreated}$ to ensure that emission reduction calculation is conservative and falls under small scale emission reduction limit.	~~CL 4~~	OK
10.2	The validation team shall verify the justification given in the PDD for the choice of data and parameters used in the equations.	**VVS para 98**	Justification given in the PDD for the choice of data and parameters used in the equations has been verified as per requirements of the meth.	OK	OK
10.3	If data and parameters will not be monitored throughout the crediting period of the proposed project activity but have already been determined and will remain fixed throughout the crediting period, the validation team shall determine whether all data sources and assumptions are appropriate and calculations are correct as applicable to the proposed project activity, and will result in an accurate or otherwise conservative estimate of the emission reductions.	**VVS para 98**	The ex-ante calculation of emission reductions has been described in section B.6.2 of the PDD with the estimated values of monitored parameters listed in section B.7.1 of the PDD.	OK	OK
10.4	If data and parameters will be monitored or estimated on implementation and hence become available only after validation of the project activity, the validation team shall determine whether the estimates provided in the PDD for these data and parameters are reasonable.	**VVS para 98**	This has been specified in section B.7.1 of the PDD.	OK	OK
11.	**Additionality of a project activity** **Validation requirement** The DOE shall determine whether the proposed project activity is additional as demonstrated in the PDD.				
11.1	The validation team shall assess and verify the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality.	**VVS para 102**	This has been carried out accordingly.	OK	OK
11.2	If required by the applicable approved methodology, the validation team shall consider tools and	**VVS para 103**	This has been carried out accordingly. The additionality of the project activity has	OK	OK

	guidelines provided by the Board to demonstrate the additionality of proposed project activities. The DOE shall also consider specific complementary or alternative requirements included in the methodology for demonstrating the additionality of the proposed project activity.		been assessed against the Guidelines on the demonstration of additionality of SSC project activity.		
12.	**Assessment on demonstration of prior consideration of the clean development mechanism**				
	Validation requirement The DOE shall determine whether CDM benefits were considered necessary in the decision to undertake the project as a proposed project activity if the starting date of the proposed project activity is prior to the start of validation, which is the date of publication of the PDD for global stakeholder consultation.				
12.1	The validation team shall determine whether the start date of the project activity, reported in the PDD, is the earliest date at which either the implementation or construction or real action of a project activity begins. For project activities that require construction, retrofit or other modifications, the date of commissioning cannot be considered the project activity start date. The validation team shall determine whether it is a project activity with a start date: (a) On or after 2 August 2008; or (b) Before 2 August 2008.	**VVS para 106**	The project is a new project activity with a start date after 2 Aug 2008.	OK	OK
12.2	For a project activity with a start date on or after 2 August 2008, for which a PDD has not been published for global stakeholder consultation or a new methodology has not been proposed to the Board before the project activity start date, the DOE shall confirm by referring to the list of prior consideration notifications from the UNFCCC website and communication between the project proponent, the secretariat and the host Party DNA regarding the commencement of a new project	**VVS para 107**	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 February 2011 as per copy of email provided. The said notification is listed on http://cdm.unfccc.int/Projects/PriorCDM/ notifications/index_html'.	OK	OK

	activity. If such notification has not been provided by the project participants within 180 days of the project activity start date, the validation team shall determine that the CDM was not seriously considered in the decision to implement the project activity.				
12.3	For a project activity with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, the validation team shall assess the project participant's prior consideration of the CDM. Specifically, the validation team shall assess whether the project participants: a) Had an 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 could include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participants, to undertake the project as a proposed project activity;	**VVS para 108**	Not applicable.	OK	OK
	b) Demonstrated that real and continuing actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this could include one or more of the following: contracts with consultants for CDM/PDD/methodology services, draft versions of PDDs and underlying documents such as letters of authorization, and if available, letter of intent, emission reduction purchase agreements (ERPA) term sheets, ERPAs or other documentation related to the potential sale of the certified emission reductions (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 methodology or requests for clarification or revision of existing methodologies to the Board, publication in a newspaper, interviews with the		Not applicable.	OK	OK

