



VALIDATION REPORT

TRADEWINDS METHANE EXTRACTION AND POWER GENERATION PROJECT

REPORT No. 2006-1021

REVISION No. 01

DET NORSKE VERITAS



VALIDATION REPORT

Date of first issue: 2007-01-22	Project No.: 92061021
Approved by: Einar Ternes Director	Organisational unit: DNV Certification AS, International Climate Change Services
Client: BioX Carbon Malaysia Sdn. Bhd.	Client ref.: Mr Mohammad Iskandar Majidi

DET NORSKE VERITAS
CERTIFICATION AS

Veritasveien 1
1322 Høvik
Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
<http://www.dnv.com>
Org. No: NO 945 748931 MVA

Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the “Tradewinds Methane Extraction and Power Generation” project in Malaysia on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design documents, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion. This draft validation report summarises the initial findings of the validation after phase I&II.

In summary, it is DNV’s opinion that the project, as described in the project design document of 4 July 2007, meets all relevant UNFCCC requirements for the CDM, and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0022. Hence, DNV requests the registration of the Tradewinds Methane Extraction and Power Generation as a CDM project activity.

Report No.: 2006-1021		Subject Group: Environment					
Report title: Tradewinds Methane Extraction and Power Generation Project							
Work carried out by: Lai Chee Keong, Ramesh Ramachandran, Cheong Tse Wei							
Work verified by: Einar Ternes							
Date of this revision: 2007-08-08	Rev. No.: 01	Number of pages: 13					
Indexing terms <table border="1"> <tr> <td rowspan="3">Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism</td> <td>Service Area Validation</td> </tr> <tr> <td>Market Sector</td> </tr> <tr> <td>Process Industry</td> </tr> </table>				Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Validation	Market Sector	Process Industry
Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Validation						
	Market Sector						
	Process Industry						
<input checked="" type="checkbox"/> No distribution without permission from the client or responsible organisational unit <input type="checkbox"/> free distribution within DNV after 3 years <input type="checkbox"/> Strictly confidential <input type="checkbox"/> Unrestricted distribution							
© 2002 Det Norske Veritas AS All rights reserved. This publication or parts thereof may not be reproduced or transmitted in any form or by any means, including photocopying or recording, without the prior written consent of Det Norske Veritas AS.							



<i>Table of Content</i>	<i>Page</i>
1 INTRODUCTION	1
1.1 Validation Objective	1
1.2 Scope	1
1.3 Description of Proposed CDM Project	1
2 METHODOLOGY	2
2.1 Review of Documents	4
2.2 Follow-up Interviews	4
2.3 Resolution of Clarification and Corrective Action Requests	4
2.4 Internal Quality Control	5
3 VALIDATION FINDINGS	5
3.1 Participation Requirements	5
3.2 Project Design	5
3.3 Baseline Determination	6
3.4 Additionality	9
3.5 Monitoring Plan	9
3.6 Calculation of GHG Emissions	9
3.7 Environmental Impacts	10
3.8 Comments by Local Stakeholders	10
4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS.....	11
5 VALIDATION OPINION	12
REFERENCES.....	13
Appendix A Validation Protocol	
Appendix B Certificates of Competence	

***Abbreviations***

BOD	Biochemical Oxygen Demand
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
COD	Chemical Oxygen Demand
DNV	Det Norske Veritas
DNA	Designated National Authority
FFB	Fresh Fruit Bunch
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NCV	Net Calorific Value
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
POME	Palm Oil Mill Effluent
UNFCCC	United Nations Framework Convention on Climate Change



1 INTRODUCTION

BioX Carbon Malaysia Sdn. Bhd. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Tradewinds Methane Extraction and Power Generation” project in Miri, Malaysia (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for small-scale CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Mr Lai Chee Keong	DNV Industry Malaysia	Team leader, CDM validator
Mr Cheong Tse Wei	DNV Industry Malaysia	CDM auditor
Mr Ramesh Ramachandran	DNV Industry India	Sector expert
Mr Einar Telnes	DNV Industry Norway	Technical reviewer

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the 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 validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AM0022. The validation team has, based on the recommendations in the Validation and Verification Manual /5/ employed a risk-based approach, 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 project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

1.3 Description of Proposed CDM Project

The proposed project will consist of capturing methane generated by an existing anaerobic open pond used in the treatment of palm oil mill effluent (POME). The captured methane will be combusted to generate electricity for the mill, while excess biogas will be flared.

The project consists of the installation of a synthetic tarpaulin geomembrane over one of the six existing anaerobic open ponds to form an anaerobic bioreactor. The geomembrane prevents methane emissions from the anaerobic process from escaping into the atmosphere. Other



components of the project include a methane gas collector over the bioreactor, a 0.3 MW_{elec} gas engine generator set to produce electricity and a flaring system to flare excess methane.

Emission reductions are claimed from (i) the capture and combustion of methane emissions from the anaerobic wastewater treatment pond, and (ii) the displacement of electricity generated from the existing diesel generators.

The proposed project is expected to reduce an average of 24 181 tonnes of CO₂e per year over a fixed crediting period of 10 years, beginning on 1 November 2007. The operational lifespan of the project is estimated to be 12.5 years.

2 METHODOLOGY

The validation consists of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /5/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

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

The completed validation protocol for the “Tradewinds Methane Extraction and Power Generation” project is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) validation protocol requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	Reference	Conclusion	Cross reference
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.</i>	<i>Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.</i>

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). A request for Clarification (CL) is used when the validation team has identified a need for further clarification.</i>

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<i>If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1 Validation protocol tables



2.1 Review of Documents

The PDD /1/ (version 2 dated 27 September 2006 and version 6 dated 4 July 2007) submitted by BioX Carbon Malaysia Sdn. Bhd. and spreadsheets for the emission reduction calculations /4/ were reviewed as part of the validation.

