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Validation Report

United Palm Oil Industry Public Company Limited (UPOIC)
VALIDATION OF THE CDM-PROJECT:
UPOIC WASTEWATER TREATMENT FOR ENERGY
GENERATION, KRABI

REPORT NO. 1233984

13th October 2011

TÜV SÜD Industrie Service GmbH
Carbon Management Service
Westendstr. 199 - 80686 Munich – GERMANY

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| | | | |
|--|--|---|---|
| Subject: Validation of a CDM Project | | | |
| Accredited TÜV SÜD Unit: TÜV SÜD Industrie Service GmbH Certification Body “climate and energy” Westendstr. 199 80686 Munich Germany | | TÜV SÜD Contract Partner: TÜV SÜD Industrie Service GmbH Carbon Management Service Westendstr. 199 80686 Munich Germany | |
| Project Participants: United Palm Oil Industry Public Company Limited 236 Moo 4, Bangpoo Industrial Estate, Sukumvit Road, Phraeksa Sub-district, Muang District, Samut- prakarn, 10280 Thailand | | Project Site(s): 96 Moo 6 , Nua Klong-Kao Panom Rd., Huay Yoong Sub-district, NuaKlong District, Krabi Province, 81130 Thailand Coordinates: 8°9.2382’ N; 99°1.4009 E. | |
| Project Title: UPOIC Wastewater Treatment for Energy Generation, Krabi | | | |
| Applied Methodology / Version: | | AMS-III.H / Version 15 AMS-I.D / Version 16 | Scope(s): 13, 1 Technical Area(s): 13.1, 1.1 |
| First PDD Version: Date of issuance: 21-02-2009 Version No.: 01 Starting Date of GSP 10-03-2009 | | Final PDD version: Date of issuance: 11-10-2011 Version No.: 11 | |
| Estimated Annual Emission Reduction: | | 18,002 tCO ₂ e | |
| Assessment Team Leader: Thomas Kleiser Assessment Team Members: Javier Castro , Madhuri Nanda ¹ Alexandra Babeck ^{1*} , Iris Waikinat, Wisanee Thana- piyawanitch ^{1**} , Praveen Tekchandani* | | Technical Reviewer: Nikunj Agarwal, Tausche Konrad Certification Body responsible: Eric Tolcach | |

Summary of the Validation Opinion:

- ☒ The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Hence TÜV SÜD is recommending the project for registration by the CDM Executive Board if letters of approval of all Parties involved will be available before the expiring date of the applied methodology(ies) or the applied methodology version respectively.
- ☐ The review of the project design documentation and the subsequent follow-up interviews have not provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. Hence TÜV SÜD will not recommend the project for registration by the CDM Executive Board and will inform the project participants and the CDM Executive Board on this decision.

¹ Auditors on site

* Yet to be appointed

** Left the organization

Abbreviations

| | |
|-----------------|---|
| AM | Approved Methodology |
| AMS | Approved Methodology Small scale |
| BM | Build Margin |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CDM EB | CDM Executive Board |
| CER | Certified Emission Reduction |
| CM | Combined Margin |
| CMP | Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol |
| CR / CL | Clarification Request |
| DNA | Designated National Authority |
| DOE | Designated Operational Entity |
| EF | Emission Factor |
| EIA / EA | Environmental Impact Assessment / Environmental Assessment |
| ER | Emission Reduction |
| FAR | Forward Action Request |
| FSR | Feasibility Study Report |
| GHG | GreenHouse Gas(es) |
| IPCC | Intergovernmental Panel on Climate Change |
| IRL | Information Reference List |
| IRR | Internal Rate of Return |
| KP | Kyoto Protocol |
| MP | Monitoring Plan |
| NGO | Non Governmental Organisation |
| OM | Operational Margin |
| PDD | Project Design Document |
| PP | Project Participant |
| TÜV SÜD | TÜV SÜD Industrie Service GmbH |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VVM | Validation and Verification Manual |

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Annex 1: Validation Protocol

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1 INTRODUCTION

1.1 Objective

The validation objective is an independent assessment by a Third Party (Designated Operational Entity = DOE) of a proposed project activity against all defined criteria set forth by the registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and results in a conclusion by the executing DOE whether a project activity is valid and should be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests with the CDM-EB and the Parties involved.

The project activity covered by this validation report has been submitted under the project title:

UPOIC Wastewater Treatment for Energy Generation, Krabi

1.2 Scope

The scope of any assessment is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of CDM project activities the scope is set by:

- The Kyoto Protocol, in particular § 12 and modalities and procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- Further COP/MOP decisions with reference to the CDM (e.g. decisions 4 – 8/CMP.1)
- Decisions and specific guidance by the EB published under <http://cdm.unfccc.int>
- Guidelines for Completing the Project Design Document (CDM-PDD), and the Proposed New Baseline and Monitoring Methodology (CDM-NM)
- Baselines and monitoring methodologies (including GHG inventories)
- Management systems and auditing methods
- Environmental issues relevant to the sectoral scope applied for
- Applicable environmental, social impacts, and aspects of CDM project activity
- Sector specific technologies and their applications
- Current technical and operational knowledge of the specific sectoral scope and information on best practice

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

Once TÜV SÜD receives a first PDD version, it is made publicly available at the UNFCCC webpage and at TÜV SÜD's webpage to start a 30 day global stakeholder consultation process (GSP). In special circumstances, e.g. certain conditions allow the GSP to be repeated, a request to revise the PDD will be processed. The original PDD and the modified PDD will form the basis for the final evaluation. Information on both PDD's is presented on page 1.

The purpose of a validation is to demonstrate compliance or non-compliance of the project with all stated and valid CDM requirements. Additionally, the purpose of validation is to enable the registration of CDM projects, which is only a part of the total CDM project cycle.

2 VALIDATION METHODOLOGY

The project assessment applies standard auditing techniques to assess the correctness of the information provided by the project participants. The assessment is based on the “Clean Development Mechanism Validation and Verification Manual” version 01. The work starts with the appointment of the team covering the technical scope(s), sectoral scope(s) and relevant host country experience for evaluating the CDM project activity. Once the project is made available for the stakeholder consultation process, members of the team carry out the desk review, follow-up actions, resolution of issues identified, and finally preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the CB “climate and energy” before submission to the CDM-EB.

In order to ensure transparency, assumptions are clear and explicitly stated; the background material is clearly referenced. TÜV SÜD developed methodology-specific checklists and protocol customised for the project. The protocol shows, in a transparent manner, criteria (requirements), the discussion of each criterion by the assessment team, and the results from validating the identified criteria.

The validation protocol serves the following purposes:

It organizes details and clarifies the requirements a CDM project is expected to meet;

It ensures a transparent validation process where the validator has to document how a particular requirement has been validated, as well as the results of the validation and any adjustments, if any, made to the project design.

The validation protocol consists of three tables. The different columns in these tables are described in the figure below.

| Validation Protocol Table 1: Conformity of Project activity and PDD | | | | |
|--|---|--|--|--|
| Checklist Topic / Question | Reference | Comments | PDD in GSP | Final PDD |
| <i>The checklist is organised in sections following the arrangement of the applied PDD version. Each section is then further sub-divided. The lowest level constitutes a checklist question / criterion.</i> | <i>Gives reference to documents where the answer to the checklist question or item is found in case the comment refers to documents other than the PDD.</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. In some cases sub-checklist are applied indicating yes/no decisions on the compliance with the stated criterion. Any Request has to be substantiated within this column</i> | <i>Conclusions are presented based on the assessment of the first PDD version. This is either acceptable based on evidence provided (☑), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification Request (CR) is used when the validation team has identified a need for further clarification. Forward action request to highlight issues related to project implementation that require review during the first verification.</i> | <i>Conclusions are presented in the same manner based on the assessment of the final PDD version and further documents including assumptions presented in the documentation.</i> |

| Validation Protocol Table 2: Resolution of Corrective Action and Clarification Requests | | | |
|---|--|---|--|
| Clarifications and corrective action requests | Ref. to table 1 | Summary of project owner response | Validation team conclusion |
| <i>If the conclusions from table 1 are either a Corrective Action, a Clarification or a Forward action Request, these should be listed in this section.</i> | <i>Reference to the checklist question number in Table 1 where the issue is explained.</i> | <i>The responses given by the client or other project participants during the communications with the validation team should be summarised in this section.</i> | <i>This section should summarise the discussion on and revision to project documentation together with the validation team's responses and final conclusions. The conclusions should be reflected in Table 1, under "Final PDD".</i> |

In case of a denial of the project activity more detailed information on this decision will be presented in table 3.

| Validation Protocol Table 3: Unresolved Corrective Action and Clarification Requests | | |
|---|-----------------------------------|---|
| Clarifications and corrective action requests | Id. of CAR/CR | Explanation of the Conclusion for Denial |
| <i>If the final conclusions from table 2 results in a denial the referenced request should be listed in this section.</i> | <i>Identifier of the Request.</i> | <i>This section should present a detail explanation, why the project is finally considered not to be in compliance with a criterion with a clear reference to the requirement which is not complied with.</i> |

The completed validation protocol is enclosed in Annex 1 to this report.

2.1 Appointment of the Assessment Team

According to the technical scopes and experiences in the sectoral or national business environment, TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body "climate and energy".

The composition of an assessment team has to be approved by the Certification Body (CB) to assure that the required skills are covered by the team. The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Validator (V);
- Validator Trainee (T);
- Technical Experts (TE).

It is required that the sectoral scope(s) and the technical area(s) linked to the methodology and project have to be covered by the assessment team.

Assessment Team:

| Name | Qualification | Coverage of scope | Coverage of technical area | Host country experience |
|--|---------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Thomas Kleiser | ATL | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Javier Castro | V | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Madhuri Nanda ¹ | V | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Alexandra Babeck ^{1*} | - | - | - | - |
| Iris Waikinat | V | <input checked="" type="checkbox"/> | - | <input checked="" type="checkbox"/> |
| Praveen Tekchandani* | - | - | - | <input checked="" type="checkbox"/> |
| Wisanee Thanapiyawannitch ^{1**} | - | - | - | <input checked="" type="checkbox"/> |

¹ Audit team on-site

*Not yet appointed.

**Left the organization

Technical Reviewer:

- Nikunj Agarwal, Tausche Konrad

2.2 Review of Documents

The first version of the PDD was submitted to the DOE in February 2009. The first PDD version submitted by the PPs and additional background documents related to the project design and baseline have been reviewed to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources (if available) has been done as initial step of the validation process. A complete list of all documents and proofs reviewed is attached as Annex 2 to this report.

2.3 Follow-up Interviews

On 23-24th April 2009 TÜV SÜD performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm relevant information, and to resolve issues identified in the first document review. The table below provides a list of all persons interviewed in this context.

| Name | Organisation |
|---|---|
| Mr. Sawang Lertthanasuntorn – Engineering Manager | United Palm Oil Industry Public Company Limited (UPOIC) |
| Mr. Sansanee Vilaidaraga - Management supervisor | United Palm Oil Industry Public Company Limited (UPOIC) |
| Ms. Ladapron Khunikakorn - CDM consultant | ENVIMA (Thailand) Co., Ltd. |
| Narumon Tiangvirjya - CDM consultant | ENVIMA (Thailand) Co., Ltd. |
| Atchariya Noppharat – Mill manager | United Palm Oil Industry Public Company Limited (UPOIC) |
| Bodin Luelurtyot – Engineer consultant / ERDI | Energy Research and Development Institute |

| Name | Organisation |
|------------------|---------------------------------|
| | (ERDI), Thailand |
| Usama Chalermwan | Journalist "Kontrang newspaper" |

2.4 Further cross-check

The documentation has also been reviewed against the approved methodologies applied (IRL #02, 03) to confirm the appropriateness of formulae and correctness of calculations.

2.5 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve the requests for corrective actions, clarifications, and any other outstanding issues which needed to be clarified for TÜV SÜD's conclusion on the project design. The CARs and CRs raised by TÜV SÜD were resolved during communication between the client and TÜV SÜD. To guarantee the transparency of the validation process the concerns raised and responses that have been given are documented in more detail in the validation protocol in Annex 1.

The final PDD version submitted in October 2011 serves as the basis for the final assessment presented. Changes are not considered to be significant with respect to the qualification of the project as a CDM project based on the two main objectives of the CDM. These are an achievement of reduction of anthropogenic GHG emissions and to contribute to a sustainable development.

2.6 Internal Quality Control

As final step of a validation activity the final documentation, which includes the validation report and the validation protocol, has to undergo an internal quality control by the CB "climate and energy". That means that each report has to be approved either by the head of the CB or the deputy. In projects where either the Head of the CB or his/her Deputy is part of the assessment team approval can only be given by the either one not serving on the project.

After confirmation of the PPs the validation opinion and relevant documents are submitted to the EB through the UNFCCC web-platform.

3 SUMMARY

The assessment work and the main results are described below in accordance with the VVM reporting requirements. The reference documents indicated in this section and Annex 1 are stated in Annex 2.

3.1 Approval

The project participants are 'United Palm Oil Industry PCL' of The Kingdom of Thailand. The host country, Kingdom of Thailand meets the requirements to participate in the CDM.

The DNA of Thailand has issued a LoA (IRL 48) on 30th April 2009 authorizing United Palm Oil Industry Public Company Ltd as a project participant. TÜV SÜD received these letters from the project participants directly and considers the provided letters as authentic.

The Thailand LoA has further been double-checked with the CDM project webpage sponsored by the Thailand Greenhouse Gas Management Organization (Public Organization) (<http://www.tgo.or.th/english/>), which further evidences the approval of this CDM project.

Furthermore, after checking the provided LoA, TÜV SÜD confirms that the letter refers to the precise proposed CDM project activity title in line with the title in the PDD "UPOIC Wastewater Treatment for Energy Generation, Krabi".

The letter also indicates that the participating Party is a Party to the Kyoto Protocol, and that the participation in the "UPOIC Wastewater Treatment for Energy Generation, Krabi" project is voluntary. The Thai LoA also confirms that the proposed CDM project activity contributes to the sustainable development of Thailand (host country). Based on the information given in these letters, TÜV SÜD considers the approval as unconditional with respect to these items.

The LoA has been issued by the host country's DNA, Ministry of Natural Resources and Environment - Thailand.

TÜV SÜD therefore considers that the requirements of VVM (§§ 45-48) have been met.

The LoA does not refer to a specific version of the PDD or validation report.

3.2 Participation

The participant of the project activity has been approved by the corresponding Parties, which is confirmed by the issued LoA.

The means of validation used are similar to the ones described in section 3.1, specifically in regard to the approval process of the project activity.

A Statement on the Modalities for Communicating with the Executive Board and the UNFCCC Secretariat (MoC) has also been handed over to the DOE and provides the focal point for all communication with the Executive Board and the UNFCCC Secretariat (IRL #64)

3.3 Project design document

The PDD is compliant with relevant form and guidance as provided by UNFCCC.

The most recent version of the PDD form was used.

TÜV SÜD considers that the guidelines for the completion of the PDD in their most recent version have been followed. Relevant information was provided by the participants in the applicable PDD sections. Completeness was assessed through the checklist included in Annex 1 of this report.