	DNA, and earlier correspondence on the project with the DNA or the secretariat.				
12.4	Assessment of real and continuing actions shall be conducted by the validation team and should focus on real documented evidence as indicated in paragraph 108(b) above, including an assessment by the validation team of the authenticity of the evidence. The validation team shall assess letters, e-mail exchanges and other documented communications submitted by the project participants to substantiate the above information, and these shall be considered as evidence only after the validation team has assessed the reliability and authenticity of such communications, inter alia through cross-checking (e.g. interviews).	**VVS para 109**	PP has provided the following: • The Board of Directors decided to install anaerobic digester with biogas recovery after due consideration of CDM revenue potentials from the project activity on 9 February 2011. • Signing of the main equipment/contractor contract to implement the project activity on 10 February 2011. • Prior consideration submitted to the UNFCCC and Indonesia DNA on 21 February 2011. • 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 confirmed upon the availability of the actual notification letter.	OK	OK
12.5	In validating proposed project activities where: (a) There is less than two years of a gap between the documented evidence, the validation team shall conclude that continuing and real actions were taken to secure CDM status for the project activity;	**VVS para 110**	Not applicable.	OK	OK
	(b) The gap between documented evidence is greater than two years and less than three years, the validation team may determine that continuing and real actions were taken to secure CDM status for the project activity and shall justify any positive or negative validation opinion based on the context of the evidence and information assessed;		Not applicable.	OK	OK
	(c) The gap between documented evidence is greater than three years, the validation team		Not applicable.	OK	OK

<table>
<tr><td></td><td>shall conclude that continuing and real actions were not taken to secure CDM status for the project activity.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>12.6</td><td>If evidence to support the serious prior consideration of the CDM as indicated above is not available, the validation team shall determine that the CDM was not considered in the decision to implement the project activity.</td><td>VVS para 111</td><td>Not applicable for this project activity.</td><td>OK</td><td>OK</td></tr>
<tr><td>13.</td><td>Identification of alternatives
Validation requirement
Where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the PDD selected to determine the most realistic baseline scenario.</td><td></td><td colspan="3"></td></tr>
<tr><td>13.1</td><td>The validation team shall assess the list of alternatives given in the PDD and to determine whether:
(a) The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed project activity;
(b) The list contains all plausible alternatives that the validation team, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the comparable outputs or services that are to be supplied by the proposed project activity;
(c) The alternatives comply with all applicable and enforced legislation.</td><td>VVS para 114</td><td>This has been carried out in accordance with para 22 of the SSC Guidelines with steps as follows:
Step 1 – These were identified as alternatives to the project proponent.
<table><tr><td>1</td><td>Use of open anaerobic lagoons for wastewater treatment without methane recovery.</td></tr><tr><td>2</td><td>Use of anaerobic lagoons with sealed cover for wastewater treatment.</td></tr><tr><td>3</td><td>Use series of aerobic lagoons for wastewater treatment.</td></tr><tr><td>4</td><td>Use of aerobic wastewater treatment using activated sludge.</td></tr><tr><td>5</td><td>Anaerobic digester without methane recovery.</td></tr><tr><td>6</td><td>Anaerobic digester with methane recovery but not registered as CDM project.</td></tr></table>Alternative # 6 complies with 13.1(a) of this checklist.</td><td>OK</td><td>OK</td></tr>
</table>

			Alternative #3 has been taken out as it was not a plausible alternative. Based on the referred documentation, due to high organic loading of POME from the palm oil milling process, it would not be possible for the POME to be directly treated under an aerobic treatment. This confirmed the requirement specified under 13.1(b) of this checklist.	OK	OK
			Step 2 – it has been confirmed that all the listed alternatives were in compliance with the applicable legal requirement. There is no legislation that specified the type of POME treatment in Indonesia. This confirmed the requirement specified under 13.1(c) of this checklist.	OK	OK
			Step 3 – from the barrier analysis and the elimination process presented by the PP, it can be concluded that Alternative #1 is the most plausible baseline scenario in comparison with the other listed alternatives. In accordance with the write up “Baseline study of methane emissions from anaerobic ponds of palm oil mill treatment”, a detailed study was carried out and it is evident that open anaerobic lagoons system can be considered a prevailing practice as it is the most financial viable system, with less technology requirement, low risk and in compliance with the applicable legal requirement that is available in the host country. The open anaerobic lagoons system has also been widely applied to the neighbouring country as Malaysia and Thailand and known for its reliability and stability eliminates all other treatment systems. Having said that, the open anaerobic lagoons system is with high emissions as the system did not have any	OK	OK