2.2 Follow-up Interviews

In the period of 11-12 December 2006, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Tradewinds Plantation Services Sdn. Bhd. and BioX Carbon Malaysia Sdn. Bhd. were interviewed. The DNA of Malaysia was interviewed on the 24th November 2006. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Tradewinds Plantation Services Sdn. Bhd.	<ul style="list-style-type: none"> ➤ Historical POME generation and electricity consumption ➤ Monitoring, reporting and record keeping procedures ➤ Calibration, internal audit and corrective action procedures ➤ Provisions for training, operation and maintenance ➤ Compliance with existing environmental regulations
BioX Carbon Malaysia Sdn. Bhd.	<ul style="list-style-type: none"> ➤ Estimated emission reductions ➤ Assumptions in baseline determination ➤ Stakeholder consultation process ➤ Provisions for training, operation and maintenance ➤ Permit to Operate ➤ Technology applied and operational lifetime ➤ Project funding sources
DNA of Malaysia (Conservation and Environmental Management Division, Ministry of Natural Resources and Environment)	<ul style="list-style-type: none"> ➤ Common practice with regards to methane capture in palm oil mills ➤ Incentives in place to invest in renewable energy ➤ Process of obtaining host country approval for CDM projects in Malaysia and the status for this project ➤ Sustainable development priorities ➤ Legal compliance and existing / emerging requirements ➤ Stakeholder consultation process ➤ Official government funding

2.3 Resolution of Clarification and Corrective Action Requests

The initial validation identified 3 corrective action requests and 6 requests for clarifications. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.



BioX Carbon Malaysia Sdn. Bhd. has responded to these CARs and CLs in table 3 of appendix A. The responses have been reviewed and comments from DNV have been included.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

3.1 Participation Requirements

The project participants are Tradewinds Plantation Management Sdn. Bhd. and BioX Carbon Malaysia Sdn. Bhd. of Malaysia, and BioX Carbon BV of Netherlands. The Parties involved, i.e. Malaysia as the host Party and the Netherlands as the participating Annex I Party, meet the requirements to participate in the CDM. Written approvals of voluntary participation from the DNA of Malaysia and the Netherlands have been obtained.

3.2 Project Design

The objective of the proposed project activity is to reduce greenhouse gas emissions through:

- (i) Capture and combustion of methane emitted from the treatment of POME in open anaerobic ponds, and
- (ii) Combustion of captured methane for power generation to displace electricity generated by diesel generators.

The above mentioned will be achieved with the installation of a cover over an existing anaerobic pond to create an anaerobic bioreactor. Methane emitted from the bioreactor will be removed, cleaned and combusted in a 0.3 MW_{electrical} gas engine generator to produce electricity for the mill. Excess methane not required by the gas engine generator will be flared.

The mill's primary source of electricity is its biomass-fuelled cogeneration plant, which also supplies power to the plantation worker's living quarters. Diesel generators are used to produce electricity during the start-up phase of the mill's boiler, when the mill is shut down for maintenance, and to supply the workers living quarters when the mill is not in operation. The project intends to replace electricity from the diesel generators with carbon-neutral electricity generated from the combustion of captured methane.

The project started on October 27 2006 and has an estimated operational lifespan of 12.5 years. The starting date of the crediting period is anticipated to be 1st November 2007. However if the date of registration is later than 1st November 2007, the date of registration will be the starting date.



By promoting renewable energy, the project is likely to contribute to sustainable development in Malaysia. The DNA of Malaysia has confirmed that the project assists in achieving sustainable development.

The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards the government Malaysia.

3.3 Baseline Determination

The project applies the approved baseline methodology AM0022 “Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector”, version 4 of 22 December 2006/6/. The project fulfils the following conditions under which AM0022 is applicable:

- The project is implemented in an existing anaerobic pond wastewater treatment facility for POME, which has a high organic loading;
- The organic wastewater contains a large fraction of simple organic compounds. However, the effluent also contains complex compounds, which are expected to produce more methane per kg of COD digested;
- The project involves the improvement of an existing wastewater treatment facility;
- The baseline scenario is the continuation of a current lagoon system for managing wastewater;
- The depth of the anaerobic lagoons is estimated to be 5m, which is greater than 1 m;
- The temperature of the wastewater in the anaerobic lagoons is anticipated to be in the region of 30°C, which is greater than 15 °C;
- The biogas recovered from the anaerobic treatment system is used onsite for power generation, and any surplus biogas will be flared;
- The electricity needs per unit input of the water treatment facility remain largely unchanged before and after the project;
- The data requirements laid out in the Monitoring Methodology of AM0022 can be fulfilled.

To demonstrate that the baseline scenario is the continued use of open anaerobic ponds for wastewater treatment, the following six steps were conducted, in accordance to AM0022.

Step 1: List Potential Baseline Options.

Potential alternative scenarios to the proposed project activity which will provide wastewater treatment services include:

1. Direct release of wastewater to a nearby water body,
2. The continuation of existing open anaerobic pond system,
3. The proposed anaerobic treatment facility not taken as a CDM project activity, and
4. New aerobic treatment facility.



The list of potential baseline options covers the range of available treatment options for POME. This will allow for an accurate determination of the baseline scenario for this project.

Step 2: Select Barriers That Can be Demonstrated to be Significant.

Barrier to the implementation of the potential baseline options include:

1. Legal Barriers

Effluent from wastewater treatment facilities must comply with the legal requirements stipulated in the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977 /7/, which states that the permissible biological oxygen demand (BOD) of POME is 5000mg/l for land application and 100mg/l for waterway discharge.

Raw POME generally has a BOD well in excess 100mg/l. As such, the option to directly release wastewater into a nearby water body will not comply with the legal requirement and is not considered as a valid baseline.

Aerobic and anaerobic treatment systems, as well as the existing system can be designed to produce effluent that is able to meet the discharge requirements.

It is thus correctly concluded that only the discharge of raw POME will face legal barriers.

2. Technical Barriers

Open anaerobic pond systems are simple to construct and operate, and do not require significant amounts of electricity and operator input to maintain it in good working condition.

Anaerobic treatment facilities such as the proposed project are more complex systems which require greater technical knowledge to operate and the constant management of various elements such as pH, temperature and flow. As a result, the technological risks associated with this technology are higher compared to the other options. The same is applicable to aerobic treatment systems.

The descriptions of the technical barriers clearly demonstrate that open pond systems face significantly less technical barriers compared to aerobic and anaerobic systems, and this has been confirmed during validation.

3. Financial Barriers

The existing system is already installed and does not require additional investments. In addition, its operational costs are minimal due to its low power consumption. In contrast, aerobic and anaerobic treatment systems require a constant supply of electricity to ensure proper operations. This would be in addition to the capital investment required for the installation of these systems at the project site. As such, aerobic and anaerobic treatment systems faces greater financial barriers compared to the existing system.