3.4 Project description

The following description of the project as per PDD was verified during the on-site audit:

United Palm Oil Industry Public Company Ltd (UPOIC) has a crude palm oil mill producing crude palm oil and palm kernels from Fresh Fruit Bunches (FFB). In this production process they generate Palm Oil Mill Effluent (POME) which has high organic content (COD of POME lies between 60000-80000 mg/l, IRL #36, 37) which is currently treated in open lagoon system using anaerobic, facultative and aeration lagoons (total 8 ponds in baseline scenario out of which pond named 'anaerobic pond 1-4' and 'facultative pond 1-2' fulfil the criteria for anaerobic condition as per paragraph 2 of AMS.III-H ver. 15). UPOIC processes FFB at the capacity of 584 tonnes/day (IRL #24) and POME is generated at the rate of 0.59m³/ton (IRL #37)

The project activity involves an installation of closed digester system comprising of 2 anaerobic reactors (each reactor of 6,000 m³ volume) with biogas recovery, which avoids the methane emission from anaerobic conditions in the lagoons in the baseline scenario. The project activity use Completely Stirred Tank Reactors (CSTR) to extract and capture biogas from the POME. The CSTR creates an enclosed anaerobic environment which enables bacteria to digest and convert the organic matter into biogas. Further the captured biogas, which is approx 2,622,256 m³/year, is utilized to produce electricity using 2 X 0.952 MW generator (IRL #14). The generated power is first used to meet in-house power demand and the surplus power is exported to National grid (IRL #13). Any excess biogas left after this process will be flared (IRL #16). In the whole process, small amount of sludge would be collected in the sand bed filter, the same would be monitored and applied to palm plantation next to the pond system.

The current practice is chosen as the baseline scenario for this project activity i.e. treatment of POME in the existing open, anaerobic lagoons of the factory (IRL #17) thereby emitting methane to the atmosphere by open lagoon treatment process. Baseline scenario for the power generated using biogas is the import of equivalent power from Thai Grid

The information presented in the PDD on the technical design is consistent with the actual planning and implementation of the project activity as confirmed by:

- A review of data and information (see Annex 2)
- Contract between ERDI and UPOIC for Biogas system design and construction (IRL 19)
- Technology description for UPOIC by ERDI (IRL 14)
- An on-site visit has been performed. Relevant personnel with knowledge of the project were interviewed.

In conclusion, TÜV SÜD confirms that the project description, as included to the PDD, is sufficiently accurate and complete in order to comply with the requirements of the CDM.

3.5 Baseline and monitoring methodology

3.5.1 Applicability of the selected methodology

Compliance with each applicability condition as listed in the chosen baseline and monitoring methodologies, AMS-III.H Version 15 / AMS-I. D Version 16, has been demonstrated.

The assessment was carried out for each applicability criteria and included, among others, the compliance check of the local project setting with the applicability criterion in regard to baseline setting and eligible project measures.

The methodology specific protocol, included to the Annex 1, documents the assessment process, which also includes the steps taken. The results on the compliance check, as well as the relevant evidence, are detailed in Annex 1 and Annex 2 of the validation report. The proposed project activity relates to option 1(d) Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system of AMS-III.H., version 15. Further, only 6 lagoons, 'anaerobic ponds no 1-4' and 'facultative ponds no. 1-2', out of 8 lagoons in the baseline scenario meets the applicability criteria of anaerobic lagoon, all other lagoons fall into aerobic category as per applied methodology.

The project activity uses the captured biogas for electricity energy generation, hence the PP has also applied AMS-I.D as per para 2(a) and para-3 of AMS-III.H. In AMS-I.D, the project activity relates to technology/measure 1, "renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit."

TÜV SÜD confirms that the chosen baseline and monitoring methodology is applicable to the project activity.

Emission sources, which are not addressed by the applied methodology, and are expected to contribute more than 1% of the overall expected average annual emission reductions, have not been identified.

3.5.2 Project boundary

The project boundary was assessed in the context of a physical site inspection, interviews, and on the secondary evidence received on the design of the project.

- As per the methodology AMS-III.H version 15 & AMS-I.D version 16 the project boundary has been described as the "physical, geographical site where the wastewater and sludge treatment takes place in baseline and project situation. It covers all the facilities affected by the project activity including sites where the processing, transportation and application or disposal of waste products as well as biogas takes place." Therefore the wastewater treatment facilities (cooling ponds, anaerobic reactors, post-treatment ponds, storage pond & the corresponding equipments) and the power generation setup along with combustion facilities have been covered in the project boundary. Disposal of waste i.e. disposal of treated wastewater disposed off to grass area is also included inside the project boundary. This also includes disposal of untreated sludge from anaerobic reactors which is applied to the palm plantation as fertilizer next to pond system at the project site.
 - Waste Water Treatment Component: The wastewater treatment component including Completely Stirred Tank Reactors (CSTR), from the effluent outlet of the De-oiling process to the disposal area of the treated waste water (referred to as "grass area" in figure 4 of PDD)
 - Electricity displacement component: The electricity generators physically connected to the Thai electric power grid and palm oil production plant

Relevant documentation assessed to confirm the project boundary are as follows:

- Electricity Flow Diagram of the CDM project and the existing biomass electricity generator (IRL #25)
- Layout Diagram of the baseline scenario (IRL #65)
- Letter of Approval from PEA (Provincial Electricity Authority) (IRL #13, 18)
- Technical Design provided by Energy Research and Development Institute (ERDI) for the project activity (IRL #14)
- Technical Design specification of Biogas flaring system provided by BKE combustion controls (IRL #16)

This was also confirmed during the validation process. Details and/or observations, if applicable, are listed in Annex 1.

Therefore, TÜV SÜD confirms that the identified boundary, the selected sources, and gases as documented in the PDD are justified for the project activity.

3.5.3 Baseline identification

The PDD defines the following baseline scenario:

Baseline Scenario for this project has two components, waste water treatment and power generation from captured biogas

- Baseline determination for waste water treatment component

Continuation of current practice: Effluent from palm oil factory is treated in a series of anaerobic & aerobic ponds as described in figure 5 of the PDD without methane recovery i.e. continuation of the existing wastewater treatment system for POME (IRL #17, refer to CAR 3, 4)

- Baseline determination for electricity displacement component

Equivalent power generation from the Thai grid is considered as baseline scenario for the net power generated from the captured Biogas in the project scenario (refer to CR7, CR9, CAR3 & FAR 1)

The information presented in the PDD has been validated by an initial document review of all data. Further confirmation is based on the on-site visit and information from third party documents for applied technology (IRL #14, 15, 16, 17). The sources referenced in the PDD have been quoted correctly. The information was verified against credible sources, such as:

- Electricity Flow Diagram of the CDM project and the existing biomass electricity generator (IRL #25)
- The factory act B.E 2535 (IRL #52)
- Layout diagram of the baseline scenario (IRL #65)
- Contract with PEA to buy electricity from UPOIC (IRL #13)
- Monthly data of power import from Grid of last three years (IRL #11)
- Annual FFB production and waste water processing capacity (IRL #24, 14)

TÜV SÜD has determined that no reasonable alternative scenario has been excluded.

Based on the validated assumptions on calculations TÜV SÜD considers that the identified baseline scenario is reasonable.

Taking the definition of the baseline scenario into account, TÜV SÜD confirms that all relevant CDM requirements, including relevant and/or sectoral policies and circumstances, have been identified correctly.

A verifiable description of the baseline scenario has been included in the PDD.

In regard to item 87 of VVM, TÜV SÜD confirms that:

1. All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;
2. All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;
3. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence, and can be deemed reasonable;
4. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;
5. The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario, and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

3.5.4 Algorithm and/or formulae used to determine emission reductions

TÜV SÜD has assessed the calculations of project emissions, baseline emissions, leakage, and emission reductions. Corresponding calculations were carried out based on calculation spreadsheets. 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 methodologies and respective tools (Applied tools are 'Tool to determine project emissions from flaring gases containing Methane' version 1, and 'Tool to calculate the emission factor for an electricity system' version 2).. The equation comparison has been made explicitly following all the formulae presented in the calculation files.

A Request for Review was initiated by UNFCCC for the project

(<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1293726368.8/Review/J6DB8S6VXHVCWEX1Z1KLD1PDPG9IL5/display>) wherein it was requested from DOE to further explain how it has validated the total electricity generated, and its components, that is: a) the electricity used for self consumption; b) the electricity for captive use; and c) the electricity to be exported to the grid, as different values are reported between the PDD and validation report.

In response to the question, DOE would like to clarify that the total electricity generated by the project has been validated based on Biotech Thai proposal (5548 MWh/year), available at the time of investment decision, which is considered in the financial analysis presented to the Board of Directors. At the same time, the results of 10-day campaign, which presented a more realistic estimate of the generation from the project (5769 MWh/year), have been considered in the ER calculations, updated financial analysis and the PDD. This approach has been accepted by the assessment team, as this gives most likely estimate of emission reductions from the project.

Electricity for captive use (646 MWh/year) has been considered based on the actual rated capacity of the installed equipment, and electricity consumption of the mill (339 MWh/year) has been based on the historic 3-year average record, as provided by the PP and validated by the assessment team.

Electricity for export to the grid (4784 MWh/year) is calculated appropriately as the difference of the total generation, and the amount used in mill and auxiliary consumption. Further, as per the proposed monitoring plan, these parameters are included for monitoring, during the crediting period.

The values are now consistently reported within the PDD and validation report.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked and confirmed.

Based on the information reviewed it can be confirmed that the sources used are correctly quoted and interpreted in the PDD.

The values presented in the PDD are considered reasonable based on the documentation and references reviewed, as well as, the result of the interviews.

The baseline methodology has been correctly applied according to requirements.

The estimate of the baseline emissions can be confirmed as the same that have been replicated by the audit team using the information provided.

Detailed information on the verification of the parameters used in the equations can be found in Annex 1. The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

3.5.4.1 Baseline Emissions

The calculation of the baseline emissions follows exactly the procedures described in the methodologies AMS-III.H Version 15 and AMS-I.D Version 16.

Baseline emission associated with wastewater treatment component (AMS-III.H)

The baseline scenario for wastewater treatment is the existing anaerobic & aerobic lagoon system without methane recovery corresponding to paragraph 1 (d) of AMS-III.H. The baseline methodology has been correctly applied following the requirements. The estimated baseline emissions, as per paragraph 17 of AMS-III.H ver. 15, can be confirmed as the same have been verified by the audit team using the information provided. Since there are no waste water and sludge treatment system with biogas recovery facility in the baseline system, therefore para 16 of the methodology, AMS-III.H, is not applicable. Following parameters have been considered for the estimation of baseline emissions:

- $BE_{power,y}$: Baseline emission from electricity or fuel consumption in year y – This has been determined based as per para 11 of AMS-I.D
- $BE_{ww,treatment,y}$: Baselines emissions of the wastewater treatment systems affected by the project activity in year y – This component has been determined as per para 21 of applied methodology, AMS-III.H. Further, MCF values for all the lagoons have been taken as per table III.H.1 (only 6 lagoons, 'anaerobic ponds no 1-4' and 'facultative ponds no. 1-2', out of 8 lagoons in the baseline scenario meets the applicability criteria of anaerobic lagoon and hence the MCF values have been taken accordingly for each lagoon).
- $BE_{s,treatment,y}$: Baseline emissions of the sludge treatment systems affected by the project activity – Since there is no sludge treatment system in the baseline or project scenario, hence this parameter is not for further consideration.
- $BE_{ww,discharge,y}$: Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake in year y – This parameter has been determined

as per para 25 of applied methodology, AMS-III.H, and the same has been successfully verified.

- $BE_{s,final,y}$: Baseline methane emissions from anaerobic decay of the final sludge produced in year y – Small amount of sludge would be collected from the sand bed filter and the same would be applied to grass area in the project scenario. Hence as per para 35 of applied methodology, only end use of the final sludge will be monitored during the crediting period.

Key parameters involved in the estimation of baseline emissions are 'Volume of wastewater treated in year y' and 'Chemical oxygen demand of wastewater before & after the treatment system'. For ex-ante baseline emissions these parameters have been calculated as mentioned below:

- Volume of waste water treated (m^3/yr): As per AMS.III-H, 10 days campaign value (IRL #37) has been used for waste water generation rate (m^3 of waste water/ton of FFB) which is 0.59 m^3 /ton FFB. Further, average FFB production of last three years (IRL #24) have been used to compute the volume of waste water treated ('generation rate' X 'average FFB production'). However 'volume of waste water treated' would be monitored throughout the crediting period to calculate the ex post baseline emissions as per the methodology.
- Chemical oxygen demand of wastewater before & after the treatment system: As per AMS.III-H, 10 days campaign value (IRL #37) has been used for this parameter. However this parameter would be monitored as mentioned in section B.7.1 of PDD

As per AMS-III.H ver 15 para 19 (a), representativeness of 10 days sampling data used in baseline emissions have been verified by

- comparing average ambient temperature (over last 30 years in Trang, and also comparing the same with average ambient temperature of year 2008), and
- comparing the monthly wastewater quantity generation records of the mill for last three years (2006,2007,2008) which confirms that June is a representative month as compared to the average.

Hence, measurement campaign conducted in the month of June & July 2009 is acceptable and representative with respect to wastewater quantity generation by the mill as well as ambient conditions.

Baseline emission associated with electricity displacement component (AMS-I.D)

The baseline emission for generated power from captured Biogas is the electricity (kWh) displaced by the renewable generating unit of the project activity multiplied by an grid emission factor (measured in $kgCO_2e/kWh$) as per AMS-I.D. Emission factor of the grid has been computed using "Tool to calculate the emission factor for an electricity system" version 2. Emission factor, Combined Margin (EF_{CM}), has been calculated as the weighted average of Operating margin emission factor (EF_{OM}) and Build margin emission factor (EF_{BM}) as per the tool.

Further, the operating margin emission factor (EF_{OM}) has been determined ex-ante based on the simple OM method using the most recent 3-years data of electricity generation in Thailand (2005, 2006, 2007, most recent available data at the start of validation), (IRL #31, 58). The data from the most recently built power plant which contributes to 20% of the power generation of the Grid have been used for computation of Build margin emission factor (EF_{BM}) ex-ante as per the tool.

The assessment team verified the spreadsheet of the grid emission factor calculation (IRL #08), further cross-checked the input data in the spreadsheet with the reference documents quoted in the PDD and submitted to us separately (IRL#29).

A Request for Review was initiated by UNFCCC for the project (<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1293726368.8/Review/J6DB8S6VXHVCWEX1Z1KLD1PDPG9IL5/display>) wherein it was requested from DOE to further explain how it has validated the emission reductions, in particular how the calculation of the build margin emission factor complies with any of the options cited in the “Tool to calculate the emission factor for an electricity system” ver. 2.2 and as per the VVM v1.2 paragraph 91.

In response to the above question, DOE would like to clarify that PDD has been revised by the PP to more transparently and clearly present the options used in the BM calculations, in line with the “Tool to calculate the emission factor for an electricity system” ver. 2.2. The same has been validated by the assessment team and are considered appropriate.

The key parameter to calculate baseline emission associated with electricity displacement component is ‘Amount of electricity to substitute grid electricity by the Project in year y’, $EG_{y,exported}$. For ex-ante calculation, this parameter has been computed based on available biogas from the closed digester (IRL #15, Annex-3 of PDD) and the capacity of biogas engine to generate electricity, kWh/Nm³ of biogas (IRL #62). Since the electricity generated from the biogas would first replace the in-house power consumption (palm oil mill) from grid, hence historical records of power import from grid for palm oil mill (IRL #11, for 2006, 2007 & 2008) has also been taken into consideration for ex-ante estimation of this parameter. However, this parameter would be monitored as mentioned in section B.7.1 of PDD.

The calculation for the baseline emissions was carried out fully in line with the methodology.