			methane capturing measures.		
			Step 4 – From Step 3, Alternative #1 is the only one alternative remains; a) it is not the proposed project activity without being registered as a CDM project; and b) it was stated in the meth of AMS-III.H. that anaerobic lagoon is the baseline system. Hence, it can be concluded that Alternative #1 is the baseline scenario for this project activity.		
			PP to provide more information and included in the table 5 of the PDD on the link to the UNFCCC registered project for Alternative #2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment).	~~CL 5~~	OK
13.2	Where the baseline scenario is prescribed in the approved methodology, no further analysis is required.	**VVS para 115**	Not the case for this project activity as it is a Greenfield project.	OK	OK
14.	**Investment analysis** **Validation requirement** If investment analysis has been used to demonstrate the additionality of the proposed project activity, the DOE shall determine whether the proposed project activity would not be: (a) The most economically or financially attractive alternative; or (b) Economically or financially feasible without the revenue from the sale of CERs.				
14.1	The validation team shall apply the latest version of the "Guidelines on the assessment of investment analysis" as provided by the Board and with other relevant provisions. (Assessment on Investment Analysis is as in Table 2)	**VVS para 118**	Not applicable.	OK	OK

14.2	The validation team shall determine whether the project activity is not the most economically or financially attractive alternative, or that it is not economically or financially feasible without CDM: a) The proposed project activity would produce no financial or economic benefits other than CDM-related income. The validation team shall determine whether the documented costs associated with the proposed project activity and the alternatives identified demonstrate that there is at least one alternative which is less costly than the proposed project activity; b) The proposed project activity is less economically or financially attractive than at least one other credible and realistic alternative; c) The financial returns of the proposed project activity would be insufficient to justify the required investment.	**VVS para 119**	Not applicable.	OK	OK
14.3	To verify the accuracy of financial calculations carried out for any investment analysis, the validation team shall: a) Determine the suitability of the financial indicator selected by the project participants and conduct a thorough assessment of all parameters and assumptions used in calculating such financial indicators, and determine the accuracy and suitability of these parameters using available evidence and applying its expertise in relevant accounting practices; b) Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices; c) Review, as appropriate, feasibility reports, public announcements and annual financial reports related to the proposed project activity and the project participants; d) Assess the correctness of computations carried out and documented by the project participants; and,	**VVS para 120**	Not applicable.	OK	OK

	e) Assess, where applicable, the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions.				
14.4	To confirm the suitability of any benchmark applied in the investment analysis, the validation team shall: a) Determine whether the type of benchmark applied is suitable for the type of financial indicator presented; b) Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity; c) Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark.	**VVS para 121**	Not applicable.	OK	OK
14.5	Where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed project activities, the validation team shall determine whether:	**VVS para 122**			
	a) The FSR is the basis for 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 that it is unlikely in the context of the underlying project activity that the input values would have materially changed; b) The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the validation team shall assess the appropriateness of the values;		Not applicable.	OK	OK
	c) The input values from the FSR are valid and applicable at the time of investment decision. The DOE shall confirm this on the basis of its specific local and sectoral expertise and by cross-checking or other appropriate means.		Not applicable.	OK	OK
15.	**Barrier analysis** **Validation requirement** If barrier analysis was used to demonstrate the additionality of the proposed project activity, the DOE shall determine whether the proposed project				

	activity faces barriers that: a) Prevent the implementation of this type of proposed project activity; b) Do not prevent the implementation of at least one of the alternatives.				
15.1	The validation team shall determine whether issues that have a direct impact on the financial returns of the project activity are not 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 sources of finance for the project activity.	**VVS para 125**	The baseline scenario is an open anaerobic lagoons system for wastewater treatment without methane recovery. The proposed project activity is an anaerobic digester with methane recovery. As been discussed in the investment barrier, it can be confirmed that the issues did not have a direct impact on the financial returns and shall not be assessed by investment analysis. In comparison of the 2 available scenarios – baseline and project activity, it can be concluded that the project activity faced barriers to the unavailability of sources of finance as in normal situation, PP prefers to just maintain the existing open anaerobic lagoons treatment as it is very reliable, stable, minimum maintenance and upkeep activities with no additional cost. The baseline is indeed a financially more viable alternative to the project activity but, it will lead to higher emissions.	OK	OK
15.2	The validation team shall apply a two-step process to assessing the barrier analysis performed, as follows: a) Determine whether the barriers are real: The validation team shall assess the available evidence and/or conduct interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. The validation team shall determine whether the existence of barriers is substantiated by independent sources of data such as relevant	**VVS para 126**	Investment barrier – without revenue generated from the CERs sales, PP would prefer the option to maintain with the current existing system. More information is needed in Alternative 5 (Anaerobic digester without methane recovery) and Alternative 6 (Anaerobic digester with methane recovery but not registered as CDM project) on the reference of journal for the investment barrier.	OK ~~CL 6~~	OK OK