The higher operational costs and capital investments is therefore considered a clear financial barrier to the aerobic and anaerobic treatment of POME.



4. Social Barriers

The treatment of POME in open anaerobic ponds generates methane, which is emitted into the atmosphere and generates a foul odour. The mill occasionally receives complaints regarding this matter, though the local community accepts this as normal practice for palm oil mill operations.

The perceived risks associated with new technology also present a social barrier to the aerobic and anaerobic treatment options. Safety issues with regards the collection and storage of biogas are also a concern.

Overall, social issues are a minor barrier for all the proposed baseline options except for the existing system.

5. Business Culture and Other Barriers

The highest priority for most mill owners with regards to POME treatment is to comply with legal requirements at the lowest possible cost. Only the existing system is able to meet this requirement due to its low costs and ease of operation. Energy generation from POME is not a priority due to the abundance of energy produced by the mill's biomass-fuelled cogeneration boiler.

In short, business culture issues are considered a minor barrier to the alternative scenarios and are not a barrier to the current pond based treatment system.

Step 3: Score the Barriers

This was conducted by filling in Table 1 of AM0022 with project specific data. The completed data is as shown in Section B.4 of the PDD. The barriers were correctly scored based on the arguments provided under step 2.

Step 4: Identify the Most Likely Baseline Scenario

Based on the results from the table 1, Section B.4 of the PDD, the existing system of open anaerobic ponds faces the least number of barriers among the potential baseline options and was thus correctly selected as the most plausible baseline.

Step 5: Investment Analysis

An investment analysis is not required because only one plausible baseline option was obtained from the barrier analysis in Step 2 to 4.

Step 6: Conclusion

The existing open anaerobic pond system was confirmed to be the most likely baseline due to the following reasons:

- a. It complies with legal requirements;
- b. It has the lowest technological risk among all the possible options;



- c. It is cheap and simple to operate;
- d. It does not require any additional capital investment;
- e. It is a common practice in the industry for treating POME.

It is therefore justified that the current practice and emissions on the site would continue in the absence of the CDM project activity.

3.4 Additionality

In accordance to AM0022 version 04/6/, the project is considered as additional if it can be demonstrated that the baseline is different from the proposed project activity not undertaken as a CDM project. From Section 3.3, the baseline was determined to be the continued use of existing open anaerobic ponds for POME treatment without methane capture. This is different from the proposed activity, which will utilise an anaerobic treatment facility and the extraction of biogas for electricity generation.

Based on the justification listed in section 3.3, it is concluded that the project is additional.

3.5 Monitoring Plan

The project correctly applied the approved monitoring methodology AM0022 “Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector” version 04, 22 December 2006 /6/.

The parameters to be measured and their measurement frequencies are in accordance to the approved monitoring methodology AM0022. It has been confirmed during the site visit and interviews. The PDD has been revised to include the volume of wastewater leaving the waste water treatment facility, flare combustion efficiency, gas engine combustion efficiency, and net calorific value of biogas. Stipulated monitoring frequencies for respective monitoring parameters will be implemented.

Provisions for calibration of the monitoring equipment are not described in the project documentation. Calibration procedures will be established and at least be implemented prior to the commencement of the project.

The responsibilities and authorities for project management have been defined and procedures for monitoring and reporting, including QA/QC procedures, have been identified.

All critical data are either measured or calculated and archived for the crediting period plus 2 years beyond as per the approved monitoring methodology.

3.6 Calculation of GHG Emissions

The formulas and factors used in the project’s emissions calculations are in accordance to the approved baseline methodology AM0022, version 4 dated 22 December 2006/6/.

In the baseline scenario, methane is emitted from the mill’s six open anaerobic ponds, and CO₂ is emitted during the generation of electricity by diesel generators. All relevant baseline emissions



are accounted for by these two sources. It was understood from the interview performed during the validation that the thermal energy and electricity needs of the mill is supplied by its biomass-fired cogeneration plant. The proposed project is to displace the usage of diesel-fired generators during the non-operating hours of biomass fired co-generation plant. Based on this scenario, the calculated baseline emission is 30,563 tCO₂e per year.

The total estimated project emissions is the sum of (a) fugitive methane emissions from the five remaining uncovered anaerobic ponds, (b) from the incomplete combustion of biogas in the gas engine generator and flare, and (c) from possible leaks in the biogas collection system. CO₂ emissions from the combustion of biogas are considered to be carbon neutral and are not included in the project emission calculations. Calculated project emissions based on this scenario are 6,382 tCO₂e per year.

As per AM00022, leakage resulting from the project activity is considered to be negligible.

The project's total emission reduction is calculated by subtracting the project emissions and leakages from the baseline emissions. This is calculated to be 24,181 tCO₂e per year, or 241,812 tCO₂e over its 10 year fixed crediting period.

Values and assumptions used in calculating the estimated emission reductions were obtained from the mill's operational records, on site measurements, data from technology providers, IPCC reference documents and conservative estimations. Based on documents reviewed, feedback from the local DNA and interviews with project proponents, these values and assumptions were verified to be conservative.

3.7 Environmental Impacts

The DNA of Malaysia has confirmed that an Environmental Impact Assessment (EIA) is not required for the project activity. The project is not expected to cause adverse environmental impacts. The project is not expected to generate any significant amount of solid or liquid waste.

3.8 Comments by Local Stakeholders

A stakeholder consultation was carried out on 6 November 2006 at the Binu Palm Oil Mill in Miri, Malaysia. The stakeholders were invited via advertisements in the local newspapers. In addition, written invitations were sent to statutory bodies and NGOs, while verbal invitations were extended to the local community.

Questions raised by the stakeholders were with regards to the technology used by the project, how the project could benefit the local community in terms of supplying gas for cooking, and the calculations used to determine biogas production and diesel savings. No adverse comments were received. The summary of comments has been included in the PDD in section E.2 and due account was taken and incorporated in the PDD section E.3. Additional details regarding the stakeholder comments are included in Annex 6 of the PDD.

The local stakeholder consultation process is deemed appropriate and in line with national requirements.



4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of 27 September 2006 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 18 Nov. to 17 Dec. 2006. Similarly, the revised PDD of 4 July 2007 was made publicly available from 10 July to 8 August 2007. Two comments from one stakeholder were received on 17 December 2006. The comments (in unedited form) is given in the below text box.