3.5.5 Project emissions

- Project emission associated with wastewater treatment component (AMS-III.H):

The project activity comprises the measures that recover methane from biogenic organic matter in wastewaters by means of paragraph 1 (d) of AMS-III.H and identified the project emissions as per paragraph 27 of AMS-III.H. The data/ parameters and calculation for the project emissions were verified and were found to be in line with the methodology. The project emissions have been calculated using the following key parameters:

- $PE_{power,y}$: CO₂ emissions on account of power used by the project activity facilities: This parameter doesn't account for project emissions as the amount of electricity consumed by project activity facilities would be provided by power generated by biogas engine (IRL #11)
- $PE_{ww,treatment}$: Methane emissions from wastewater treatment systems affected by the project activity: This parameter has been calculated as per para 27 of AMS-III.H. However this parameter would also be monitored ex-post based on ‘volume of waste water treated in year y’ & ‘chemical oxygen demand removed by the wastewater treatment system in the project activity’ (IRL #11)
- $PE_{ww,discharge,y}$: Methane emissions from degradable organic carbon in treated wastewater in year y (tCO₂e). This parameter has been calculated as per para 27 of AMS-III.H. However this parameter would also be monitored ex-post based on volume of waste water treated in year y & the chemical oxygen demand of the treated waste water discharged into grass area in the project scenario (IRL #11).
- $PE_{fugitive,ww,y}$: Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y: This parameter has been calculated as per para 27 of AMS-III.H. This parameter would also be monitored ex post based on volume of waste water treated in year y & the chemical oxygen demand removed by the treatment system of the project activity equipped with biogas recovery (IRL #11).

- $PE_{\text{flaring},y}$, Methane emissions due to incomplete flaring : This parameter has been calculated as per “Tool to determine project emissions from flaring gases containing methane”. This parameter would also be monitored ex post based on volume of bio-gas flared in the project scenario.
- Project emission associated with electricity displacement component (AMS-I.D):
The project emissions under AMS-I.D were included in the project emission under AMS-III.H.

3.5.6 Leakage

- Leakage associated with wastewater treatment component (AMS-III.H)
Since the project activity does not involve technology transfer from/ to another, there is no leakage from transfer of technology. Hence, the leakage emission within the project boundary is considered zero as per AMS-III.H.
- Leakage associated with electricity displacement component (AMS-I.D)
The leakage emission within the project boundary is zero under AMS-I.D.

3.5.7 Emission Reductions

As per the applied methodologies, ex-ante calculation of emission reduction has been done using equation 14 of AMS-III.H. Further ex post determination of emission reduction would be done as per para 31 and 32 of AMS-III.H

3.6 Additionality

The additionality of the project has been presented in the PDD using investment barrier as per “Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities”

The approach used in the PDD has been assessed initially through a document review, during which following documents have been reviewed:

- Proposal from Corporate Public consultant (IRL #21)
- Proposal from Smart Energy Co. Ltd (IRL #42)

During on site visit, the additionality has been discussed principally with Sawang Lertthanasuntorn and Sansanee Vilaidaraga. Further documents have been reviewed on-site (Annex 2).

Finally, the data, rationales, assumptions, justifications, and documentation provided have been verified using local knowledge as well as sectoral and financial expertise. This information was also confirmed through the following documentation:

- Application letter to Energy Policy and Planning office, Thailand (EPPO) for ENCON fund (IRL #22)
- 10 days campaign report from Trang Sure laboratory (IRL #37)
- Board Resolution of the project activity (IRL #12)
- Contract with ERDI for biogas system design (IRL #19)
- Design details from ERDI (IRL #14)
- Contract with PEA to buy electricity from UPOIC (IRL #13)

Based on these validation steps we can confirm that the documentation assessed is appropriate for this project.

3.6.1 Prior consideration of the clean development mechanism

The starting date of the project activity is determined to be 10th March 2008, date on which UPOIC contracted the construction company. In order to corroborate this information the assessment team has reviewed the following documents:

- Contract between UPOIC and Biogas Constructor name "Know-How Transfer company limited" (IRL #23)

The original documents presented have been reviewed and verified based on interviews with Mr. Sawang Lertthanasuntorn and Mr. Sansanee Vilaidaraga

A Request for Review was initiated by UNFCCC for the project

(<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1293726368.8/Review/J6DB8S6VXHVCWEX1Z1KLD1PDPG9IL5/display>) wherein it was requested from DOE to further explain how it has validated the suitability of the project starting date cited in the validation report (11 March 2008, construction contract signed) and confirm if this was the earliest financial commitment made by the project participant in line with the CDM Glossary of Terms, given that the PDD states that the construction started also on the same date.

In response to the above question, the DOE would like to further clarify that the date of signing the construction contract and start of construction is on the same day, as 10th March 2008, which is a little unusual in the common practice. Although, initially the date was provided as 11th March 2008, however this was an error, and has been corrected with this submission in the PDD and validation report.

The above date, 10th March 2008, could be re-confirmed and validated based on the following facts, which could be validated by the assessment team during on-site visit and during the course of validation:

1. UPOIC has been under negotiations with the contractor for a long time, and the start date of construction was already agreed in the construction contract, as 10th March 2008. Contract document (IRL 23) is already submitted to the assessment team with the specified condition.
2. Also, the P.O. dated 13th March 2008 has been submitted by the PP, which shows that the release of payment to the contractor was done within 3 days, as per the processing time of the accounts department.
3. UPOIC is a public listed company in Thailand with very good reputation, which is why the contractor is not hesitant in starting the construction of project immediately, in parallel, with the signing of contract.

In line with the above facts and submitted documentary evidence, DOE could validate the start date of project as the date of signing the construction contract, which also is the start date of construction for the project. It could be confirmed that this was the earliest financial commitment made by the project participant in line with the CDM Glossary of Terms.

The starting date of the project activity is determined to be 10th March 2008, which is before 02 August 2008, as well as prior to the GSP. The PPs presented the following information to the assessment team:

- Board approval for the project activity dated 10.08.2007 (IRL #12)
- “Integrated Capacity Strengthening for CDM (ICS-CDM), Project Design Document (PDD) Preparation Programme” dated 07.10.2005 (IRL #26)
- Invoice from CDM consultant (ENVIMA) to UPOIC dated 25.02.2008 (IRL #41)
- Emission reduction Purchase Agreement (ERPA) with Tricorona dated 17.09.2008 (IRL #59)

The original documents presented have been reviewed and verified based on interviews with Mr. Sawang Lertthanasuntorn and Mr. Sansanee Vilaidaraga . Therefore the documents can be considered appropriate to confirm the prior consideration of CDM. Additionally, in order to confirm that the PPs have taken real actions to continue the activity as CDM, the following timeline has been reviewed against the respective documents presented in the table below:

| Activity | Document | Date | Auditor conclusion |
|---|---|------------|---|
| Offer of ENVIMA (CDM consultant) on finance scheme for CDM, call for meeting | Email communication between PP and ENVIMA (CDM consultant) to discuss on the finance scheme for CDM (IRL #66) | 11/01/2007 | Considered as one of the continuous actions for serious consideration of CDM |
| Smart Energy Co., Ltd proved biogas proposal to LS which also contains CDM revenue calculations for the project. | Proposal by Smart Energy (IRL #42) | 23/02/2007 | Considered as one of the action for exploring the project activity with CDM revenues. |
| Biotech Thai Corporation provided biogas proposal to LS considering CDM revenues | Proposal from biotech Thai Corporation (IRL #50) | 11/06/2007 | Considered as one of the continuous actions for serious consideration of CDM |
| Papop provided biogas proposal to LS which also contains CDM revenue calculations for the project | Proposal from Papop (IRL #68) | 27/07/2007 | Considered as one of the continuous actions for serious consideration of CDM |
| Proposal for consulting services for CDM application (proposal to take quotation and consider in the board meeting) | Proposal Envima to UPOIC (IRL #41) | 03/08/2007 | Considered as one of the continuous actions for serious consideration of CDM |
| Internal Board approval at UPOIC | Board approval letter for the project activity (IRL #12) | 10/08/2007 | Board approval letter indicates CDM revenue consideration for the project activity |
| Submission of PIN to | Letter of confirmation | 26/02/2008 | Considered as one of |

| Activity | Document | Date | Auditor conclusion |
|---|--|------------|--|
| Thai DNA for Host country approval | from UPOIC for submission (IRL #27) | | the continuous actions for serious consideration of CDM |
| UPOIC approves first payment to CDM consultant - Envima | Invoice from CDM Consultant (ENVIMA) to PP (IRL #41) | 28/02/2008 | Considered as one of the continuous actions for serious consideration of CDM |
| PP signed contract with contractor for construction | Contract letter (IRL #23) | 10/03/2008 | Considered as start date for the project activity. (The agreement mentioned the start date of construction on 11/03/2008 and the Purchase Order was issued on 13/03/2008). |

This confirms that the project complies with the requirements to demonstrate the prior consideration of the CDM.

3.6.2 Identifications of alternatives

The output of the project is the electricity generated by the captured biogas from POME waste water treatment plant.

PPs have used 'Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities' to prove this project additional. The alternative to the project activity is considered as non action which would have led to higher emissions of greenhouse gases.

3.6.3 Investment analysis

The PP uses the investment analysis to demonstrate the additionality. The financial returns of the proposed project are insufficient to justify the investment.

The parameters used in the financial calculations have been validated based on a revision of the sources presented in the PDD inter alia:

| Description | Source / Cross-check | IRL # (Annex 2) |
|--------------------|--|-----------------|
| Installed capacity | Source available at the time of investment decision: Feasibility report from Biotech Thai Corporation, Cross-check: ERDI specification based on contract signed by PP at the time of start of project activity. | 50, 14 |
| Total investment | Source at the time of investment decision: Feasibility report from Biotech Thai Corporation. Cross-check: Actual invoices/ Pos from vendors supplying the equipment, available at the time of start of project activity | 50, 35 |

| Description | Source / Cross-check | IRL # (Annex 2) |
|--------------------|--|-----------------|
| Electricity tariff | Source at the time of investment decision: Actual rate from official website of PEA valid from 2005 until the date of investment decision, as there has been no subsequent update from PEA. Cross check: based on actual invoices from PEA. Also a comparison is done with the Power Purchase Tariff document for VSPP from EPPO considering the average of 5 years from the investment decision (2002-Aug. 2007). | 13, 30, 39, 70 |
| Benchmark | Source at the time of investment decision: Letter from Palm oil crushing mill association, & Article from Ayudhya Securities for IPP bidders, & Letter from Energy research and Development Institute (ERDI), Chiang Mai University, the technology provider Cross check: Latest EB Guidelines on assessment of investment analysis ver. 5 (EB 62 report, Annex 5) and other similar projects in the palm oil sector in Thailand | 32, 33, 34, 69 |

The submitted referenced documents have been found to be relevant and consistent with the information provided in the PDD for the investment analysis. Based on the above references, input values have been found to be reasonable and correct.

Furthermore, the period of time between the finalization of the FSR and the investment decision is only six months, therefore it can be confirmed that it is unlikely that the input values have significantly changed. Moreover, PP has also calculated IRR using latest available input values for the project activity and the updated IRR has also been verified to be less than the identified benchmark.

Benchmark

Benchmark analysis has been used to demonstrate the investment barrier for the project activity. The project participants selected the project IRR as the financial indicator and compared it against an appropriate benchmark.

PPs produced the following documents for benchmark identification:

- Letter from Palm Oil Crushing Mill Association: A letter from Palm Oil Crushing Mill association dated 17th July 2007 (IRL 33) indicates 15% as benchmark IRR for power generation from captured biogas at waste water treatment plant considering technological & operational risk associated with the project activity. Further it was also clarified by PP that this association is a conglomerate of all the association registered and operated by Government of Thailand (CAR 5), IRL #34. Hence 15% as benchmark value can be considered to be supplied by one of the relevant National Authorities.
- Further, an article "IPP Bidding" published by Ayudhya Securities Public Company Limited: An independent financial firm in Thailand published an article indicating benchmark for Independent Power plants to be 15% in Thailand.
(http://www.ays.co.th/Uploadeds/Research/eng/Energy_071119_U.pdf)

- Further, a letter issued by Energy research and Development Institute (ERDI), Chiang Mai University, dated 18.07.2007, indicates the benchmark for an anaerobic biogas system to treat waste water from Palm oil milling plant is 15% considering risk in technology & operation (IRL #69).

A Request for Review was initiated by UNFCCC for the project (<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1293726368.8/Review/J6DB8S6VXHVCWEX1Z1KLD1PDPG9IL5/display>) wherein it was requested from DOE to further explain how it has validated: a) that the selected benchmark is determined by a relevant national authority, in line with the “Guidance on the assessment of investment analysis, EB 51, Annex 58” (VR, p. 22), as the cited references do not appear to be official publications; and b) whether the benchmark is a sector benchmark for the palm oil industry or independent power producers and how it is considered appropriate in the specific context of the project activity. In doing so, please refer to VVM ver. 1.2 paragraph 112.

In response to the above question, the DOE would further like to clarify that the assessment team has now considered the latest EB guidelines, EB 62 report Annex 05, Guidelines on the assessment of investment analysis (ver. 05) paragraph 14, and considers that 15% as the expected returns on the investment by the PP could be applied as appropriate benchmark as the project could be developed by only one possible project developer, UPOIC, and has been demonstrated to have been used for similar projects in the palm oil sector in Thailand. As UPOIC does not have any past experience of implementation of such (electricity generation) projects, hence, other similar projects in Thailand could be considered for selecting the benchmark, as per the guidelines. PP provides the reference to registered CDM project, Thachana Palm Oil Company Wastewater Treatment Project in Thailand (Reg. No. 2644) which is a similar project in Thailand using 15% benchmark. DOE has further checked other projects in Thailand, which are registered CDM projects (Reg. No. 2970, 3085, 3335, 4479, 4491, 4581, 4589 and 4710), and confirm that all these projects have considered more than 15% as benchmark for this kind of project in the country. Hence, the assessment team considers 15% benchmark as appropriate for the project activity.

The DOE considers the benchmark applicable to energy generation projects in palm oil sector in Thailand, as reference is made to other similar projects in Thailand, in the palm oil sector.

Further, the PP has also demonstrated that the IRR is lower than the default value for the expected return on equity, as provided in the appendix with the Guidelines on the assessment of Investment Analysis ver. 05 (Annex 05, EB 62 report), wherein for Thailand Group 1 industry sector, it is prescribed as default benchmark of 11.2%. The assessment team cross-checked and validated that the IRR results (5.85%), including the sensitivity analysis, are lower than the default value (11.2%). Hence, the project is clearly considered additional.