	national legislation, surveys of local conditions and national or international statistics. If the existence of a barrier is substantiated only by the opinions of the project participants, the validation team shall not consider this barrier to be adequately substantiated. If the validation team considers, on the basis of its sectoral or local expertise, that a barrier is not real or is not supported by sufficient evidence, it shall raise a CAR to have reference to this barrier removed from the project documentation; b) Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives: Since not all barriers present an insurmountable hurdle to a project activity being implemented, the validation team shall apply its local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario.		Technological barrier – as reported in the referred documents; "Baseline study of methane emissions from anaerobic ponds of palm oil mill treatment" and "Section Safety-Anaerobic Digesters", it is evident that the implementation of the proposed project activity faced technological barrier as the operation and maintenance of the project required skilled person. As for the baseline scenario, there is less advanced technology involved as most of the systems were a series of open lagoons with gravity flow and minimum supervision and maintenance. The system was also known for its minimum risk. Prevailing legal – there is no regulation that specified the type of treatment in the host country. And, the existing baseline treatment is complying against the discharge limit. This is also applicable to the neighbouring country as Malaysia and Thailand with the same nature of industry. PP to include the reference on technological barrier on Alternative 2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment). PP to correct footnote 19 as per registered project.	OK ~~CL 7~~ ~~CL 8~~	OK OK OK
16.	**Common practice analysis** **Validation requirement** For proposed large-scale project activities, unless the proposed project type is first-of-its-kind as determined in accordance with the relevant guidelines, the DOE shall assess whether the project participants have conducted a common practice analysis.				

16.1	The validation team shall use official sources and its local and sectoral expertise to: a) 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 chosen, the validation team shall assess the explanation of why this region is more appropriate; b) Determine to what extent similar and operational projects (e.g. using similar technology or practice), other than project activities, have been undertaken in the defined region; c) Assess, if similar and operational projects, other than project activities, are already "widely observed and commonly carried out" in the defined region, whether there are essential distinctions between the proposed project activity and the other similar activities.	**VVS para 129**	Not applicable	OK	OK
17.	**Monitoring plan** **Validation requirement** The DOE shall determine whether the description of the monitoring plan included in the PDD is based on the approved monitoring methodology including applicable tool(s).				
17.1	The validation team shall apply a two-step process to meet the above requirement: a) To assess compliance of the monitoring plan with the approved methodology and the applicable tool(s), the validation team shall: i) Identify the list of parameters required by the selected approved methodology including applicable tool(s) by means of document review;	**VVS para 132**	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

	ii) Confirm that the description of the monitoring plan contains all necessary parameters, that they are described and that the means of monitoring described in the plan complies with the requirements of the methodology including applicable tool(s).		PP to confirm the number of boiler used (segregated into biomass and biogas boiler) with its intended purposes for project activity. More information on the calibration requirements to be included in the QA/QC section of data to be monitored. PP to clarify in table 1.2 and table 2.1 of the section B.7.1 of PDD on doing analysing internally (internal lab with method used, frequency etc) and cross checking with the external accredited lab. PP to clarify on monitoring of energy consumed by project activity in accordance to fulfil para 9 of the methodology in section B.7.1 referring to table 2.10 to 2.14 of the PDD. The measuring technique and frequency comply with good monitoring practices. However, PP to add frequency of calibration in accordance to the manufacturer specification or as per small scale guidelines.	~~CL 9~~ ~~CL 10~~ ~~CL 11~~ ~~CL 12~~ ~~CL 8~~	OK OK OK OK OK
	b) To assess the implementation of the plan the validation team shall, by means of review of the documented procedures, interviews with relevant personnel, project plans and any physical inspection of the proposed project activity site, assess whether: i) The monitoring arrangements described in the monitoring plan are feasible within the project design; ii) The means of implementation of the monitoring plan, including the data management and quality assurance (QA)/quality control (QC) procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed project activity can be reported ex post and verified.	**VVS para 132**	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