Comment by:	Yik Kew Chan, University of Malaya
Inserted On:	2006-12-17
Subject:	Tradewinds Methane Extraction and Power Generation Project
Comment:	<p>Comment 1:</p> <p>Re: page 2, Section B.2 -</p> <p>According to the Applicability Criteria no. 2 of AM0022, the organic wastewater contains simple organic compounds (mono-saccharides). Obviously, palm oil mill effluent from palm oil processing (more of triglycerides and fatty acids), which is drastically different in characteristics from wastewater of the starch industry, does not meet this requirement. Instead, the approved methodology which has been developed for palm oil mill effluent should be applied.</p> <p>Comment 2:</p> <p>Re: Section B.6.3 -</p> <p>It was stated in the Project Assumption for the Project Emission calculation on page 22 that: "The average treatment efficiency of anaerobic lagoons is 50% (based on anaerobic lagoon treatment efficiency in baseline scenario)". The factor of 0.5 should be applied to the calculation of the term $M/lagoon_total$ not only for the project emissions but also for the baseline emissions case.</p>

How DNV has considered the comment received in its validation:

DNV agrees with the response provided by the project proponent on 9 February 2007 that the methodology is not restricted only to wastewaters containing simple organic compounds (monosaccharides). As the required by the methodology the project proponent has evaluated the specific methane generation from palm oil effluents based on the study conducted by Yacob et al /8/. The study indicates a methane generation of 0.238 kg CH₄ /kg COD. However the project activity uses a more conservative value of 0.21 kg CH₄ /kg COD deemed applicable for simple organic compounds (monosaccharides) as mentioned in the methodology. DNV has assessed the information provided and considers the factor of 0.21 kg CH₄ / kg COD chosen as appropriate and conservative.

The assumptions and calculations related to lagoon treatment efficiency have been reassessed by the project proponent. DNV considers the explanation provided justified and appropriate.

The necessary changes have also been incorporated in the PDD.



5 VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “Tradewinds Methane Extraction and Power Generation” in Miri, Malaysia. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation consisted of the following three phases: i) a desk review of the project design, baseline and monitoring plan (December 2006), ii) follow-up interviews with project stakeholders (December 2006) and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion August 2007).

The host country is Malaysia and the Annex I country is Netherlands. Both countries fulfil the participation criteria and have approved the project and authorized the project participants. The DNA from Malaysia confirmed that the project assists in achieving sustainable development.

The project correctly applies the approved baseline and monitoring methodology AM0022 / version 04. The baseline is the amount of methane that would have been emitted to the atmosphere during the crediting period in the absence of the project activity. In accordance with AM0022, this is the amount of methane captured and flared and/or combusted as it can be assumed that the amount of CH₄ generated by the anaerobic digester in the project scenario is representative for the amount of CH₄ generated by the open anaerobic lagoons (ponds) in the baseline. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The monitoring plan is in line with the approved monitoring methodology AM0022 / Version 04. The monitoring plan makes sufficient provision for monitoring relevant project and baseline emission indicators. Detailed responsibilities and authorities for project management, monitoring and reporting and QA/QC procedures have also been envisaged.

The ex-ante GHG emission estimations are calculated and documented in a complete and transparent manner. The algorithm and methodologies for accounting GHG emissions are appropriate and the total emission reductions from the project are estimated to be on the average 24 181 tCO₂e per year over the selected 10 year crediting period.

The project is not expected to create any adverse environmental impacts. There is no requirement under Malaysian law for the proposed project activity to undergo an Environmental Impact Assessment.

In summary, it is DNV's opinion that the “Tradewinds Methane Extraction and Power Generation” in Malaysia, as described in the PDD of 4 July 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0022 (Version 04). DNV thus requests the registration of the project as a CDM project activity.



REFERENCES

Documents provided by the project proponent that relate directly to the project:

- /1/ BioX Energy Malaysia Sdn. Bhd.: “Tradewinds Methane Extraction and Power Generation” version 2, dated 27 September 2006 and version 6 dated 4 July 2007.
- /2/ Conservation and Environmental Management Division, Ministry of Natural Resources and Environment (DNA of Malaysia) *Letter of Approval dated 17 August 2007*
- /3/ Ministry of Housing, Spatial Planning and Environment (DNA of Netherlands): *Letter of Approval dated 9 February 2007*
- /4/ Spreadsheet for CER and IRR calculations
Written approval to the installation of bioreactor
Written approval to the installation of biogas engine
Wastewater test results (inlet and outlet)
Stakeholders’ consultation – minutes of meeting
Letter from the Sarawak Department of Environment regarding the compliance of palm oil mills in Sarawak to the effluent discharge standards, dated 4 July 2007.

Background documents related to the design and/or methodologies employed in the design or other reference documents:

- /5/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /6/ CDM Executive Board: “Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector” AM0022, version 04 of 22 December 2006
- /7/ Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977
- /8/ Yacob, S., Hassan, M.A., Shirai, Y., Wakisaka, M. and Subash, S. 2005. “Baseline study of methane emission from anaerobic ponds of palm oil mill effluent treatment.” Science of the Total Environment 366 (2006) 187 – 196.

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

- /9/ Mr. Ahmad Fauzi Ismail, Mill Manager of Tradewinds Plantation Services Sdn. Bhd.
- /10/ Mr. Mohamad Iskandar Majidi, Senior Manager of BioX Energy Malaysia Sdn. Bhd.
- /11/ Dr. Nazri, DNA of Malaysia
- /12/ Mr. Faizal, DNA of Malaysia

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	OK	Table 2, Section E.4.1 Netherlands has been identified as the Annex 1 country.
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	CAR 4	Table 2, Section A.3 Confirmation from the DNA of Malaysia has been obtained.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	CAR 4	The Letters of Approvals (LoA) from the DNA of Malaysia and Netherlands have been obtained.
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	The project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Malaysia.