Investment analysis

As per ‘Guidelines on the assessment of investment analysis’ version 4, the input values used in the investment analysis have been found to be valid and applicable at the time of the investment decision taken by the project participant. Project IRR using input values at the time of investment decision (Aug 2007) has been verified. During the onsite visit (2009) it was verified that the plans for installing the project activity was slightly modified in terms of the intended capacity, hence as a conservative approach, project IRR using latest available input values (cross check values) during validation of the project activity has also been verified. The suitability of all the parameters and assumptions (for project IRR at Investment decision & project IRR using latest values available during validation) used in the calculation of the investment analysis has been validated as follows:

Project investment cost –The values for the investment cost have been taken from the internal project costing analysis report prepared for board approval based on feasibility report obtained from Biotech Thai Corporation (IRL #50).. Further, there were some alterations in terms of technical specification (biogas generation, power generation) therefore IRR computation using the latest values has also been verified and is found to be less than identified benchmark. The estimated value in Investment analysis have been cross-checked with the quotations, purchase orders to suppliers and vendors (IRL #35) and it has been found that the actual realized value is slightly lower than the estimated cost (only 1.47% lower than the estimated cost).

| | Project IRR during Investment Decision | Project IRR based on latest available values (cross-check value) |
|--------------------------|--|---|
| Value of Investment Cost | Internal project costing analysis report prepared for board approval based on feasibility report obtained from Biotech Thai Corporation (IRL #50). Total investment amounts to 84,000,000 TBH. | Actual quotations, purchase orders to suppliers and vendors (IRL#35, 60). Total capital investment amounts to 82,763,662 TBH. |

Production Capacity of FFB – Maximum production of FFB from historical FFB production 2002-2006 has been considered estimating biogas generation. Since maximum value of FFB has been taken for investment analysis the same can be confirmed as conservative and appropriate

| | Project IRR during Investment Decision | Project IRR based on latest available values |
|----------------------------|--|---|
| Production Capacity of FFB | As a conservative approach, maximum production of FFB from the historical FFB production 2002-2006 has been considered estimating biogas generation. Maximum production of FFB was observed at 2002 (192,989 tons/year which is approximately 40 tons/hour) (IRL#24) | Input value has been sourced from ERDI design data which is based on average value of FFB production for last three years including 2007 & 2008 (175,200 tons FFB/year) (IRL#24,14) |

Waste water generation per ton of FFB – An article ‘Assessment of Palm oil mill effluent as Biogas Energy source in Thailand’ on 33rd Congress on Science and technology of Thailand indicates a value of 0.50 m3 of waste water generation per ton of FFB processed. Hence 0.50 m3/ton of FFB has been used as waste water generation per ton of FBB.

| | Project IRR during Investment Decision | Project IRR based on latest available values |
|---------------------------------------|--|--|
| Waste water generation per ton of FFB | An article ‘Assessment of Palm oil mill effluent as Biogas Energy source in Thailand’ on 33 rd Congress on Science and technology | 10 days campaign has been carried out in the plant, as per AMS-III.H, from which a value of 0.59 m3 of wastewater per ton of |

| | | |
|--|--|--|
| | of Thailand indicates a value of 0.50 m3 of waste water generation per ton of FFB processed (IRL#36) | FFB processed has been obtained. Laboratory reports from third party labs have been provided for 10 days campaign (IRL#37) |
|--|--|--|

Amount of biogas produced – Amount of biogas generated by the project activity has been validated as follows:

| | Project IRR during Investment Decision | Project IRR based on latest available values (cross-check value) |
|-------------------|--|--|
| Biogas generation | Biogas produced has been calculated based on COD of waste water, waste water quantity, & the following factors verified from Biotech Thai proposal, IRL #50: a) 0.28: 1 kg of COD digestion generates 0.28 m3 of methane gas b) 0.8: it can digest 80% of COD c) 0.6: 60% of methane gas in biogas. | Biogas produced has been calculated based on COD of waste water (collected from 10 days sample), waste water quantity, & the following factors verified from Design document from Energy Research & Developmental Institute (ERDI), IRL #14: a) 0.9=safety factor for non degradable part of reduced COD b) 0.35= COD equivalent to methane (Metcalf & Eddy: Wastewater Engineering Treatment and Reuse, p.633) c) 0.65=fraction of methane in biogas |

Electricity production rate - Electricity production rate of 2.2 kWh/m3 of biogas has been considered from generator proposal (IRL #38). Further it is also supported by ERDI designs (IRL #14)

Electricity tariff – Tariff has been taken from official value from Provincial Electricity Authority (PEA) of Thailand (IRL #30,13), and additional revenue due to renewable power generation has also been added, 0.3 THB/kWh (IRL #39)

| | Project IRR during Investment Decision | Project IRR based on latest available values (cross check values) |
|--------------------|---|--|
| Electricity Tariff | Electricity tariff for the project, has been calculated using the mixture of peak (2.6950 THB/kWh) & off-peak rates (1.1914 THB/kWh) provided by PEA (IRL #30,13) valid from Oct 2005. As verified, there have been no subsequent revisions | Tariff has been cross-checked using the mixture of peak (2.6950 THB/kWh) & off-peak rates (1.1914 THB/kWh) as verified from the actual invoices from PEA (IRL #70) As per peak & off-peak hours defined by PEA, peak hours contributes for |

| | Project IRR during Investment Decision | Project IRR based on latest available values (cross check values) |
|--|--|--|
| | <p>from PEA. Hence, the same is valid at the time of investment decision, too. As per peak & off-peak hours defined by PEA, peak hours contributes for 54.17% of time (peak hours are 0900 to 2200 during Monday to Friday), as conservative measure PP has considered this peak hours for weekends as well.</p> <p>Adder of 0.3 THB/kWh has been added for each unit of power exported to the grid for initial 7 years of operation.</p> <p>The figure taken in the investment analysis is the mixed tariff rate (2.1216 THB/kWh), with adder (0.3 THB/kWh), which is validated to be a total value of 2.4216 THB/kWh for initial 7 years.</p> <p>Further, comparison has been made with the Power Purchase Tariff for VSPP (average from 2002 - Aug. 2007) which is verified as 2.2031 THB/kWh, which could be considered in the same range as the value considered in the investment analysis (2.1216 THB/kWh). Comparison with the average of 2007, the rate could be verified as 2.3908 THB/kWh, which is also in the same range. Hence, the value of electricity tariff considered in the investment analysis The same is deemed appropriate.</p> | <p>54.17% of time, as conservative measure PP has considered this peak hours for weekends as well.</p> <p>Adder of 0.3 THB/kWh has been added for each unit of power exported to the grid for initial 7 years of operation, in line with the policy regulations from EP-PO.</p> <p>Because of slight variation in actual electricity production as compared to the amount envisaged at the time of planning, the figure of off-peak hours electricity production has slightly increased, thus resulting in mixed tariff figure of 2.3859 THB/kWh. The figure is still within the sensitivity range. Hence, accepted.</p> <p>The same has been considered in the investment analysis.</p> |

Operating expenditure – The values for the O&M have been taken from the internal project costing analysis report prepared for board approval based on feasibility report obtained from Biotech Thai Corporation (IRL #50). The estimated value in investment analysis have been cross-checked with the actual quotations, purchase orders to suppliers and vendors for the period of Jan 2010 to March 2011 (IRL #71), time period after implementation of the project activity, and it has been found that the actual realized value is only 8.62% lower than the estimated cost. Since this variation of 8.62% is covered under the sensitivity analysis, hence the same has been successfully accepted.

| | Project IRR during Investment Decision | Project IRR based on latest available values |
|---------------------------------------|--|---|
| Chemical Cost | Chemical cost of 500,000 bhat/year has been verified from the Biotech Thai proposal (IRL #50) | Letter from ERDI has been reviewed to verify that O&M cost shall not change substantially even if there is change in capacity from the investment decision (IRL #72). |
| Cost of electricity for biogas system | 0.5% of the construction cost of biogas system ,300,000 bhat/yr, has been verified Biotech Thai proposal (IRL #50). | Letter from ERDI has been reviewed to verify that O&M cost shall not change substantially even if there is change in capacity from the investment decision (IRL #72). |
| Maintenance cost of biogas system | 3% of the construction cost of the biogas system, 1,800,000 bhat/yr, has been verified from the feasibility report based on Biotech Thai proposal (IRL #50). | Letter from ERDI has been reviewed to verify that O&M cost shall not change substantially even if there is change in capacity from the investment decision (IRL #72). |
| Maintenance cost of Gas engine | 0.2 bhat/kWh has been verified from the feasibility report based on Biotech Thai proposal (IRL #50). | Letter from ERDI has been reviewed to verify that O&M cost shall not change substantially even if there is change in capacity from the investment decision (IRL #71). |
| Employee cost for engineering system | 5 staff with 170 bhat/day has been verified from the Biotech Thai proposal (IRL #50). | Letter from ERDI has been reviewed to verify that O&M cost shall not change substantially even if there is change in capacity from the investment decision (IRL #71). |

As a conservative measure, total O&M cost for the project activity has been crosschecked using actual purchase orders issued to vendors after the implementation of the project activity (for January 2010 to March 2011). The actual realized value is only 8.62% lower than the total estimated cost mentioned above, which is covered under the sensitivity analysis, hence accepted.

Revenue from avoidance of electricity used in the baseline scenario:

Implementation of the project activity avoids the electricity, which would have been used by the baseline scenario. Revenue from this avoidance has been calculated using:

- a) Auxiliary consumption based on the installed power capacity of pump & aerator at the baseline scenario & running hours of these machines. Rated capacities of these machines have been verified using photographs of nameplate of the respective pumps & aerator (IRL #11, 73). Further, running hours have been verified from the baseline data confirmed by a letter by UPOIC indicating the operating hours of the same (IRL #73).
- b) Electricity consumption in the palm oil based on the 3-year historic records, as provided by UPOIC. (IRL #54)

The tariff of electricity import has been validated from the invoices by PEA and other data provided by PEA (IRL 13, 30, 70), as described in the section above. The value considered in the financial analysis, as validated by the assessment team based on these invoices, which also includes the Ft component, is 2.3876 THB/kWh.

A Request for Review was initiated by UNFCCC for the project (<https://cdm.unfccc.int/Projects/DB/TUEV-SUED1293726368.8/Review/J6DB8S6VXHVCWEX1Z1KLD1PDPG9IL5/display>) wherein it was requested from DOE to further clarify why the amount of electricity savings due to avoided electricity imports from the grid used in the financial calculations (93.9 MWh/year) differ from the amount of electricity imports used in emission reductions calculations (433 MWh/year). In doing so please refer to the VVM version 1.2 paragraph 111.

In response to the question, DOE would like to clarify that the earlier submission of investment analysis did not consider the electricity savings on account of the part used by the palm oil mill. Hence, the discrepancy was noticed by the secretariat. As a result, CAR22 was raised by the assessment team, and revised and corrected documents were submitted by the PP. However, it was noticed that this change did not make a significant difference, as the equivalent amount of electricity is now not considered in the electricity export to grid, thereby reducing the revenue for the project. Hence, IRR is not significantly affected. Nevertheless, for transparency, a clear and consistent approach, as requested in the Request for Review, has been presented in the PDD and validation report.

Subsidy – Subsidy has been granted to the project activity from ENCON fund by EPPO (IRL #20). It was further verified that subsidy element was not known during the investment decision by confirming the date of ‘application letter from PP to EPPO’ (IRL #22). Hence the same has not been considered in the computation of project IRR. However as a conservative approach PP has also computed IRR for the project activity based on latest available information during validation (also including subsidy) even after investment decision.

| | Project IRR during Investment Decision | Project IRR based on latest available values (cross check value) |
|-----------------|--|--|
| Subsidy element | Not considered. It was clarified by PP that subsidy was not known to them during investment decision; it was also verified through date of application for | 5 Million THB subsidy element has been considered as per the contract between UPOIC and EPPO (IRL #63) |

| | | |
|--|---|--|
| | subsidy fund (IRL #22) that PP applied for subsidy after Investment decision. | |
|--|---|--|

Inflation rate: Inflation rate of 5.90% has been taken from average of Jan to June 2006 inflation values from Bank of Thailand (IRL #74)

| | Project IRR during Investment Decision | Project IRR based on latest available values |
|----------------|--|--|
| Inflation Rate | Same as mentioned above | Same as mentioned above |

Increasing rate of energy cost: 3% annual increase in power tariff has been considered based on feasibility report prepared by Biotech Thai Corporation (IRL #50).

Investment analysis has been carried out by the PP using all the key assumptions mentioned above. The IRR of the project activity during investment decision comes out to be 5.85% and project IRR using latest available information even after investment decision date comes out to be 4.17% (Please refer to IRL #09,10 & CAR 6).

DOE confirms that the accuracy of financial calculations have been carried out by the assessment team in line with the requirements of para 111 of VVM ver. 1.2.

Sensitivity analysis – The sensitivity analysis has been carried out for 10% variation in following key parameters: Project investment cost, operation & maintenance (O&M) costs & income from sale of electricity. Only a decrease in investment costs by 43.40%, or O&M costs by 75.1% or increase in revenue by 40.70% will lead to the IRR of the project close to benchmark. However, these situations are not considered plausible for the project, and appropriate justifications presented in the PDD could be validated by the audit team.

Varying the above parameters by 10%, the best case scenario in sensitivity analysis generates IRR of 8.47% when there is 10% increase in electricity tariff (income from the project activity). Hence the sensitivity analysis indicates that the benchmark is still not crossed by variation of the above mentioned parameters; thereby indicating that the economic un-attractiveness of the project is robust.

Even if we consider the default value available in the Appendix of Guidelines on assessment of investment analysis ver. 5 (EB 62 report, Annex 5), 11.2% (as prescribed for Thailand Group 1 industries) is not reached with 10% variation in the above parameters. Hence, the project could be considered additional.

In light of the above it can be stated that the input values used in the investment analysis are suitable for the project type.

3.6.4 Common practice analysis

Since the project activity is a small scale project activity and PPs have used 'Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities' hence the PPs have not carried out common practice analysis for the project activity

3.7 Monitoring plan

The monitoring plan presented in the PDD complies with the requirements of the applicable methodologies. The assessment team has verified that all parameters in the monitoring plan against the requirements of the methodologies; no relevant deviations have been found.

The procedures have been reviewed by the assessment team through document review and interviews with the relevant personnel. This information, together with a physical inspection, allows the assessment team to confirm that the proposed monitoring plan is feasible, and within the project design. The major parameters to be monitored have been discussed with the PPs. Especially the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project.

Following are the key parameters which would be monitored as per the applied methodologies:

- Volume of wastewater treated by the Completely Stirred Tank Reactors (CSTR). For monitoring this parameter, the flow meter will be installed before the CSTR (figure 6 of PDD & CAR 11). It will be maintained and calibrated at least once in a year. Continuous monitoring with hourly records of reading would be done to ensure high reliability.
- COD of the untreated wastewater and COD of the treated wastewater by the CSTR. For monitoring them, weekly sampling and analysis of the wastewater before and after the CSTR will be implemented in accordance with Standard Method of the Examination of Water and Wastewater.
- Volumetric flow rate of biogas on dry basis leaving the digester in year y: A flow meter for continuous measurement would be installed at the biogas delivery piping system to measure the amount of biogas generated from the digester tanks. Accuracy of the meter would be based on manufacturer's standards or $\pm 1.5\%$ accuracy of measured value. Hourly value shall be recorded on the memory card of the recorder. PDD was further verified to document the monitoring conditions which shall ensure no air-ingress into the piping system (as per applied methodology AMS-III.H version 15).
- Volumetric flow rate of the biogas to the flare in dry basis at normal conditions in hour h: The flow meter would be installed in the individual delivery pipeline to the flaring system after the branch from the main biogas. Accuracy of the meter would be based on manufacturer's standards or $\pm 1.5\%$ accuracy of measured value. Hourly value will be recorded on the memory card of the recorder.
- Total annual electricity generated from the project in year y: The amount of electricity consumed by the project will be monitored continuously by a separate and officially calibrated electric meter.
- End use of sludge generated in year y: The end use of sludge collected from sand bed filter would be monitored as per para 39 of AMS-III.H

Therefore, we find that the PP's will be able to implement the monitoring plan and the emission reductions achieved can be reported ex-post and verified.

3.8 Sustainable development

The LoA of the Host Country presented a statement that the project contributes to the sustainable development of the Host Party.

3.9 Local stakeholder consultation

The relevant local stakeholders have been invited via invitation letters. The evidence of these invitations is IRL #56. The assessment team has reviewed the documentation in order to validate the inclusion of relevant stakeholders. Based on local expertise it can be confirmed that the communica-

tion method used to invite the stakeholders was considered appropriate. The summary of comments presented in the PDD has been verified with the documentation of the stakeholder consultation and is found to be fulfilled.