17.2	Is the monitoring plan includes apportioning mechanism?	**VVS para 132**	NA. This is not a wind mill project.	NA	NA
17.3	Is the PDD indicating all the apportioning mechanism parameters?	**VVS para 132**	NA.	NA	NA
17.4	Is the PP submitted sample invoice, breakups, JMRs for a month?	**VVS para 132**	NA.	NA	NA
18.	**Environmental impacts** **Validation requirement** a) The DOE shall determine whether the project participants conducted an analysis of the environmental impacts of the proposed project activity, including transboundary impacts, and whether those impacts are considered significant by the project participants or the host Party. **b)** The DOE shall also determine whether the project participants conducted an environmental impact assessment, if required to do so by the host Party, in accordance with the host Party's procedures.				
18.1	The validation team shall assess the above requirements by means of a document review and/or using local official sources and expertise.	**VVS para 136**	Under the current Indonesian Law, an environmental impact assessment (AMDAL) is not required for the proposed project. However, an AMDAL report was done for this project.	OK	OK
			Yes, the project complies with the local environmental legislation. However, the description of the environmental impact in section D of PDD needs to be consistent with that identified in the AMDAL report.	~~CAR 3~~	OK
19.	**Local stakeholder consultation** **Validation requirement** The DOE shall determine whether the project participants have completed a local stakeholder consultation process and that due steps were taken to engage stakeholders and solicit comments for the proposed project activity.				
19.1	The validation team shall, by means of document review and interviews with local stakeholders as appropriate, determine whether:	**VVS para 139**	Referring to Section E of the PDD, local stakeholders' consultation was conducted on 05/05/2011 from 10.30am to 12.00pm.	OK	OK

	a) Comments have been invited from local stakeholders that are relevant for the proposed project activity; b) The summary of the comments received as provided in the PDD is complete; c) The project participants have taken due account of all comments received and have described this process in the PDD.		To get the attendance list, presentation materials, reason for holding the meeting, interview session with the stake holder and to conclude whether the stakeholder meeting is sufficient. Details shall be confirmed after site audit.		
			All evident and supporting documents were provided. Around 40 pax attended. Presentation was done in bi-language (English and Bahasa Indonesia). A booklet on the CDM project was given to all attendees. Knowledge on CDM project on the local stakeholders interviewed was adequate. 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. Yes, summary of the comments is documented in Section E.2. of the PDD.	OK	OK
20.	Global stakeholder consultation	**VVS section E**			
20.1	Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available (include the start date and the end date of the GSCP period).		PDD was uploaded on 06/12/2011. The global stakeholder was conducted from 07/12/2011 to 05/01/2012.	OK	OK
20.2	Any comments received? If yes, has the comments been validated?		No comment received.	OK	OK
	SPECIFIC VALIDATION REQUIREMENTS FOR SMALL SCALE CDM PROJECT ACTIVITY				
	REQUIREMENT	**REFERENCE**	**COMMENTS**	**DRAFT CONCLUSION**	**FINAL CONCLUSION**
21.	**Project activity eligibility** **Validation requirement** The DOE shall determine whether the proposed project activity meets the small-scale eligibility				

	requirements.				
21.1	For a project activity that is within the small-scale project activity threshold but applies a large-scale approved methodology, the DOE shall determine whether this project activity follows the modalities and procedures for large-scale project activities.	**VVS para 151**	Not applicable to the project activity.	OK	OK
21.2	The validation team shall determine whether: a) The project activity qualifies within the thresholds of the three possible types of small-scale project activities. It may include more than one component; for example, a type III methane recovery component activity and a type I electricity component activity (See EB 28 report, paragraphs 56 and 57, for guidance on size limits for the components);	**VVS para 152**	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.	OK	OK
	b) The project activity conforms to one or more of the approved small-scale methodologies applied in conjunction with the general guidelines to SSC CDM methodologies (See EB 54 report, paragraph 37 and the latest "General guidelines to SSC methodologies" for further clarification);		Yes.	OK	OK
	c) The proposed small-scale project activity is not a debundled component of a large-scale project activity (See Appendix C of the simplified modalities and procedures for small-scale CDM project activities and the "Guidelines on assessment of de-bundling for SSC project activities").		The project was also not a debundled component of a larger project activity.	OK	OK
22.	**Debundling** **Validation requirement** The DOE shall determine whether the proposed small-scale project activity is not a debundled component of a large-scale project activity in accordance with the "Guidelines on assessment of debundling for SSC project activities". If the proposed small-scale project activity is deemed to be a debundled component but the total size of such an activity combined with the previous registered small-				