Requirement	Reference	Conclusion	Cross Reference / Comment
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	<u>DNA of Malaysia:</u> Conservation and Environmental Management Division, Ministry of Natural Resources and Environment. <u>DNA of Netherlands:</u> Ministry of Housing, Spatial Planning and the Environment.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Malaysia ratified the Kyoto Protocol on 4 September 2002. Netherlands ratified to the Kyoto Protocol on 31 May 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	The assigned units of Netherlands has been calculated and recorded.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	Netherlands has in place a National Registry.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F The project is not expected to result in adverse environmental impacts.
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech	CDM Modalities and Procedures	OK	Table 2, Section D

Requirement	Reference	Conclusion	Cross Reference / Comment
Accords and relevant decisions of the COP/MOP	§37f		
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD of the "Tradewinds Methane Extraction and Power Generation" was made publicly available on www.dnv.com/certification/climatechange and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during the period from 18 Nov. to 17 Dec.2006. Two comments were received.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	CDM-PDD version 3 dated 28 July 2006.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity <i>The project design is assessed.</i>					
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The project is located near the town of Miri, in the state of Sarawak, Malaysia.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	<p>The project's system boundaries include the anaerobic bioreactor, the open anaerobic ponds, the 0.3 MW gas engine generator, the flare and the backup diesel power generators.</p> <p>The description of the project activity lacks clarity with respect to</p> <p>a) Configuration/flow regime/type of existing lagoon systems</p> <p>b) Discharge Standards (Land or Waterway)</p> <p>It has to be clarified with analytical data (inlet/outlet) whether the existing lagoon systems are able to meet the discharge standards</p>	GL-1	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.2. Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR	The project design engineering reflects good practices as it captures methane emissions from the anaerobic ponds and utilises it to generate electricity. This is superior to the current practice of allowing methane emissions to escape into the atmosphere.		OK
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR I	The technologies employed include a synthetic tarpaulin geomembrane, a methane gas collector, a 0.3 MW gas engine generator and a biogas flaring system. This is technologically superior to the current practice of only using open anaerobic ponds for POME treatment.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR I	The project is unlikely to be substituted by other more efficient technologies, at least within the ten year crediting period.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR I	BioX Carbon Malaysia Sdn. Bhd. will provide training to the local staff before the Project starts operating and generating CERS.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Yes, the project has made necessary provision for meeting training and maintenance needs.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.3. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR I	Permit to discharge and written approval for the constructions of bioreactor have been reviewed.		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR I	Yes, It was confirmed during the follow-up interview with the local DNA that the project is in line with Malaysia specific CDM requirements.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR I	Yes. The project contributes to sustainable development by: <ul style="list-style-type: none"> • Utilising biogas (a renewable energy source) for electricity generation, • Displacing the use of fossil fuel for power generation (by the displacement of diesel consumed in backup electricity generators), and • Creating employment through the establishment of a local support system for biogas reactors and gas engines. 		OK
A.3.4. Will the project create other environmental or social benefits besides GHG emission reductions?	/1/	DR	The project creates environmental benefits by capturing and combusting methane that would otherwise be emitted into the atmosphere. Methane emissions result in decreased air quality and odour problems to the surrounding area. Social benefits resulting from the project include increased employment opportunities and the improvement of local manpower		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			skills.		
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved baseline methodology AM0022 "Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector", version 03 dated 28 July 2006.(later updated to version 4)		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR I	Yes. The project fulfils the following conditions under which AM0022 is applicable. a. Project is implemented in an existing lagoon-based industrial wastewater treatment facilities for wastewater with high organic loading; b. The organic wastewater contains mainly simple organic compounds. However, the effluent also contains complex compounds, which are expected to produce more methane per kg of COD digested; (this is to be supported with laboratory test results) c. The project involves the improvement of	GL-2	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			<p>existing wastewater treatment facilities;</p> <p>d. The baseline scenario is the continuation of a current lagoon system for managing wastewater. The current lagoon based system is in full compliance with existing rules and regulations;</p> <p>e. The depth of the anaerobic lagoons is greater than 1m (estimated to be about 5 m);</p> <p>f. The temperature of the wastewater in the anaerobic lagoons is always at least 15 °C (in the region of 30 °C);</p> <p>g. The biogas recovered from the anaerobic treatment system is used onsite for power generation, and any surplus biogas is flared;</p> <p>h. The electricity needs per unit input of the water treatment facility remain largely unchanged before and after the project;</p> <p>i. The data requirements as laid out in the related Monitoring Methodology can be fulfilled.</p>		

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2. Baseline Determination <i>The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.</i>					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	Yes. The baseline discussion and determination was conducted in accordance to the 'Baseline Determination' section of AM0022.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR I	The Project has assumed that the methane emissions from inefficient combustion and leaks are expected to be negligible (page 16 & 17 of PDD). The Project Participants need to justify the assumption.	CL4	OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	The baseline was determined in accordance to AM0022: <u>Baseline scenario for wastewater treatment:</u> Treatment of POME by open anaerobic pond system without methane gas capture. <u>Baseline scenario for power generation:</u> Generation of power by diesel generators.		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR I	Yes. The baseline scenario complies with relevant environmental regulations and current prevailing practices.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR I	Yes. Baseline is compatible with existing data.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	<p>The selected baseline scenario was determined in accordance to AM0022:</p> <p>Step 1: List Potential Baseline Options</p> <ol style="list-style-type: none"> 1. The existing open anaerobic pond system; 2. Direct release of wastewater to a nearby water body; 3. Aerobic treatment facility; 4. The proposed anaerobic treatment facility not taken as a CDM project activity. <p>Step 2: Select Barriers That Can be Demonstrated to be Significant</p> <ol style="list-style-type: none"> 1. Legal barriers 2. Technical barriers 3. Financial barriers 4. Social barriers 5. Business culture and other barriers <p>Step 3: Score the Barriers</p> <p><u>Existing Open Anaerobic Pond System</u></p> <ul style="list-style-type: none"> • This scenario does not face any of the barriers indicated in Step 2. <p><u>Direct Release to Nearby Water Body</u></p> <ul style="list-style-type: none"> • This scenario does not comply with legal requirements. As such, it is not a viable baseline scenario. 		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			<p><u>Aerobic Treatment Facility</u></p> <ul style="list-style-type: none"> This scenario has significant technological risks and faces financial barriers due to its high electrical power requirements. Social barriers and existing business cultures are minor barriers to this baseline. <p><u>Anaerobic Treatment Facility Not Taken as CDM</u></p> <ul style="list-style-type: none"> This scenario faces financial barriers due to its high initial investment; The technology required is difficult to purchase through local suppliers and is not commonly used in similar industries; Social barriers and existing business cultures are minor barriers to this baseline. <p>Step 4: Identify the Most Likely Baseline Scenario The existing anaerobic pond system faces the least number of barriers among the potential baseline options. Therefore, it is the most likely baseline.</p> <p>Step 5: Conduct an Investment Analysis There is only one plausible baseline option. As such, an investment analysis is not necessary.</p>		