Hence the local stakeholder consultation has been adequately performed according to the CDM requirements.

3.10 Environmental impacts

The project participants undertook not to conduct an environmental impact assessment as per the current regulations in Thailand (IRL #61). The assessment team reviewed the documentation of the presented information. The URL # http://www.pcd.go.th/info_serv/en_reg_envi_32.html from Pollution Control Department in Thailand with related environmental regulations confirms the correctness of the approach used by the PPs. Hence, the assessment team could conclude that the PPs followed the requirements of the host country in regards to environmental impacts.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

TÜV SÜD published the project documents on the UNFCCC website by installing a link to TÜV SÜD's own website, and invited comments by affected Parties, stakeholders, and non-governmental organisations during a 30 day period.

The following table presents all gathered key information:

| | |
|--|----------------------------|
| webpage: http://cdm.unfccc.int/Projects/Validation/DB/7XZXCVF7QDLMH4X5NK12AWBJL4B4P1/view.html | |
| Starting date of the global stakeholder consultation process: 10-03-2009 | |
| Comment submitted by: - | Issues raised: - |
| Response by TÜV SÜD: - | |

5 VALIDATION OPINION

TÜV SÜD has performed a validation of the following proposed CDM project activity:

UPOIC Wastewater Treatment for Energy Generation, Krabi


Standard auditing techniques have been used for the validation of the project. Methodology-specific customized checklists and protocol for the project have been prepared to carry out the audit in order to present the outcome in a transparent and comprehensive manner.

The review of the project design documentation, subsequent follow-up interviews and further verification of references have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria in the protocol. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Therefore, TÜV SÜD will recommend the project for registration by the CDM Executive Board.

An analysis, as provided by the applied methodology, demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are additional to any that would occur in the absence of the project activity. Considering that the project will be implemented as designed, the project is likely to achieve the estimated amount of emission reductions of 18,002 tCO₂e and a total estimated of 180,017 tCO₂e as specified within the final PDD version.

The validation has been performed following the requirements of the latest version of the CDM VVM and on the basis of the contractual agreement. The single purpose of this report is its use during the registration process as part of the CDM project cycle.

Munich, 13-10-2011



Eric Tolcach
Certification Body "climate and energy"
TÜV SÜD Industrie Service GmbH

Munich, 13-10-2011



Thomas Kleiser
Assessment Team Leader

Validation of the CDM Project:
UPOIC Wastewater Treatment for Energy Generation, Krabi



Industrie Service

Annex-1: Validation Protocol

Validation Protocol

Project Title: UPOIC Wastewater Treatment for Energy Generation, Krabi

Date of Completion: 13/10/2011



Industrie Service

| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|---|------|--|-------------------------------------|-------------------------------------|
| A. General description of small-scale project activity | | | | |
| A.1. Title of the small-scale project activity | | | | |
| A.1.1. Does the used project title clearly enable to identify the unique CDM activity? | 1 | The title of the project activity is unique and helps to identify the project activity in consideration. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.1.2. Are there any indication concerning the revision number and the date of the revision? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.1.3. Is this consistent with the time line of the project's history? | 1 | Yes, the version number of the PDD in GSP is 1, dated 21/02/2009 which is consistent with the time line of the project's history. Final version of the PDD is 11, and it is dated 11 th October 2011 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.2. Description of the small-scale project activity | | | | |
| A.2.1. Is the description delivering a transparent overview of the project activities? | 1 | Partially. United Palm Oil Public Industry Public Company Limited will implement a closed digester system for waste water treatment. Biogas will be captured and used for electricity production. At on-site audit is has been clarified that electricity will be supplied to the palm oil factory and surplus electricity will be fed into the grid. At time of validation PP is only allowed to supply 1 MW electricity to the grid due to constraints of the line. See A.2.5. | CAR | <input checked="" type="checkbox"/> |
| A.2.2. What proofs are available demonstrating that the project description is in compliance with the actual situation or planning? | | Evidencing documents have been verified on-site audit: - Approval for construction (2 MW biogas genset) - Approval for grid electricity supply (1 MW), - Project implementation schedule, - Equipment purchase order (biogas genset) and service contracts (genset installation, biogas system design, biogas system construction), - Design study and technical layout of the biogas system - Line diagrams of electricity system | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|--|------|---|------------|-------------------------------------|
| | | - Design data for the existing pond system | | |
| A.2.3. Is the information provided by these proofs consistent with the information provided by the PDD? | 1 | See A.2.5 | CAR | <input checked="" type="checkbox"/> |
| A.2.4. Is all information presented consistent with details provided by further chapters of the PDD? | 1 | Section A.2. indicates that electricity will be fed into the grid (10,646 MWh/year) while Section A.4 states that electricity will be used to meet in-house demand and electricity will be fed into the grid. See A.2.5 | CAR | <input checked="" type="checkbox"/> |
| A.2.5. Does the description of the technology to be applied provide sufficient and transparent input to evaluate its impact on the greenhouse gas balance? | 1 | <p>Methane emissions from the microbiological degradation of wastewater are reduced due to the installation of a closed digester system replacing open anaerobic ponds. In addition the project generates electricity which is exported to the Thai grid that is dominated by fossil fuel power plants. At on-site audit it has been clarified that the electricity system of the palm oil mill factory is connected to the biogas genset/ wastewater treatment system. The electricity of the factory is provided by a biomass steam power plant, a diesel genset and also purchases electricity from the grid. However PP clarified that there is only one line connection to the electricity grid therefore electricity for the factory premises can be purchased from the grid OR supplied to the grid. Therefore it is expected that the electricity generated by the biogas system will be used to meet in-house demand first and only supply surplus electricity to the grid. Moreover the actual electricity purchase agreement with PEA only allows to supply 1 MW electricity to the grid due to constraints of the line.</p> <p><u>Corrective Action Request No.1.</u></p> <p>1) The description of the project should more clearly explain how the proposed project activity reduces GHG emissions (see SSC</p> | CAR | <input checked="" type="checkbox"/> |

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|----------------------------|------|---|------------|-----------|
| | | <p>PDD guide section A2).</p> <p>2) Please transparently describe the project activity according to the latest planning (including PEA permit cap of 1 MW).</p> <p>3) Transparently describe the existing wastewater treatment system (specification of the existing wastewater treatment system and subsystems i – including loading rate COD in- and outflow etc) and the project wastewater treatment system and subsystems k (biogas plant/lagoon system expected amount of methane capture and electricity generation capacity, designed COD removal rates etc.).</p> <p>4) Clearly describe the purpose of electricity generation (in-house use and only surplus electricity to be fed into the grid). At on-site audit it has been clarified that the electricity system of the palm oil mill factory (which includes a biomass steam power plant and also purchases electricity from the grid) is connected to the biogas genset/wastewater treatment system and that there is only one line connection to the electricity grid (electricity for the factory premises can be purchased from the grid <u>OR</u> supplied to the grid. Therefore it is expected that the electricity generated by the biogas system will be used to meet in-house demand first and only supply surplus electricity to the grid. The single line diagram submitted at on-site audit seems to only include the part of the biogas genset. A single line diagram of the complete factory should be submitted to the audit team showing transparently each electricity generation equipment connected to the captive grid.</p> <p>5) Please provide a projection of the amount of electricity used for captive purposes and the amount exported to the grid and transparently describe and justify these projections. Please ensure consistency with other sections of the PDD (also in regard to projections of FFB use, specific wastewater generation, quantity of</p> | | |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|---|------|--|-------------------------------------|-------------------------------------|
| | | wastewater generated, quantity of biogas etc.). | | |
| A.2.6. Is the brief explanation how the project will reduce greenhouse gas emission transparent and suitable? | 1 | The project would avoid methane emissions from wastewater treatment and would avoid carbon dioxide emissions at grid by exporting surplus electricity to the grid (see A.2.5.) | CAR | <input checked="" type="checkbox"/> |
| A.2.7. Is the location of the wastewater treatment plant as well as the source generating the wastewater uniquely defined and described in the PDD? | 1 | Yes. The wastewater results from the production process of the United Palm Oil Public Industry Public Company Limited. The wastewater treatment plant is located at the premises of the factory. This is described in A.4. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.3. Project participants | | | | |
| A.3.1. Is the form required for the indication of project participants correctly applied? | 1 | The form is correctly applied. As per the GSP PDD, the project is a bilateral project. United Palm Oil Industry PCL is the private entity from non-Annex I party i.e. Thailand. Carbon Asset Management Sweden AB is the private entity from Annex I party i.e. Sweden. During the finalization of the project, UPOIC has cancelled the agreement with Carbon Asset Management Sweden AB, the same has been updated in the final PDD. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.3.2. Is the participation of the listed entities or Parties confirmed by each one of them? | 1 | Letter of approval from the Thai DNA. | Open | <input checked="" type="checkbox"/> |
| A.3.3. Is all information on participants / Parties provided in consistency with details provided by further chapters of the PDD (in particular annex 1)? | 1 | See A.2.5. | CAR | <input checked="" type="checkbox"/> |
| A.4. Technical description of the small-scale project activity | | | | |
| <i>A.4.1. Location of the small-scale project activity</i> | | | | |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|---|-------|---|-------------------------------------|-------------------------------------|
| A.4.1.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)? | 1 | <p>The geographical location of the project activity has been clearly defined in the PDD. The address and geographical coordinates are provided. The project is located at the United Palm Oil Industry PLC factory: 96 Moo 6, NuaKlong-Kao Panom Rd., Huay Yoong district, Amphur NuaKlong, Krabi province, 81130</p> <p>The coordinates given in the PDD could not be verified. Coordinates of the office on-site are 8°9.2382' N; 99°1.4009 E (GSP device, number of satellites 8, accuracy 11m, April 22, 2009)</p> <p>Clarification Request No. 1. The coordinates given in the PDD could not be verified. Please correct. Coordinates verified at on-site audit by GSP device are 8°9.2382' N; 99°1.4009 E</p> | CR | <input checked="" type="checkbox"/> |
| A.4.1.2. How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (ownership, licenses, contracts etc.)? | | The biogas plant will be implemented at the premises of UPOIC palm oil mill factory. Current valid operation licence and the approval for grid electricity supply (1 MW) have been submitted to the audit team. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2. Type and category(ies) and technology/measure of the small-scale project activity | | | | |
| A.4.2.1. To which type(s) does the project activity belong to? Is the type correctly identified and indicated? | 1,2,3 | The project activity has two components i.e. methane avoidance and renewable electricity generation. The methane avoidance is classified under Type III activities and renewable power generation is classified under Type I activities. The types have been correctly stated in the GSP PDD. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.2. To which category (ies) does the | 1,2,3 | The category for methane avoidance components has been cor- | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|------|---|------------|-------------------------------------|
| project activity belong to? Is the category correctly identified and indicated? | | rectly identified as III.H. (Methane recovery in Wastewater Treatment) and the electricity generation is correctly identified as I.D. (grid connected renewable electricity generation). | | |
| A.4.2.3. Does the technical design of the project activity reflect current good practices? | 1 | <p>Yes, it represents current good practice in the industry. Conventionally wastewater is treated in open pond systems. The project activity uses a hybrid reactor system (Chiang Mai University (CMU) Plug Flow - completely stirred tank reactor (CSTR) - system).</p> <p>The project activity uses a hybrid reactor system (Chiang Mai University (CMU) Plug Flow - completely stirred tank reactor (CSTR) - system) with a capacity of 2 x 6000 m³. H₂S will be removed in scrubber systems, the biogas will be dried before combustion. Two Guascor genset (952 kW, approx 400 m³ biogas/h each), will be used for electricity generation and a flare with a capacity of 500 m³/h is available for emergency cases.</p> <p><u>Corrective Action Request No.2.</u></p> <p>The methane content in biogas is assumed to be 70 %. Please provide supportive documentation for this assumption. Technical design assumes 65 %. The designed COD removal efficiency is 90% rather than the Biogas production rate as stated on page 7 in the PDD. Please correct.</p> <p><u>Clarification Request No. 2.</u></p> <p>Please document in the PDD the type of flare used. In case of applying a default value for the flare efficiency, the manufacturers specification for the operation of the flare should be also documented (see Flaring tool page 3).</p> | CAR, CR | <input checked="" type="checkbox"/> |

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|--|------|---|-------------------------------------|-------------------------------------|
| A.4.2.4. Does the implementation of the project activity require any technology transfer from Annex-I-countries to the host country (ies)? | 1 | The genset is manufactured by Guascor (Spain) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.5. Is the technology implemented by the project activity environmentally safe? | 1 | Yes, the technology is expected to be environmentally safe. The project is also intended to run under the Gold Standard which sets additional and higher standards on environmental and social impacts of such a project in comparison to CDM. pH, volatile fatty acids and alkalinity are parameters that will be controlled to ensure the systems proper operation. Analysis is to be done at the laboratory in the factory. One year follow up and training is fixed in the contract with Chiang Mai University to support the factory. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.6. Is the information provided in compliance with actual situation or planning? | 1 | See CAR-1, section A.2.5 | CAR | <input checked="" type="checkbox"/> |
| A.4.2.7. Does the project use state of the art technology and / or does the technology result in a significantly better performance than any commonly used technologies in the host country? | 1 | Biogas system is developed by the Energy Research and Development Institute of Chiang Mai University. The biogas gensets will be provided by a European equipment supplier (Guascor) and the flaring equipment by a Thai company (BKE COMBUSTION CONTROLS CO.,LTD). | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.8. Is the project technology likely to be substituted by other or more efficient technologies within the project period? | 1 | No, there is no indication that the technology could be substituted by another or more efficient technology during the lifetime of the project. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.9. Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled dur- | | The maintenance is expected to be done by staff of UPOIC factory. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| ing the project period? | | Training for biogas system operation and control is provided by ERDI. Work instruction has been set up and respective documentation will be included in existing ISO 9001:2000/ISO 14001:2004 system. Technical training for genset operation is also contracted. | | |
| A.4.2.10. Is information available on the demand and requirements for training and maintenance? | | The operation of the biogas system requires some training which has been foreseen. Maintenance is expected to be performed in line with supplier specifications | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.2.11. Is a schedule available for the implementation of the project and are there any risks for delays? | | Yes. The latest implementation schedule for the year 2009 has been submitted to the audit team. At on-site audit construction was ongoing, however construction schedule could be verified to be mainly in line with this planning. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.3. Estimated amount of emission reductions over the chosen crediting period | | | | |
| A.4.3.1. Is the table format required for the indication of projected emission reductions correctly applied? | 1 | Yes, the form has been correctly applied. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.3.2. Are the figures provided consistent with other data presented in the PDD? | 1 | Yes, the data is consistent within the PDD. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.3.3. Are the figures consistent with the small-scale criteria for the used Type? | 1 | Yes. The emission reductions are less than 60 000 t CO ₂ e/a and the installed electricity generation capacity is far below 15 MW. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| A.4.4. Public funding of the small-scale project activity | | | | |
| A.4.4.1. Is the information provided on public funding provided in compliance with the actual situation or planning as available by | 1 | Financing will be through own capital of United Palm Oil Industry PCL, the sale of CER and funding from the Ministry of Energy through their Biogas technology promotion scheme: "Energy Con- | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|----------|---|----------------------|-----------|--------------------------------|----|---|----|--|----|--|----|---|---|
| the project participants? | | servation Promotion Fund” from Energy Policy and Planning Of- fice. An official letter from the Energy Policy and Planning Office is included in the PDD Annex 2 confirming that no ODA fundings are involved in the programme (announced on January 2009) | | | | | | | | | | | | |
| A.4.4.2. Is all information provided consis- tent with the details given in remaining chapters of the PDD (in particular annex 2)? | 1 | Clarification Request No. 3. Annex 2 states that besides CER sales, financing will be through loan of a commercial Thai Bank, funding from “Energy Policy and Planning Office (EPPO). At on-site audit it has been clarified and substantiated that there will be no loan involved, thus please re- vise the PDD accordingly. | CR | ☑ | | | | | | | | | | |
| A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity | | | | | | | | | | | | | | |
| A.4.5.1. Is there a registered small-scale CDM project activity or an application to register another small-scale CDM project activity: with the following characteristics: | 1 | <table><tr><th>Debundling checklist</th><th>Yes / No</th></tr><tr><td>the same project participants?</td><td>No</td></tr><tr><td>In the same project category and technolo- gy/measure?</td><td>No</td></tr><tr><td>Registered within previous two years? Or in registration process?</td><td>No</td></tr><tr><td>Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration?</td><td>No</td></tr></table> | Debundling checklist | Yes / No | the same project participants? | No | In the same project category and technolo- gy/measure? | No | Registered within previous two years? Or in registration process? | No | Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration? | No | ☑ | ☑ |
| Debundling checklist | Yes / No | | | | | | | | | | | | | |
| the same project participants? | No | | | | | | | | | | | | | |
| In the same project category and technolo- gy/measure? | No | | | | | | | | | | | | | |
| Registered within previous two years? Or in registration process? | No | | | | | | | | | | | | | |
| Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration? | No | | | | | | | | | | | | | |
| A.4.5.2. If the answer to all the above ques- tion is ‘Yes’ then does the total size of the small scale project activity combined with previously registered small scale CDM project activity exceeds the limits of small scale CDM project activities? | 1 | NA | ☑ | ☑ | | | | | | | | | | |