	scale project activity does not exceed the limits for small-scale project activities then the project activity can qualify to use simplified modalities and procedures for small-scale project activities.				
22.1	The validation team shall determine the proposed small-scale project activity to be a debundled component of a large-scale project activity if there is a registered small-scale project activity or an application to register another small-scale project activity.	**VVS para 155**	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 the SSC Guidelines.	OK	OK
22.2	The validation team shall, where appropriate, take into account specific debundling requirements for Type I project activities and small-scale transport project activities.	**VVS para 156**	Not applicable.	OK	OK
23.	**Additionality** **Validation requirement** The DOE shall determine whether the proposed SSC project activity is additional in accordance with CDM requirements applicable for small-scale project activities.				
23.1	The validation team shall refer to the specific requirements on demonstration of additionality for small-scale project activities (See Attachment A to Appendix B of 4/CMP.1, annex II), and the "Non-binding best practice examples to demonstrate additionality for SSC project activities".	**VVS para 159**	This has been carried out accordingly.	OK	OK
23.2	In the case of Type I project activities up to 5 MW that employ renewable energy as their primary technology, Type II energy efficiency project activities that aim to achieve energy savings at a	**VVS para 160**	This has been carried out accordingly.	OK	OK

	scale of no more than 20 GWh per year, and Type III project activities that aim to achieve emissions reductions at a scale of no more than 20 ktCO2e per year, the DOE shall assess the relevant criteria to establish the automatic additionality for these projects. (See the latest "Guidelines for demonstrating additionality of microscale project activities").				

TABLE 2 : ASSESSMENT ON INVESTMENT ANALYSIS – NOT APPLICABLE TO THE PROJECT ACTIVITY

	REQUIREMENT	COMMENTS	DRAFT CONCLUSION	FINAL CONCLUSION
1.	Is an appropriate analysis method chosen for the project (simple cost analysis, investment comparison analysis or benchmark analysis)?			
2.	If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. The benchmark approach is suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.			
3.	Is a clear, viewable and unprotected Excel spreadsheet available for the investment calculation? Are all formulas used in this analysis readable and all relevant cells be viewable and unprotected?			
4.	In cases where a benchmark approach is used, the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.			

	Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented.			
5.	In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market. The validation team's validation of the benchmark shall also include opinion on whether a company-specific benchmark or a benchmark based on parameters that are standard in the market is suitable in the context of the underlying project activity.			
6.	Does the period chosen for the investment analysis reflect the technical lifetime of the project activity or in case a shorter period is chosen, is the fair value of the project activity's assets at the end of the investment analysis period (as a cash inflow) included?			
7.	Is the fair value calculated in accordance with local accounting regulations (where available) or international best practice?			
8.	Are depreciation and other non-cash related items, which have been deducted in estimating gross profits on which tax is calculated, has been added back to net profits for the purpose to calculate the financial indicator? Note: Taxation should only be included as an expense in the IRR/NPV calculation in cases where the benchmark or other financial indicator is intended for post-tax comparisons.			
9.	Is taxation excluded in the investment analysis or is the benchmark intended for post tax comparisons?			
10.	Are the input values used in the investment analysis valid and applicable at the time of the investment decision?			
11.	Is the plant load factor used in the investment analysis based on 1) data provided to the banks 2)			

	data provided to the equity financiers 3) data provided to the government while applying the project activity for implementation approval 4) third party assessment report? (Ref: EB 48 Annex 11 para 3)			
12.	When the PLF is based on the third party assessment, does the PLF include derating factor?			
13.	Is the investment analysis using derating as a separate input value? (If the answer to the question no.12 and 13 is yes, then raise a CAR as it can be treated as double counting)			
14.	Is insurance/premium one of the input value used in the investment analysis?			
15.	Is the PP submitted insurance receipt for the purpose of crosschecking the insurance/ premium used in the investment analysis?			
16.	Is the breakups like total premium, net premium, discounting factor if any are described in the receipt?			
17.	Are the cost of financing expenditures (i.e. loan repayments and interest) been excluded in the calculation of project IRR?			
18.	In the calculation of equity IRR only the portion of investment costs which is financed by equity should be considered as the net cash outflow, the portion of the investment costs which is financed by debt should not be considered a cash outflow.			
19.	Due to the impact of loan interest on income tax calculations it is recommended that when a project IRR is calculated to demonstrate additionality a pre-tax benchmark be applied. In cases where a post-tax benchmark is applied the validation team shall ensure that actual interest payable is taken into account in the calculation of income tax.			
20.	Are variables/parameters that constitute more than 20% of either total project costs or total project revenues been identified with potential material impact on the financial parameter?			
21.	Has the sensitivity analysis been presented in the PDD and related spreadsheets?			