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Step 6: Conclusion The existing open anaerobic pond system is the most likely baseline because: <ol style="list-style-type: none"> 1. It complies with legal requirements; 2. It is a common practice in the industry for treating POME; 3. It does not require any additional capital investment; 4. It has the lowest technological risk among all the possible options. 		
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/	DR	Please refer to B.2.6.		OK
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	Risks related to existing fossil fuel consumption, COD removal efficiency of existing treatment systems, and compliance of existing system to legal requirements have been identified and addressed.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR I	2006's IPCC values should be used.	CL-4	OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR	The project starting date is 1 November 2006, and is estimated to have an operational lifetime of 12.5 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	The project selected a fixed crediting period of 10 years, starting from 1 April 2007. (Changed to 1 November, 2007)		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D. Monitoring Plan <i>The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).</i>					
D.1. Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	Yes. The project applies the approved monitoring methodology AM0022 version 3 dated 28 July 2006 "Avoided Wastewater On-site Energy Emissions in the Industrial Sector".(Later updated).		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes. Please refer to B.1.2		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR I	It was made clear during the follow-up interview that there were a number of inconsistencies in terms of monitoring parameters and monitoring frequencies. The existing monitoring plan in PDD does not include the following data variables as required by methodology: a) Wastewater flows leaving project treatment facility b) Flare combustion efficiency c) Gas engine combustion efficiency	CAR-3	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			d) Flow of wastewater directly to the current treatment system and bypassing the new wastewater treatment facility. e) Loss of biogas from pipeline f) Organic Material removed from wastewater facility (lagoon) g) Biogas Calorific value h) Amounts of chemical oxidising agents entering system boundary.		
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes. Monitoring methodology selected is in accordance to AM0022.		OK
D.2. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR I	Yes. Project related data will be collected and archived for the crediting period plus 2 years as per the approved methodology AM0022. It will allow for the determination of project emissions.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR I	Yes, data needed to calculate project emissions will be directly monitored at regular intervals. The existing monitoring plan in PDD does not include the following data variables as required by methodology: a) Wastewater flows leaving project treatment facility b) Flare combustion efficiency c) Gas engine combustion efficiency	GAR-3	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			d) Flow of wastewater directly to the current treatment system and bypassing the new wastewater treatment facility. e) Loss of biogas from pipeline f) Organic Material removed from wastewater facility (lagoon) g) Biogas Calorific value h) Amounts of chemical oxidising agents entering system boundary. The PDD has to be revised to include the volume of wastewater leaving the waste water treatment facility, flare combustion efficiency, gas engine combustion efficiency, and net calorific value of biogas.		
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR, I	Yes. Measurement equipment will be installed to monitor these indicators. The number of measurement equipment to be used has yet to be determined.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	Yes. These indicators will allow the measurement of fugitive methane emissions resulting from incomplete combustion, leakages, and emissions from subsequent anaerobic ponds.		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	Yes		OK
D.3. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
D.3.1. Does the monitoring plan provide for the	/1/	DR	In accordance to AM0022, leakage due to		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Page A-15