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| B. Application of a baseline and monitoring methodology | | | | |
| B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity | | | | |
| B.1.1.1. Are reference number, version number, and title of the baseline and monitoring methodology clearly indicated? | 1,2,3 | <p>Yes. Approved small scale methodologies AMS III.H. version 13 (EB42) and AMS I.D. Verion 13 (EB 36) have been applied to the project activity in the GSP PDD and the same has been transparently indicated in the GSP PDD.</p> <p>The methodology, in the final PDD, has been updated to AMS III.H version 15 & AMS I.D version 16 in the final PDD.</p> <p>Clarification Request No. 4.</p> <p>The Tool to determine project emissions from flaring gases containing methane (EB28) is applied in order to calculate project emissions due to incomplete flaring in line with methodology AMS III.H. although in section B.1. it states that it is not applied. Please update the information. Also make reference to the Tool to calculate Emission Factor.</p> | CR | <input checked="" type="checkbox"/> |
| B.1.1.2. Is the applied version the most recent one and / or is this version still applicable? | 1,2,3 | <p>Yes. The applied versions are the most recent versions during the time of GSP</p> <p>However the same has been updated in the final PDD to AMS III.H ver 15 & AMS I.D ver16.</p> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.2. Justification of the choice of the methodology and why it is applicable to the project activity | | | | |
| B.2.1. Is the applied methodology considered the most appropriate one? | 1,2,3 | Yes. See below. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Integrate the required amount of sub-checklists on the applicability criteria as given by the applied methodology and comment on at least every line | | | | |

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| answered with “No”; | | | | | | | | | | | | |
| B.2.1.1. Criterion 1: Project substitutes existing aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.2. Criterion 2: Project introduces anaerobic sludge treatment system with biogas recovery and combustion to an existing wastewater treatment plant without sludge treatment. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.3. Criterion 3: Project introduces biogas recovery and combustion to an existing sludge treatment system. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.4. Criterion 4: Project introduces biogas recovery and combustion to an existing anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.5. Criterion 5: Project introduces anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.6. Criterion 6: Project introduces sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an existing anaerobic wastewater treatment system without biogasrecovery. | 1,2 | <div>PDD section B.6.1. states that scenario (vi) of paragraph 1 of the methodology IIH applies for the project activity.</div> <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NO</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | NO | Compliance provable? | Yes | Compliance verified? | Yes | CR | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | NO | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | |

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| | | <p><u>Clarification Request No. 5.</u></p> <p>Please clearly define in section B2 which measures (as given in para 1 of the methodology) the project activity is comprising. The section should specify how the project is fulfilling the applicability criteria of the methodologies (rather than repeating the requirements of the methodologies).</p> | | | | | | | | | | |
| B.2.1.7. Project activity utilise the biogas recovered for combustion/flaring. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.8. Project activity utilise the biogas recovered for thermal or electrical energy generation directly. | 1,2 | <table border="1"><thead><tr><th>Applicability checklist</th><th>Yes / No / NA</th></tr></thead><tbody><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></tbody></table> <p>Biogas will be used for captive power and grid electricity production. Flaring is foreseen for emergency cases.</p> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | Yes | Compliance provable? | Yes | Compliance verified? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | Yes | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | |
| B.2.1.9. Project activity utilise the biogas recovered for thermal or electrical energy generation after bottling of upgraded biogas. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.10. Project activity utilise the biogas recovered for thermal or electrical energy generation after upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |

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| B.2.1.11. Project activity utilise the biogas recovered for thermal or electrical energy generation after upgrading and transporting the biogas via a dedicated piped network to a group of end users. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.12. Project activity utilise the biogas recovered for hydrogen production. | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.13. In case where the project activity is covered under paragraph 2(a), Does the PDD clearly indicate the use of the corresponding category under type 1 (applicable checklist should be also filled)? | 1,2,3 | <div>The project is not a cogeneration system and the installed capacity is below 15 MW threshold (rated design capacity 2 X 952 kW_e). This has been verified with the design and equipment purchase orders.</div> <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <div>See section G of the validation protocol</div> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | Yes | Compliance provable? | Yes | Compliance verified? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | Yes | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | |
| B.2.1.14. In the case where the recovered biogas is utilized for production of hydrogen (project activity covered under paragraph 2 (d)), Does the PDD indicate the use of the corresponding category under AMS III.O (applicable checklist should be also filled)? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.2.1.15. Applicable for project activity covered under paragraph 2 (b). Does the sales outside the project boundary are | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |

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| ensured via contract between the bottled biogas vendor and the end-user? | | | | |
| B.2.1.16. Does the project activity claims emission reduction form the displacement of fossil fuels from the end use of bottled biogas? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.2.1.17. For the cases where the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period: does the project describes the CO2 emission avoided by the displacement of the fuels is according the type I methodology O (applicable checklist should be also filled)? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.2.1.18. In case where the project activities covered under paragraph 2 (c i) emission reductions from the displacement of the use of natural gas is eligible under this methodology: Does the geographical extent of the natural gas distribution grid in the host country boundaries is provide in the PDD? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.2.1.19. In case where the project activities covered under paragraph 2 (c ii): Does the emission reductions for the displacement of the use of fuels is claimed and reported according the provision in the corresponding type I methodology, | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| e.g. AMS I.C.? | | | | | | | | | | | | |
| B.2.1.20. In case where the project activities covered under paragraph 2 (b) and 2 (c): Is upgrade done by way of absorption with water such that methane content of the upgrade biogas is in accordance with national regulations or a minimum of 96 %? | 1,2 | NA | ☑ | ☑ | | | | | | | | |
| B.2.1.21. Is the project activity resulting in a capacity addition of the wastewater or sludge treatment system ? (if yes, see B.4.1.) | 1,2, 24 | The project activity takes place at an existing wastewater treatment system. An additional sequential wastewater stage is included. The existing wastewater pond treatment system was designed for a capacity of 75 t FFB/h in 2004 and a flow rate of 1000 m³/day. Historical FFB processing rates show that this capacity was not achieved within the last 5 years up to March 2009. The new system has a design capacity of 350 m³/day and thus it can be concluded that the project activity is not resulting in a capacity addition | ☑ | ☑ | | | | | | | | |
| B.2.1.22. Are the projected aggregated emission reductions less than or equal to 60,000 tonne CO ₂ per annum for all type III components of project activity? | 1,2 | <table><tr><th>Applicability checklist</th><th>Yes / No / NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | Yes | Compliance provable? | Yes | Compliance verified? | Yes | ☑ | ☑ |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | Yes | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | |
| B.2.1.23. If the project is under a programme of activities, have all the applicability criteria and additional requirements been considered according to the methodology? | 1,2 | NA | ☑ | ☑ | | | | | | | | |
| B.3. Description of the project boundary | | | | | | | | | | | | |
| B.3.1. Does the project boundary include physical, geographical site where the wastewater and sludge treatment takes place | 1,2 | The project boundary covers the wastewater treatment facilities (cooling ponds, reactors, post-treatment ponds and storage pond as well as the facilities for the combustion of the biogas and elec- | CAR | ☑ | | | | | | | | |

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| in baseline and project situation covering all facilities affected by the project activity (including sites where the processing, transportation and application or disposal of waste products takes place)? | | <p>tricity generation) as indicated in Figure 2 of section A.4.</p> <p><u>Corrective Action Request No.3.</u></p> <p>PDD should transparently describe the wastewater treatment facilities in the baseline <u>and</u> project scenario. Details on the pond system (pre-and post project scenario) should be included (information on capacity, COD, retention time etc.). The exclusion of sections or components that are considered as “not affected” should be justified (see ACM III.H. paragraph 13,14, page 3/23).</p> | | |
| B.3.2. Does the PDD transparently describe also the treatment systems not affected by the project activity (i.e. sections operating in the project scenario under the same operational conditions as in the baseline scenario) | 1,2 | See B.3.1. | CAR | <input checked="" type="checkbox"/> |
| B.3.3. Does the PDD justify the exclusion of sections and components | 1,2 | See B.3.1. | CAR | <input checked="" type="checkbox"/> |
| B.3.4. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD? | 1 | <p>The boundary involves the existing Lagoon system of UPOIC, Krabi, as well as the equipment including the new anaerobic treatment stage (Biogas reactor, Biogas cleaning equipment, Biogas genset, Flare).</p> <p><u>Corrective Action Request No.4.</u></p> <p>The lagoon system as presented in figure 2 does not exactly comply with the situation on-site. Please clearly show each pond/lagoon and its function. See also CAR 1.</p> | CAR | <input checked="" type="checkbox"/> |
| B.4. Details of baseline and its development | | | | |
| B.4.1. Have all technically feasible baseline scenario alternatives to the project activity been identified and discussed by the PDD? | 1,2 | <p>PDD discussed the following waste-water treatment alternatives to the project activity</p> <p>1) The aerobic treatment of the wastewater (replacing the existing anaerobic ponds by managed aerobic or alternating</p> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| Why can this list be considered as being complete? | | ponds) 2) Continuation of current practice 3) Implementation of the project activity without CDM The small scale methodology assumes the continuation of current practice to be the most likely baseline scenario (page 3/25 ff). It has been verified that there are no legal or regulatory restrictions to the continuation of current practice and thus the list is considered as being complete. | | |
| B.4.2. Does the project identify correctly and excludes those options not in line with regulatory or legal requirements? | 1,2,7, 52 | All alternatives are complying with applicable regulatory/ legal Requirements | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.3. Have applicable regulatory or legal requirements been identified? | 1,2,4, 52 | See B.4.1. No. Clarification Request No. 6. Please summarise in the PDD the applicable regulatory/ legal requirements and show that the continuation of current practice is not restricted (for example by discharge COD values/colour of the discharged water). | CR | <input checked="" type="checkbox"/> |
| B.4.4. Baseline scenario selection: | | | | |
| B.4.4.1. Scenario (i): the existing aerobic wastewater or sludge treatment system. | 1 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.4.2. Scenario (ii): the existing sludge disposal system. | 1 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.4.3. Scenario (iii): the existing sludge treatment system without methane recovery and combustion. | 1 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| B.4.4.4. Scenario (iv): the existing anaerobic wastewater treatment system. | 1 | NA | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.4.4.5. Scenario (v): the untreated wastewater being discharged into sea, river, lake, stagnant sewer or flowing sewer. | 1 | NA | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| B.4.4.6. Scenario 6: the existing anaerobic wastewater treatment system without biogas recovery. | | <table><tr><td>Baseline scenario checklist</td><td>Yes / No / NA</td></tr><tr><td>Scenario discussed in the PDD?</td><td>No</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p><u>Corrective Action Request No.5.</u></p> <p>As the project activity involves two components (wastewater treatment and grid electricity supply), please transparently describe the baseline for the two components of the project in section B.4.</p> <p>For the wastewater component the baseline description should include the specification of COD removal rates (COD removal efficiencies) of the baseline treatment systems is affected by the project in line with para 17/18 of the methodology (see also SSC_PDD guide section B.4.). At on-site audit it has been clarified that historical records are only available for the COD inflow before treatment in the lagoon system and COD outflow of the effluent. However this system includes anaerobic, as well as facultative anaerobic and aerobic lagoons and therefore each treatment system needs to be considered separately. Respective measurements are to be undertaken as per para 18a of the methodology. Records of the measurement campaign should be submitted to the audit team.</p> | Baseline scenario checklist | Yes / No / NA | Scenario discussed in the PDD? | No | Compliance provable? | Yes | Compliance verified? | Yes | | CAR | <input checked="" type="checkbox"/> |
| Baseline scenario checklist | Yes / No / NA | | | | | | | | | | | | |
| Scenario discussed in the PDD? | No | | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | | |
| B.4.5. Is the identified baseline scenario in line with regulatory or legal requirements? | 1,2 | Please refer to section B.4.3 | | CR | <input checked="" type="checkbox"/> | | | | | | | | |