22.	Is the range of variation reasonable in the specific context of the project activity, taking into consideration historic trends in the business sector?			

TABLE 3 : RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to Table 1 & 2	Response from project participant	Validation team conclusion
CAR 1 LoA from the DNA of Indonesia has yet to be obtained	1.1	The LoA from Indonesian DNA has been provided to the DOE.	Letter of approval from Indonesia DNA reference no. B 071/KNMPB/03/2012 dated 06/03/2012 has been obtained. Email confirmation with Indonesia DNA on authenticity of the LoA. CAR 1 closed.
CAR 2 The description on the final discharge included in the PDD is not correct i.e. not consistent with that described in AMDAL.	6.5	The PDD, particularly in the project description (Section A.2) and project boundary (Figure 2), has been updated to include that the discharge will be to the river instead of land application.	PDD has been amended in section A.2 and the discharge has been amended to the river as per AMDAL. CAR 2 closed.
CAR 3 Section D of PDD to be made consistent with AMDAL report.	18.1	Section D of the PDD has been updated in accordance with AMDAL.	Environmental impact has been amended in the PDD in accordance to AMDAL. CAR 3 closed.
CL 1 Noted that the starting date of the first crediting period indicated in the PDD was 31/08/2012 or project registration date. However, since the project schedule commissioning date of the plant would be in June 2013, PP has yet to change the starting date based on the appropriate date.	6.5	Section C.2.2.1 of the PDD has been updated to read as follows: "The start date of the crediting period will be 30/11/2013 (i.e. the expected operational start date of the project activity) or the date on which the project is registered as a CDM project activity, whichever is later".	Section C.2.2.1 of the PDD has been updated in accordance to the project implementation schedule. CL 1 closed.
CL 2 The methodology selected was in line with the project category which was AMS-III.H vers. 16. However PP to clarify on the use of para 1 (e) for Greenfield project activity.	7.1	Paragraph 1(e) has been changed to paragraph 1(f).	Justification of choice of the project category for Greenfield project has been adequately explain in section B.2 Table 1 of the PDD. CL 2 closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to Table 1 & 2	Response from project participant	Validation team conclusion
CL 3 Explanation on applicability of para 28 (2) (b) on the linkages on the top 20% of registered CDM project with similar or identical plant and with the lowest emission reduction rate per ton COD removal was unclear and need more justification.	7.1	Explanation on applicability of paragraph 28 (2) (b) on the linkages on the top 20% of registered CDM project with similar or identical plant and with the lowest emission reduction rate per ton COD removal has been included in Annex 3 of the PDD.	Annex 3 of the PDD has been amended as per para 28 (2) (b) on the linkages on the top 20% of registered CDM project with similar or identical plant and with the lowest emission reduction rate per ton COD removal. CL 3 closed.
CL 4 Clarification is needed in PDD on the use of 65,000 ppm of $COD_{untreated,l,y}$ to ensure that emission reduction calculation is conservative and falls under small scale emission reduction limit.	10.1	The clarification on the COD value is now provided in the updated PDD under Section B.6.1. The value of $COD_{untreated,i,y}$ (65,000 mg/L) is based on the design value provided by a third-party consultant for the palm oil mill. The supporting evidence is provided along with the response to CAR and CL.	Clarification on $COD_{untreated,l,y}$ value has adequately been addressed in Table 8 section B.6.1 of the PDD together with the supporting evidence from Golden Palm Consultancy. CL 4 closed.
CL 5 More information is needed in table 5 of the PDD on the link to the UNFCCC registered project for Alternative 2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment).	13.1	Information on the registered PDD (with the link to the UNFCCC) of the projects implementing Alternative 2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment) has been included in Table 5 of the PDD.	Alternative 2 in Table 5 of the PDD has been amended adequately with the reference footnotes of 12, 13, 14, 15, 16 and 17. CL 5 closed.