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
collection and archiving of all relevant data necessary for determining leakage?			the project activity is considered to be negligible.		
D.4. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes. The data collected and archived is in accordance to AM0022 and will allow for the determination of baseline emissions.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Yes, most of the data necessary to calculate baseline emissions will be directly monitored at regular intervals. The following factors/ parameters as required by the methodology are to be assessed and justification for the appropriate values used in PDD to be given. a) Organic removal ratio b) Organic material deposition/sedimentation removals c) Sensitivity analysis for surface aerobic losses of organic material (COD) d) Chemical Oxidation Removals	GL-3	OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes. Measurement equipment will be installed to monitor these indicators.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?			Yes. These indicators will allow the measurement of electricity generated by the gas engine generator, CO ₂ emissions from diesel combustion in the generator set and the estimation of methane emissions from		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			the anaerobic ponds.		
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR, I	There is no specific requirement from the approved methodology nor the local DNA.		OK
D.6. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	Yes, the authority and responsibility of project management is described in Annex 4 (Monitoring Plan) of the PDD.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	It was indicated in the Monitoring Plan that the project developers will implement a management and operational system for monitoring of GHG emission reductions.		OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR I	Internal training will be made available to operational staff before the Project begins operations.		OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR I	No such emergencies were identified in the monitoring plan. It is not clear if such emergencies are likely to occur. It was reported during Follow-up Interview that an internal procedure will be established and implemented.	GL-6	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR I	Provisions for calibration of the monitoring equipment are not clear in the project documentation. Calibration procedures should at the latest be implemented prior to commencement of the project.	CL-5	OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR I	Provisions for calibration of the monitoring equipment are not clear in the project documentation. Calibration procedures should at the latest be implemented prior to commencement of the project.	CL-5	OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR I	The procedures for monitoring, measurement and reporting were mentioned in the Monitoring Plan. However, the Monitoring Plan only contains general statements regarding the procedures. It was reported during follow-up interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR I	The PDD contains general statements with regards to the day-to-day records handling. It was reported during follow-up interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR I	The PDD contains general statements with regards to the monitoring data adjustments na uncertainties. It was reported during follow-up interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR I	The PDD contains general statements with regards to review of reported results/data. It was reported during follow-up interview that	CL-6	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			current internal procedure will be revised to include the proposed bioreactor.		
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR I	The PDD contains general statements with regards to internal audits of GHG project compliance with operational requirements. It was reported during Follow-up Interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR I	The PDD contains general statements with regards to performance reviews. It was reported during follow-up interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR I	The PDD contains general statements with regards to corrective actions in times of deviation. It was reported during follow-up interview that current internal procedure will be revised to include the proposed bioreactor.	CL-6	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E. Calculation of GHG Emissions by Source <i>It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.</i>					
E.1. Project GHG Emissions <i>The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.</i>					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR I	Fugitive emissions from incomplete combustion, leaks in the biogas system and wastewater from the dewater process were not included in the calculations. The Project assumed that these emissions are negligible.	GL4	OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR I	There are some discrepancies with regards to unit conversions in the spreadsheet. These should be corrected in the PDD.	GL4	OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	No. Please refer to B.2.2	GL4	OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	Yes		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	Yes		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.2. Leakage <i>It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.</i>					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	In accordance to AM0022, leakage resulting from the project activity is considered to be negligible.		OK
E.3. Baseline Emissions <i>The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.</i>					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	Yes. The baseline emissions include methane emissions from the anaerobic lagoons and CO ₂ emissions from fossil fuel combustion for electricity generation.		OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	Yes. The baseline boundaries were determined in accordance to AM0022.		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	The calculations in the PDD are in accordance to AM0022.		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR I	Yes, assumptions made in the calculation of baseline emissions should be referenced.	GL-4	OK
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	. As required by the methodology the emission reduction calculations do not include verification of whether the emissions of CH ₄ from the lagoons in the baseline situation are not higher than the total	CAR-2	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			emissions of biogas from the digester and lagoons in the project situation so as to ensure a conservative estimate.		
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	As required by the methodology the emission reduction calculations do not include verification of whether the emissions of CH ₄ from the lagoons in the baseline situation are not higher than the total emissions of biogas from the digester and lagoons in the project situation so as to ensure a conservative estimate.	CAR-2	OK
E.4.Emission Reductions <i>Validation of ex-ante estimated emission reductions.</i>					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	Yes. The project is estimated to reduce 30,366.6 tCO ₂ e per year over the next 10 years.		OK
F. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR I	Yes. The project is not expected to result in adverse environmental impacts.		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR I	No EIA is required by the host country. This has been confirmed with the DNA of Malaysia.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR I	The project is expected to have positive environmental impacts as a result of reduced methane and odours emissions from the anaerobic ponds, and a reduction		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			in fossil fuel consumption.		
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR I	There are no adverse transboundary environmental impacts.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR I	Yes, the minor environmental concerns from the project have been addressed in the PDD.		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR I	Yes.		OK
G. Stakeholder Comments <i>The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.</i>					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR I	Yes. The stakeholder consultation was conducted on 6 November 2006 at Binu Palm Oil Mill in Miri.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR I	Stakeholders were invited for the consultation meeting via advertisements in local newspapers, written invitations, and verbal invitations.		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR I	Yes.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes, it is incorporated in Section E.2 and Annex 6 of the PDD.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	Yes, it is incorporated in Section E.3 and Annex 6 of the PDD.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CAR 1</p> <p>Written approval of voluntary participation from the DNAs of Malaysia, the Netherlands, including a confirmation by the DNA of Malaysia that the project assists in achieving sustainable development is pending.</p>	<p>Table 1 (Section 4)</p>	<p>Malaysian host country approval was received on 28 December 2006 and further extended to 30th June 2007. The approval from DNA of Netherlands was obtained on 9th February 2007.</p>	<p>OK. Copies of the LoAs from the DNA of Malaysia and the Netherlands have been submitted to DNV.</p>
<p>CAR 2</p> <p>As required by the methodology the emission reduction calculations do not include verification of whether the emissions of CH₄ from the lagoons in the baseline situation are not higher than the total emissions of biogas from the digester and lagoons in the project situation so as to ensure a conservative estimate.</p>	<p>E.3.5 E.3.6</p>	<p>The anaerobic activity in the bioreactor would be optimized and expect to generate more methane than the baseline situation. The baseline calculation is done conservatively. The calculation has been added into the PDD, page 30 (Formula 13).</p>	<p>OK. The emission reduction calculations has included the verification of whether the methane emission from the lagoons in the baseline situation are not higher than the total emissions of biogas from the digester and lagoons in the project situation. The project situation was anticipated to be higher than the baseline by 1,257.8 tCO₂e/year</p>

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CAR 3</p> <p>The existing monitoring plan in PDD does not include the following data variables as required by methodology:</p> <ul style="list-style-type: none"> a) Wastewater flows leaving project treatment facility b) Flare combustion efficiency c) Gas engine combustion efficiency d) Flow of wastewater directly to the current treatment system and bypassing the new wastewater treatment facility. e) Loss of biogas from pipeline f) Organic Material removed from wastewater facility (lagoon) g) Biogas Calorific value h) Amounts of chemical oxidising agents entering system boundary. 	<p>D.1.3</p> <p>D.2.2</p>	<p>All these data would be monitored as per the requirement of the methodology and included in the project monitoring procedures. This information has been included in the PDD. Although no chemical is added in palm oil extraction process, it would still be monitored in case any change in the production process.</p> <p>The following monitoring parameters have been included in the revised PDD. The number in bracket indicates the monitoring item number.</p> <ul style="list-style-type: none"> a) Wastewater flows leaving project treatment facility (2) b) Flare combustion efficiency (11) IPCC default value 90% for Enclosed Flare c) Gas engine combustion efficiency (13) d) Flow of wastewater directly to the current treatment system and bypassing the new wastewater treatment facility.(15) e) Loss of biogas from pipeline (16) f) Organic Material removed from wastewater facility (lagoon) (17) g) Biogas Calorific value (18) h) Amounts of chemical oxidising agents (12) 	<p>OK. Those data variables left out initially have now been incorporated into the PDD, version 4. The frequency of monitoring are now in accordance those stipulated in the approved methodology.</p>
<p>CL 1</p> <p>The description of the project activity lacks clarity with respect to</p>	<p>A.1.2</p>	<p>a) The existing configuration of the wastewater system has been included into the PDD in section A.2 figure 1.</p>	<p>OK. The configuration of the wastewater system has now been incorporated into the PDD. The existing</p>