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| B.4.6. Is this identification supported by official and/or verifiable documents (e.g. studies, web pages, certificates, etc)? | 1,2 | Please refer to section B.4.4 | CAR | <input checked="" type="checkbox"/> |
| B.4.7. Is an assessment of the alternatives of the project activity included as per para (14/16) of the General Guidance for SSC methodologies? | 1,2 | NA. The project does not result in any capacity addition. See B.2.1.21 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.1. Have all technically feasible baseline scenario alternatives to the project activity been identified and discussed by the PDD? Why can this list be considered as being complete? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.2. Have applicable regulatory or legal requirements been identified? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.3. Does the project identify correctly and excludes those options not in line with regulatory or legal requirements? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.4. Is a complete list of barriers developed that prevent the different alternatives to occur? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.5. Is transparent and documented evidence provided on the existence and significance of these barriers? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.6. Is it transparently shown that the execution of at least one of the alternatives is not prevented by the identified barriers? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.4.7.7. Which alternative scenarios are not prevented by any barrier? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| B.4.7.8. Is it explained how the registration of the CDM project activity will alleviate the barriers that prevent the proposed project activity from occurring in the absence of the CDM? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): | | | | |
| Integrate questions concerning the determination of the additionality when applying the “additionality tool”; Replace blue text, if necessary | | | | |
| B.5.1. In case of applying step 2 / investment analysis of the additionality tool: Is the analysis method identified appropriately (step 2a)? | 1,2 | <p>PDD states that “investment analysis” is applied for the exclusion of alternative scenarios, however no specific investment analysis is provided despite of general statements of additional investment required for a change in wastewater treatment system.</p> <p><u>Corrective Action Request No.6.</u></p> <p>Additionality discussion shall follow Attachment A of Appendix B of the simplified modalities and procedures for SSC CDM project activities (see http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SS_C_AttachmentA.pdf). Please also take into consideration EB 35 report Annex 34 (non binding best practice examples to demonstrate additionality for SSC project activities).</p> <p>Transparent and documented evidence should be provided substantiating the barriers claimed. At on-site audit it has been clarified that the project faces investment barriers. In case investment barrier is claimed in the PDD, a detailed investment analysis should be provided in the PDD. The respective excel calculation file detailing the calculations and the sources of reference for all input values should be submitted to the audit team.</p> | CAR | <input checked="" type="checkbox"/> |
| B.5.2. In case of Option I (simple cost analysis): Is it | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| demonstrated that the activity produces no economic benefits other than CDM income? | | | | |
| B.5.3. In case of Option II (investment comparison analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5.4. In case of Option III (benchmark analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)? | 1,2 | Please refer to section B.5.1 | CAR | <input checked="" type="checkbox"/> |
| B.5.5. In case of Option II or Option III: Is the calculation of financial figures for this indicator correctly done for all alternatives and the project activity? | 1,2 | Please refer to section B.5.1 | CAR | <input checked="" type="checkbox"/> |
| B.5.6. In case of Option II or Option III: Is the analysis presented in a transparent manner including publicly available proofs for the utilized data? | 1,2 | Please refer to section B.5.1 | CAR | <input checked="" type="checkbox"/> |
| B.5.7. In case of applying step 3 (barrier analysis) of the additionality tool: Is a complete list of barriers developed that prevent the different alternatives to occur? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5.8. In case of applying step 3 (barrier analysis): Is transparent and documented evidence provided on the existence and significance of these barriers? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5.9. In case of applying step 3 (barrier analysis): Is it transparently shown that the execution | 1,2 | Continuation of current practice is not prevented by the barriers. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| of at least one of the alternatives is not prevented by the identified barriers? | | | | |
| B.5.10. Have other activities in the host country / region similar to the project activity been identified and are these activities appropriately analyzed by the PDD (step 4a)? | 1,2 | NA. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5.11. If similar activities are occurring: Is it demonstrated that in spite of these similarities the project activity would not be implemented without the CDM component (step 4b)? | 1,2 | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.5.12. Is it appropriately explained how the approval of the project activity will help to overcome the economic and financial hurdles or other identified barriers (step 5)? | 1,2 | Please refer to section B.5.1 | CAR | <input checked="" type="checkbox"/> |
| If the additionality tool has not been used please answer B.5.13 to B.5.18 | | | | |
| B.5.13. If the starting date of the project activity is before the date of validation, is evidence available to prove that incentive from the CDM was seriously considered in the decision to proceed with the project activity? | 1,2 | <p>At on-site audit it has been clarified that start of the project activity is prior than the start of validation. Service contracts and genset purchase contract have been signed in March-July 2008. However extract of the Minutes of Board Meeting of 10/08/2007 has been submitted evidencing the CDM consideration in the decision to approve the investment. In addition supporting documentation has been submitted evidencing that parallel to the technical implementation of the project activities steps have been taken to secure CDM status (Signed Agreement with consultant as well as email correspondence).</p> <p><u>Corrective Action Request No.7.</u></p> <p>Please revise the start date of the project activity and include within the section of additionality discussion an implementation time-</p> | CAR | <input checked="" type="checkbox"/> |

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| | | line of the project activity. The timeline should include the date when the investment decision was made and the date when construction works started and when commissioning is expected. In addition to this implementation timeline please include a timeline of events and actions, which have been taken to achieve CDM registration, with description of the evidence used to support these actions. | | | | | | | | | | | | | | | | | | | |
| B.5.14. Is a complete list of barriers developed that prevents the project activity to occur? | 1,2 | See B.5.1 | | | CAR | ☑ | | | | | | | | | | | | | | | |
| B.5.15. Does this list include at least one of the following barriers? | 1,2 | <table><tr><th>Barrier</th><th>Discussed?</th><th>Verifiable?</th></tr><tr><td>Investment</td><td>Yes</td><td>See B.5.1</td></tr><tr><td>Technological</td><td>Yes</td><td>See B.5.1</td></tr><tr><td>Due to prevailing practice</td><td>No</td><td>-</td></tr><tr><td>Other</td><td>-</td><td>-</td></tr></table> | | | Barrier | Discussed? | Verifiable? | Investment | Yes | See B.5.1 | Technological | Yes | See B.5.1 | Due to prevailing practice | No | - | Other | - | - | CAR | ☑ |
| Barrier | Discussed? | Verifiable? | | | | | | | | | | | | | | | | | | | |
| Investment | Yes | See B.5.1 | | | | | | | | | | | | | | | | | | | |
| Technological | Yes | See B.5.1 | | | | | | | | | | | | | | | | | | | |
| Due to prevailing practice | No | - | | | | | | | | | | | | | | | | | | | |
| Other | - | - | | | | | | | | | | | | | | | | | | | |
| B.5.16. Does the discussion sufficiently take into account relevant national and/or sectoral policies? | 1,2 | Yes | | | ☑ | ☑ | | | | | | | | | | | | | | | |
| B.5.17. Is transparent and documented evidence provided on the existence and significance of these barriers? | 1,2 | See B.5.1 | | | CAR | ☑ | | | | | | | | | | | | | | | |
| B.5.18. Is it appropriately explained how the approval of the project activity will help to overcome the identified barriers? | 1,2 | See B.1.5 | | | CAR | ☑ | | | | | | | | | | | | | | | |
| B.6. Emissions reductions | | | | | | | | | | | | | | | | | | | | | |
| Integrate questions concerning methodological choices and selection of options, if necessary | | | | | | | | | | | | | | | | | | | | | |
| B.6.1. Explanation of methodological choices | | | | | | | | | | | | | | | | | | | | | |

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| B.6.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity? | 1,2 | Yes. Section B.6.1. of the PDD describes the methodological choices. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | |
| B.6.1.2. Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site? | 1,2 | Yes. However see below. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | |
| B.6.1.3. Determination of baseline emissions (Comment on any line answered “No”) | | | | | | | | | | |
| B.6.1.3.1. Component 1: (i) Emissions on account of electricity or fossil fuel <div>[BE_{power,y}].</div> | 1,2 | Emissions on account of electricity or fossil fuel are excluded because the existing system uses anaerobic ponds. Any further consumption is neglected which is conservative. <div><table><tr><td>Baseline emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table></div> | Baseline emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Baseline emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | |
| B.6.1.3.2. Component 2: (ii) Methane emissions from baseline wastewater treatment systems <div>[BE_{ww,treatment,y}].</div> | 1,2 | <div><table><tr><td>Baseline emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>Yes</td></tr></table></div> <div>There is only one baseline wastewater treatment system (anaerobic open lagoon system)</div> | Baseline emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Baseline emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | Yes | | | | | | | | | |
| B.6.1.3.3. Component 3: (iii) Methane emissions from baseline sludge treatment systems <div>[BE_{s,treatment,y}].</div> | 1,2 | There is no specific sludge treatment system in the baseline scenario. In any case exclusion is conservative. <div><table><tr><td>Baseline emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table></div> | Baseline emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Baseline emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | |
| B.6.1.3.4. Component 4: | 1,2 | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | |

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| (iv) Methane emissions on account of inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in treated wastewater discharged into river/lake/sea [BE _{ww, discharge,y}] | | <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>Yes</td></tr></table> | | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | Yes | | |
| Project emission checklist | Yes / No/ NA | | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | | |
| Formulae correctly applied? | Yes | | | | | | | | | | |
| B.6.1.3.5. Component 5: (v) Methane emissions from the decay of the final sludge generated by the baseline treatment system [PE _{S, final,y}] | 1,2 | <p>This term is neglected.</p> <table><tr><td>Baseline emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table> | | Baseline emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Baseline emission checklist | Yes / No/ NA | | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | | |
| B.6.1.3.6. Are there any wastewater and sludge treatment systems equipped with biogas recovery facility in the baseline situation. If yes, are these excluded? | 1,2 | There are no wastewater systems equipped with biogas recovery facility at the existing (baseline) plant. | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | |
| B.6.1.4. Determination of project emissions (Comment on any line answered “No”) | | | | | | | | | | | |
| B.6.1.4.1. Component 1: (i) CO ₂ emissions on account of power used by the project activity facilities. [PE _{power,y}]. | 1,2 | <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>On-site audit</td></tr></table> <p>Project emissions from electricity consumption are accounted for. The emissions will be calculated based on the grid electricity consumption multiplied with a respective emission factor.</p> <p>Clarification Request No. 7.</p> <p>At on-site audit it has been clarified that the electricity system of the palm oil mill factory is connected to the biogas gen-set/wastewater treatment system. The electricity of the factory is</p> | | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | On-site audit | CR | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | | |
| Formulae correctly applied? | On-site audit | | | | | | | | | | |

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| | | <p>provided by a biomass steam power plant, a diesel genset and also purchases electricity from the grid. Therefore the source of electricity supply for the project activity facilities system can be a) a turbine (steam generated by biomass), b) a (diesel?) generator, c) the project activity or d) grid electricity. Please clarify if the project emission calculation will take into account this different electricity sources and if yes, how. The single line diagram submitted at on-site audit seems to only address the part of the biogas genset. A single line diagram of the complete factory should be submitted to the audit team showing transparently each electricity generation equipment connected to the captive grid (see also CAR1).</p> <p><u>Forward Action Request No. 1</u></p> <p>The PP has provided the three year historical data of power consumption in the Palm oil by biomass power plant which is 4,022,173 KWh for 2006, 2,754,348 KWh for 2007 and 4,945,426 KWh for 2008. Average of last three years comes out to be 3,907,316 KWh and It needs to be cross checked with the consumption in the Palm oil plant from Biomass power plant during the crediting period to confirm that the power generation from project activity has not replaced power generation from Biomass power plant</p> | | | | | | | | |
| B.6.1.4.2. Component 2: (ii) Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation. <div>[PE_{ww,treatment,y}].</div> | 1,2 | <p>Component 2 is excluded because there are no anaerobic treatment systems remaining that are not equipped with biogas recovery.</p> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>No</td></tr></table> <p>Corrective Action Request No.8.</p> | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | No | CAR | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | No | | | | | | | | | |

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|---|--------------|---|----------------------------|--------------|---------------------------------|-----|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | | Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation should be included. See also B.3.1. | | | | | | | | |
| B.6.1.4.3. Component 3: (iii) Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation <div>[PE_{s, treatment, y}].</div> | 1,2 | <div>There is no sludge treatment system affected by the project activity.</div> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table> | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | |
| B.6.1.4.4. Component 4: (iv) Methane emissions on account of inefficiency of the wastewater treatment systems and presence of degradable organic carbon in treated wastewater <div>[PE_{ww, discharge, y}]</div> | 1,2 | <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>Yes</td></tr></table> | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | Yes | | | | | | | | | |
| B.6.1.4.5. Component 5: (v) Methane emissions from the decay of the final sludge generated by the project activity treatment systems <div>[PE_{S, final, y}]</div> | 1,2 | <div>This term is neglected as per the methodology. Sludge treatment and/or use and/or final disposal will be monitored during the crediting period (see B.7.1.15).</div> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table> | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | |
| B.6.1.4.6. Component 6: (vi) Methane fugitive emissions on account of inefficiencies in capture systems; <div>[PE_{fugitive, y}]</div> | 1,2 | <div>Methane emissions from biogas release in the anaerobic wastewater treatment system are accounted for. The project activity does not involve anaerobic sludge treatment.</div> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr></table> | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| Project emission checklist | Yes / No/ NA | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | |

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| | | Formulae correctly applied? | Yes | | | | | | | | |
| B.6.1.4.7. Component 7: (vii) Methane emissions due to incomplete flaring <div>[PE_{flaring,y}]</div> | 1,2 | <div>Methane emissions due to incomplete flaring are determined as per the “Tool to determine project emissions from flaring gases containing methane” (EB 28).</div> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>No</td></tr></table> <div>Clarification Request No. 8. Please exactly use the formulae given in the tool to determine PE_{flaring,y} (= PE_{flare}) and explain any assumptions made. In case of applying a default value for the flare efficiency step 5 to 7 shall be applied. See also Validation protocol section I.</div> | | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | No | CR | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | | |
| Formulae correctly applied? | No | | | | | | | | | | |
| B.6.1.4.8. Component 8: (viii) Methane emissions from biomass stored under anaerobic conditions which does not take place in the baseline situation <div>[PE_{biomass,y}]</div> | 1,2 | <div>There is no biomass storage under anaerobic conditions due to the project activity.</div> <table><tr><td>Project emission checklist</td><td>Yes / No/ NA</td></tr><tr><td>Component discussed in the PDD?</td><td>Yes</td></tr><tr><td>Formulae correctly applied?</td><td>NA</td></tr></table> <div>Clarification Request No. 9. The electrical system allows the electricity supply by a) a turbine (steam generated by biomass), b) a generator (0.8 MW), c) the project activity or d) grid electricity. Beyond this background the exclusion of this potential emission source should be based on a brief assessment on the likeliness that the electricity generated by biogas might replace biomass generated electricity.</div> | | Project emission checklist | Yes / No/ NA | Component discussed in the PDD? | Yes | Formulae correctly applied? | NA | CR | <input checked="" type="checkbox"/> |
| Project emission checklist | Yes / No/ NA | | | | | | | | | | |
| Component discussed in the PDD? | Yes | | | | | | | | | | |
| Formulae correctly applied? | NA | | | | | | | | | | |
| B.6.1.5. Are the formulae required for the determination of leakage emissions cor- | 1,2 | No leakage is to be considered as per the methodology because | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | |

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| rectly presented, enabling a complete identification of parameter to be used and / or monitored? | | the project activity does not involve any equipment transfer. | | |
| B.6.1.6.Are the formulae required for the determination of emission reductions correctly presented? | 1,2 | <p>The emission reduction is calculated as the difference between the baseline emissions and the sum of the project emissions and leakage.</p> <p>This approach is correct for estimation of emission reductions ex-ante.</p> <p><u>Corrective Action Request No.9.</u></p> <p>As per the methodology for cases 1 (vi) ex-post emission reductions shall be based on the lowest value of</p> <ul style="list-style-type: none"> a) the amount of biogas recovered and flared during the crediting period, that is monitored ex post b) Ex-post calculated baseline, project and leakage emissions <p>Please take into account formulae 15 ff of the meth III.H. within section B.6.1.1.</p> | CAR | <input checked="" type="checkbox"/> |
| B.6.2. Data and parameters that are available at validation | | | | |
| B.6.2.1. Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied methodology? | 1,2 | See below. | CAR | <input checked="" type="checkbox"/> |
| Comment on any line answered with "No" | | | | |
| B.6.2.2. Parameter Title: BE _{power,y} - baseline emissions from electricity or fuel consumed in the year "y" by the replaced aerobic wastewater or sludge | 1,2 | NA. see B.6.1.3.1. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|---------------|--|----------------|---------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-----|----------------------------|-----|-------------------------|-----------|-------------------------------|-----------|-------------------------------------|-----|---|----|-----|---|
| treatment system (t CO ₂ e) (as per AMS – I.D.) | | | | | | | | | | | | | | | | | | | | | | |
| B.6.2.3.In case of BE _{ww,treatment,y} Parameter Title : MCF _{ww,treatment,BL,i} methane correction fac- tor for baseline wastewater treatment sys- tems I (MCF values as per table III.H.1.) | 1,2 | <table border="1"> <tr> <th>Data Checklist</th> <th>Yes / No / NA</th> </tr> <tr> <td>Title in line with methodology?</td> <td>Yes</td> </tr> <tr> <td>Data unit correctly expressed?</td> <td>Yes</td> </tr> <tr> <td>Appropriate description of parameter?</td> <td>Yes</td> </tr> <tr> <td>Source clearly referenced?</td> <td>Yes</td> </tr> <tr> <td>Correct value provided?</td> <td>See A.2.5</td> </tr> <tr> <td>Has this value been verified?</td> <td>Se3 A.2.5</td> </tr> <tr> <td>Choice of data correctly justified?</td> <td>Yes</td> </tr> <tr> <td>Measurement method correctly described?</td> <td>NA</td> </tr> </table> Value for anaerobic lagoon (depth more than 2 metres is applied), however it has been clarified that the system is involving different types of lagoons, not only anaerobic lagoons. | Data Checklist | Yes / No / NA | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided? | See A.2.5 | Has this value been verified? | Se3 A.2.5 | Choice of data correctly justified? | Yes | Measurement method correctly described? | NA | CAR | ☑ |
| Data Checklist | Yes / No / NA | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | See A.2.5 | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | Se3 A.2.5 | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | NA | | | | | | | | | | | | | | | | | | | | | |
| B.6.2.4. In case of BE _{s,treatment,y} Parameter Title: MCF _{s, treatment,BL,i} – methane correction fac- tor for the baseline sludge treatment sys- tem j (MCF values as per table III.H.1.) | 1,2 | NA see B.6.1.3.3. | ☑ | ☑ | | | | | | | | | | | | | | | | | | |
| B.6.2.5. In case of BE _{s,treatment,y} Parameter Title: DOC _s – Degradable organic content of the untreated sludge generated in year y (fraction, dry basis) (Default values for domestic or industrial sludge) | 1,2 | NA see B.6.1.3.3. | ☑ | ☑ | | | | | | | | | | | | | | | | | | |