CL 6 More information is needed and included in Alternative 5 (Anaerobic digester without methane recovery) and Alternative 6 (Anaerobic digester with methane recovery but not registered as CDM project) on the reference of journal for the investment barrier.	15.2	Reference on investment barrier for implementing Alternative 5 (Anaerobic digester without methane recovery) and Alternative 6 (Anaerobic digester with methane recovery but not registered as CDM project) has been included in Table 5 of the PDD.	Alternative 5 and 6 in Table 5 of the PDD has been amended adequately with reference footnote of 18 and 19. CL 6 closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to Table 1 & 2	Response from project participant	Validation team conclusion
CL 7 More information is needed and included the reference on technological barrier on Alternative 2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment).	15.2	Reference on technological barrier for implementing Alternative 2 (Installation of anaerobic lagoons with sealed covers for wastewater treatment) has been included in Table 5 of the PDD.	Alternative 2 in Table 5 of the PDD has been amended adequately with the reference footnotes of 12, 13, 14, 15, 16 and 17. CL 7 closed.
CL 8 Footnote 19 in PDD is inconsistent with registered projects.	15.2	Footnote 30 (footnote 19 in Version 1 of the PDD) of the PDD has been updated, to refer to registered projects in Annex 3.	Footnote 30 has been linked to the referred registered projects in Annex 3. CL 8 closed.
CL 9 Information on boiler used for methane destruction was insufficient with lack of detail on the number of boiler used, its capacity, the specifications and also reiterated that biomass boiler is mainly used while methane fuel boiler is additional.	17.1	The PDD has been updated to incorporate the details on the boiler. One boiler will be installed with the following specifications. Guaranteed steam output : 35,000 kg/h (35 MT/h) Operating pressure : 30 barg Steam temperature : 280°C The boiler will be a co-fired boiler which can use both biomass and biogas as fuel.	Technical specification of the boiler has been included in section A.4.2 of the PDD even though the use of biogas (boiler) is not covered within the project activity. The statement that the boiler will be co-firing the biomass and biogas has also been included. CL 9 closed.
CL 10 More information on the calibration requirements to be included in the QA/QC section of data to be monitored.	17.1	The information on calibration of the measurement device in the relevant tables under Section B.7.1 has been updated to include that calibration will be conducted as per the manufacturer's specification or once every three years, whichever is earlier.	QA/QC section B.7.1 of the PDD has been amended adequately. CL 10 closed.
CL 11 Clarification is needed in table 1.2 and table 2.1 of the section B.7.1 of PDD on doing analysing internally (internal lab with method used, frequency) and cross checking with the	17.1	Tables 1.3 (previously is Table 1.2 in PDD Version 1), 2.1 and 2.2 (i.e. $COD_{untreated,i,y}$, $COD_{ww,treated,y}$ and $COD_{ww,discharge,PJ,y}$) under Section B.7.1 of version 2 of the PDD have been	Detail of sampling measurement, frequency and size is provided in Annex 4 of the PDD. CL 11 closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to Table 1 & 2	Response from project participant	Validation team conclusion
external accredited lab.		updated. The measurement of COD will be according to national or international standards by internal team from PP. The COD will be measured through representative sampling. The values will be cross-checked periodically through an accredited laboratory. Further information on the frequency of sampling is provided under Annex-4 of the PDD.	
CL 12 Clarification is needed on monitoring of energy consumed by project activity in accordance to fulfil para 9 of the methodology in section B.7.1 referring to table 2.10 to 2.14 of the PDD.	17.1	The PDD has been updated to account for project emissions due to electricity consumption in the project activity. The electricity source for the project activity is generally from renewable energy source i.e. biomass and biogas based captive power plant in the palm oil mill. However, in the case when electricity is sourced from diesel based back-up generator, emissions on account of electricity consumption will be accounted in accordance with "Tool to calculate baseline, project and/or leakage emission from electricity consumption" (version 1).	$EC_{PJ,y}$ has been accounted using electricity meter (dedicated to diesel gen set line) for quantity of electricity consumed by project activity using diesel gen set. CL 12 closed.

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APPENDIX B
Auditor’s Certificate

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 Scope No: 13 - Waste handling disposal

TA 13.1 - Waste handling and disposal.

Sectoral Scope No: 15 - Agriculture

TA 15.1 - Agriculture

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

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**