* MoV = Means of Verification, DR= Document Review, I= Interview

Page A-25

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>a) Configuration/flow regime/type of existing lagoon systems</p> <p>b) Discharge Standards (Land or Waterway)</p> <p>It has to be clarified with analytical data (inlet/outlet) whether the existing lagoon systems are able to meet the discharge standards</p>		<p>b) The current wastewater treatment system was designed to meet the discharge requirement of the palm oil mill which was a main requirement for approval of license to operate. Consistently meeting the required limit however has been a huge struggle not only for this mill but for most mills in the industry. This is mainly due to the inconsistent nature of palm oil fruits and mill operation. Since the beginning of operation, the mill has had no problem in getting their yearly wastewater discharge license renewed. It must be noted that there is no requirement for biogas/methane capture in local wastewater treatment regulation.</p>	<p>POME treatment system was generally not able to comply with the discharge standards applicable to most palm oil mills (BOD at 20 ppm for water discharge). It should be noted that 35% of the palm oil mills in Sarawak do not comply with the effluent discharge standards. This was confirmed through a letter from the Sarawak Department of Environment /4/. The mills in the remaining 65% frequently comply with the standards, though they still experience the occasional non-compliance. This demonstrates that non-compliance to the discharge standards is a common practice in the region, and the project is additional.</p>
<p>CL 2</p> <p>The applicable conditions on whether the wastewater contains simple organic compounds (mono-saccharides) and therefore use a factor of 0.21Kg/CH₄ was not supported by appropriate analytical /monitoring data.</p>	B.1.2	<p>POME is expected to generate more CH₄ as existing practice is acidification of the POME before feeding into the open ponds. Based on the study by Yacob <i>et al.</i>, 2006, an average of 0.238 kgCH₄/kgCOD was emitted from anaerobic pond treatment of POME². Thus use of a 0.21 kgCH₄/kgCOD CH₄ emission factor is quiet conservative.</p>	<p>OK. Reference has been sighted. Relevant literature has been referenced. The study has indicates a methane generation of 0.238 kg CH₄ /Kg COD. However the project activity uses a conservative value of 0.21 kg CH₄ /Kg COD applicable for simple organic compounds (monosaccharides) as mentioned in the methodology. DNV has assessed the information provided and considers the factor of 0.21 kg CH₄ / kg COD chosen as appropriate and conservative.</p>
CL 3	D.4.2	All references are highlighted in the	OK. All relevant literature and

* MoV = Means of Verification, DR= Document Review, I= Interview

Page A-26

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>The following factors/ parameters as required by the methodology are to be assessed and justification for the appropriate values used in PDD to be given.</p> <p>a) Organic removal ratio</p> <p>b) Organic material deposition/sedimentation removals</p> <p>c) Sensitivity analysis for surface aerobic losses of organic material (COD)</p> <p>d) Chemical Oxidation Removals</p>		<p>PDD.</p> <p>a) A conservative figure of 95% was used. See Yacob, S., Hassan, M.A., Shirai, Y., Wakisaka, M. and Subash, S. 2005. Baseline study of methane emission from anaerobic ponds of palm oil mill effluent treatment. Science of the Total Environment 366 (2006) 187 – 196.</p> <p>b) 5% of Deposition is used.{See Environmental Management Guideline for the palm Oil Industry (1997) IP-Institut für Projektplanung GmbH on behalf of GTZ}</p> <p>c) used 254 kg COD per hectare of pond surface as recommended by the methodology</p> <p>d) No chemical is added during the oil extraction process</p>	<p>references have been referenced in the PDD.</p>
<p>CL 4</p> <p>The Project has assumed that the methane emissions from inefficient combustion and leaks are expected to be negligible (page 16 & 17 of PDD). The Project Participants should justify the assumption.</p> <p>Assumptions made in the calculation of baseline and project emissions should be referenced. The latest IPCC 2006 values should be used.</p>	<p>B.2.2</p> <p>B.2.9</p> <p>E.1.1</p> <p>E.1.2</p> <p>E.1.3</p> <p>E.3.4</p>	<p>The specification from the suppliers for both the gas engine and flare indicated that 99% of the methane will be burned. However, IPCC default value of 90% for the efficiency of Enclosed Flare system will be used. For Gas Engine efficiency, it would be determined yearly during O&M downtime throughout the crediting period as required by the methodology. For methane leakage from New Anaerobic Wastewater Treatment Facility (NAWTF), IPCC default value of 15% will be used.</p>	<p>OK. All relevant default values, IPCC values and assumptions have been incorporated.</p>

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CL 5</p> <p>Provisions for calibration of the monitoring equipment are not described in the project documentation. Calibration procedures should at the latest be implemented prior to commencement of the project.</p>	<p>D.6.5 D.6.6</p>	<p>The monitoring protocol and procedure for the project activity is being finalized. The calibration procedure of the monitoring and measuring equipment would be covered under this procedure.</p>	<p>OK. Provisions have been made and relevant procedures and protocol will be finalised and training will be given to relevant employees prior to the implementation of project.</p>
<p>CL 6</p> <p>Tradewinds is currently certified to ISO 9001:2000 standard. The existing procedures should be revised or independent procedures should be established to include the proposed bioreactor. Training should be given to relevant personnel before the commencement of the project with regard to:</p> <ul style="list-style-type: none"> a. Procedure for handling of emergencies situations, b. Procedures for monitoring, measurement and reporting, c. Procedure for handling of day-to-day records, d. Procedure for handling of monitoring data adjustments and data uncertainties, e. Procedure for review of reported results/data, f. Procedure for Internal audit of GHG project based on operational requirements; g. Procedures for project performance review; and 	<p>D.6.4 D.6.7 D.6.8 D.6.9 D.6.10 D.6.11 D.6.12 D.6.13</p>	<p>The Standard Operating Procedure for the Bioreactor as well as the Monitoring Protocol and Procedure is being finalized. All the mentioned procedures would be included into the SOP.</p>	<p>OK. All relevant procedures and work instruction will be up-dated to include the bioreactor in its ISO 9001:2000 management system. Training will be executed prior to the implementation of project.</p>

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
h. Procedures for corrective actions in order to provide for more accurate future monitoring and reporting.			

- o0o -

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Einar Telnes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3 6 & 10		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0028, AM0034	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0030	Yes
ACM0004	Yes	AM0031	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0032	Yes
ACM0007	Yes	AM0035	Yes
ACM0008	Yes	AM0038	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0041	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0034	Yes
AM0009, AM0037	Yes	AM0043	
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0046	
AM0014	Yes	AM0047	
AM0017	Yes	AMS-II.A-F, AM0044	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes
AM0021	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael
Technical Director

Lehmann



CERTIFICATE OF COMPETENCE

Ramesh Ramachandran

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 4, 5, 13		
Technical Reviewer for (group of) methodologies:			
ACM002, AMS-IA-D, AM0019, AM0026, AM0029	Yes		

Høvik, 22 December 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

Lai Chee Keong

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Tse Wei Cheong

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director