Validation Protocol

Project Title: UPOIC Wastewater Treatment for Energy Generation, Krabi

Date of Completion: 13/10/2011



Industrie Service

| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD | | | | | | | | | | | | | | | | |
|--|---------------|--|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-----|----------------------------|-----|-------------------------|-----|-------------------------------|-----|-------------------------------------|-----|-----|-------------------------------------|
| B.6.2.6. In case of $BE_{s,treatment,y}$ and sludge is composted Parameter Title: $EF_{composting}$ – Emission factor for composting of organic waste (t CH4/ton waste treated) | 1,2 | NA see B.6.1.3.3. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | |
| B.6.2.7. In case of $BE_{s,treatment,y}$ and baseline waste water treatment is different from project waste water treatment Parameter Title: SGR_{BL} – Sludge generation ratio of the wastewater treatment plant in the baseline scenario (ton of dry matter in sludge/ton COD removed) | 1,2 | NA see B.6.1.3.3. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | |
| B.6.2.8. In case of $BE_{ww,discharge,y}$ Parameter Title: $COD_{ww,discharge,y}$ – Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the baseline scenario (ton/m³) | 1,2 | Baseline treatment system is different from treatment systems in the project scenario, therefore $COD_{ww,discharge,y}$ will be estimated based on the monitored COD inflow during crediting period and the removal efficiency of the baseline treatment system (s). See B.6.2.9. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | |
| B.6.2.9. In case of $BE_{ww,discharge,y}$ and if baseline treatment system(s) is different from treatment systems(s) in the project scenario Parameter Title: COD removal efficiency of the baseline wastewater treatment system | 1,2 | <div>See A.2.5., B.4.4.6. and B.6.2.4</div> <table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr></table> | Data Checklist | Yes / No / NA | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided? | Yes | Has this value been verified? | Yes | Choice of data correctly justified? | Yes | CAR | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No / NA | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | Yes | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | Yes | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | Yes | | | | | | | | | | | | | | | | | | | |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | | PDD in GSP | Final PDD | | | | | | | | | | | | | | | | | | |
|--|---------------|--|-----|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-----|----------------------------|-----|-------------------------|-----|-------------------------------|-----|-------------------------------------|-----|---|----|-------------------------------------|-------------------------------------|
| | | Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | | |
| | | At on-site audit it has been clarified that COD removal rates are only available for the complete wastewater system (COD inflow and COD outflow), however this system involves different subsystems and COD removal rate of each subsystem i needs to be specified ex-ante. | | | | | | | | | | | | | | | | | | | | | |
| B.6.2.10. In case of $BE_{ww, discharge, y}$ Parameter Title: $MCF_{ww, discharge, BL, i}$ – methane correction factor based on discharge pathway in the baseline situation of the wastewater (MCF values as per table III.H.1.) | 1,2 | <table> <tr> <th>Data Checklist</th> <th>Yes / No / NA</th> </tr> <tr> <td>Title in line with methodology?</td> <td>Yes</td> </tr> <tr> <td>Data unit correctly expressed?</td> <td>Yes</td> </tr> <tr> <td>Appropriate description of parameter?</td> <td>Yes</td> </tr> <tr> <td>Source clearly referenced?</td> <td>Yes</td> </tr> <tr> <td>Correct value provided?</td> <td>Yes</td> </tr> <tr> <td>Has this value been verified?</td> <td>Yes</td> </tr> <tr> <td>Choice of data correctly justified?</td> <td>Yes</td> </tr> <tr> <td>Measurement method correctly described?</td> <td>NA</td> </tr> </table> MCF IPCC default value for discharge to sea, river or lake is applied (as per Table III.H.1.) | | Data Checklist | Yes / No / NA | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided? | Yes | Has this value been verified? | Yes | Choice of data correctly justified? | Yes | Measurement method correctly described? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No / NA | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | NA | | | | | | | | | | | | | | | | | | | | | | |
| B.6.2.11. In case of $BE_{s, final, y}$ Parameter Title: $S_{final, BL, y}$ – amount of dry matter in final sludge generated by the baseline wastewater treatment system in the year (t) | 1,2 | NA see B.6.1.3.5. | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| B.6.2.12. In case of $BE_{s, final, y}$ Parameter Title: $MCF_{s, BL, final}$ – methane correction factor of the disposal site that receives the final | 1,2 | NA see B.6.1.3.5. | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |

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|--|---------------|---|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-----|----------------------------|-----|-------------------------|-----|-------------------------------|-----|-------------------------------------|-----|---|----|-------------------------------------|-------------------------------------|
| sludge in the baseline (as per AMS-III.G) | | | | | | | | | | | | | | | | | | | | | | |
| B.6.2.13. In case of $PE_{ww,treatment,y}$ Parameter Title : $MCF_{ww,treatment,PJ,k}$ methane correction factor for project wastewater treatment system k (MCF values as per table III.H.1.) | 1,2 | NA see B.6.1.4.2. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| B.6.2.14. In case of $PE_{s,treatment,y}$ Parameter Title: $MCF_{s,treatment,I}$ – methane correction factor for the project sludge treatment system I (MCF values as per table III.H.1.) | 1,2 | NA see B.6.1.4.3. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| B.6.2.15. In case of $PE_{ww,discharge,y}$ Parameter Title: $MCF_{ww,PJ,discharge}$ – methane correction factor based on discharge pathway in the project situation of the wastewater (MCF values as per table III.H.1.) | 1,2 | <table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> MCF IPCC default value for discharge to sea, river or lake is applied (as per Table III.H.1.) | Data Checklist | Yes / No / NA | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided? | Yes | Has this value been verified? | Yes | Choice of data correctly justified? | Yes | Measurement method correctly described? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No / NA | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | NA | | | | | | | | | | | | | | | | | | | | | |
| B.6.3. Ex-ante calculation of emission reductions | | | | | | | | | | | | | | | | | | | | | | |
| B.6.3.1.Is the projection based on the same procedures as used for future monitoring? | 1,2 | Ex-ante calculation is based on the same procedures as used for future monitoring. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| B.6.3.2.Are the GHG calculations documented | 1,2, | Calculations are transparently documented | CR | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |

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| in a complete and transparent manner? | 7, 8, 11 | Clarification Request No. 10. Excel sheet for the calculation of emission reductions should be submitted | | |
| B.6.3.3.If there is more than one component of the project activity, then are emission reduction calculations provided separately for each component? | 1,2 | The project involves a methane recovery component and an electricity generation component. Emission reduction calculations are presented separately for each component. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.6.3.4. Is the data provided in this section consistent with data as presented in other chapters of the PDD? | 1,2 | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.6.4. Summary of the ex-ante estimation of emission reductions | | | | |
| B.6.4.1. Will the project result in fewer GHG emissions than the baseline scenario? | 1,2 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.6.4.2. Is the form/table required for the indication of projected emission reductions correctly applied? | 1,2 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.6.4.3. If the project activity involves more than one component, is separate table included for each of the component. | 1,2 | One table showing the aggregate emission reductions of the project activity is included in section B.6.4. Corrective Action Request No.10. As per the SSC-PDD guidance please includes also a separate table for each of the component (AMS III.H. and AMS I.D.) that is applied. | CAR | <input checked="" type="checkbox"/> |
| B.6.4.4. Do these values comply with small-scale criteria for every year? | 1,2 | Yes. Project emissions are below 60 kt CO ₂ e annually. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.6.4.5.Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting | 1,2, 47 | Project is scheduled to start operation in June 2009. See section C.1 for more details | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|----------|--|----------------------|-----------|---------------------------------|-----|---|---|
| period? | | | | | | | | |
| B.6.4.6. Is the data provided in this section in consistency with data as presented in other chapters of the PDD? | 1,2 | See B.6.3.4 | CR | ☑ | | | | |
| B.7. Application of the monitoring methodology and description of the monitoring plan | | | | | | | | |
| B.7.1. Data and parameters monitored | | | | | | | | |
| B.7.1.1.Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology? | 1,2, 57 | See below. <u>Corrective Action Request No.11.</u> Please make sure that for all the monitoring parameters all information/specification as indicated in SSC-guide is presented in the tables of parameters: <ul style="list-style-type: none">- measurement methods and procedures should be described- applied industry standards or national or international standards should be specified- measurement equipment should be specified- how the measurement is undertaken (including a specification of for example sampling/analysis of COD– which internationally recognized procedures are applied)- which calibration procedures are applied- accuracy of the measurement method- who is the responsible person / entity that should undertake the measurements- measurement/recording interval | CAR | ☑ | | | | |
| Comment on any line answered with “No” | | | | | | | | |
| B.7.1.2.Parameter Title: Q _{ww,j,y} -volume of wastewater treated (m³). | 1,2 | <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | ☑ | ☑ |
| Monitoring Checklist | Yes / No | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | |

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|--|----------|---|--------------------------------|------------|---------------------------------------|-----|--------------------------------|-----|--|-----|-------------------------------|-----|---|-----|---------------------------------|-----|---|-----|---------------------------------|-----|----------------------------------|-----|-----------------------------|----|-------------------------------|----|--|-----|-------------------------------------|
| | | <table><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided for estimation? | Yes | Has this value been verified? | Yes | Measurement method correctly described? | yes | Correct reference to standards? | Yes | Indication of accuracy provided? | Yes | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | Yes | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | For ex-ante calculation, this parameter is calculated using POME generation rate (Nm3 of POME/ tonnes of FFB process) from 10 days campaign. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.3.Parameter Title: COD _{ww,untreated,y} -chemical oxygen demand of the wastewater before the treatment system k (tonnes/m ³). – (inflow COD) | 1,2 | <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>No</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>No</td></tr><tr><td>Correct reference to standards?</td><td>No</td></tr><tr><td>Indication of accuracy provided?</td><td>No</td></tr><tr><td>QA/QC procedures described?</td><td>No</td></tr><tr><td>QA/QC procedures appropriate?</td><td>No</td></tr></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | No | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | No | Correct reference to standards? | No | Indication of accuracy provided? | No | QA/QC procedures described? | No | QA/QC procedures appropriate? | No | | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Corrective Action Request No.12. | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|---|----------|--|----------------------|-----------|---------------------------------|----|--------------------------------|----|---------------------------------------|----|----------------------------|----|--|----|-------------------------------|----|---|----|---------------------------------|----|----------------------------------|----|-----------------------------|----|-------------------------------|----|-----|---|
| | | <p>Correct title of the parameter is COD_{ww,untreated,y} rather than COD_{ww,PJ,y}. Projections should be given for the COD values of the wastewater before entering the treatment system k (see para 34b of the methodology III.H.).</p> <p>The sampling and analysis procedures should be specified. Which “internationally recognised procedures” will be applied? Accuracy of the measurement method should be provided, too.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.4.Parameter Title: COD _{ww,treated,y} -chemical oxygen demand of the wastewater after the treatment system k (tonnes/m ³) – (outflow COD) | 1,2 | <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>No</td></tr><tr><td>Data unit correctly expressed?</td><td>No</td></tr><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>Source clearly referenced?</td><td>No</td></tr><tr><td>Correct value provided for estimation?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>No</td></tr><tr><td>Correct reference to standards?</td><td>No</td></tr><tr><td>Indication of accuracy provided?</td><td>No</td></tr><tr><td>QA/QC procedures described?</td><td>No</td></tr><tr><td>QA/QC procedures appropriate?</td><td>No</td></tr></table> <p><u>Corrective Action Request No.13.</u></p> <p>COD_{ww,treated,y} (COD outflow) of the treatment system k in the project is to be monitored as well as the resulting parameter COD_{ww,removed,PJ,k,y}.</p> | Monitoring Checklist | Yes / No | Title in line with methodology? | No | Data unit correctly expressed? | No | Appropriate description of parameter? | No | Source clearly referenced? | No | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | No | Correct reference to standards? | No | Indication of accuracy provided? | No | QA/QC procedures described? | No | QA/QC procedures appropriate? | No | CAR | ☑ |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.5. Parameter Title: COD _{ww,removed,PJ,k,y} — Chemical oxygen demand removed by the treatment system | 1, 2 | <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | | CAR | ☑ | | | | | | | | | | | | | | | | | | | | |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | | PDD in GSP | Final PDD | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------|--|--|----------------------|-----------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|----|----------------------------|-----|--|----|-------------------------------|----|---|----|---------------------------------|----|----------------------------------|----|-----------------------------|-----|-------------------------------|----|-----|-------------------------------------|
| <p>“k” affected by the project activity (tonnes/m³)</p> <p>Note:</p> <p>$\text{COD}_{\text{ww,removed,PJ,k,yj}} = \text{inflow COD (COD}_{\text{ww,untreated,y}}) - \text{outflow COD (COD}_{\text{ww,treated,y}})$</p> | | Data unit correctly expressed? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Appropriate description of parameter? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Source clearly referenced? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Correct value provided for estimation? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Has this value been verified? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Measurement method correctly described? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Correct reference to standards? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Indication of accuracy provided? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | QA/QC procedures described? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | QA/QC procedures appropriate? | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | See B.7.1.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.6.Parameter Title: $\text{COD}_{\text{ww,discharge,PJ,y}}$ — Chemical oxygen demand of the final treated wastewater discharged into the sea, river or lake in the project activity. | 1,2 | <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>No</td></tr><tr><td>Correct reference to standards?</td><td>No</td></tr><tr><td>Indication of accuracy provided?</td><td>No</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>No</td></tr></table> <p><u>Corrective Action Request No.14.</u></p> <p>$\text{COD}_{\text{ww,discharge,PJ,y}}$ is defined as the COD of the final treated wastewater discharged into the sea, river or lake rather than COD of the treated wastewater. Please revise the description and indi-</p> | | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | No | Source clearly referenced? | Yes | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | No | Correct reference to standards? | No | Indication of accuracy provided? | No | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | No | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|--|----------|---|-------------------------------------|-------------------------------------|-----|-------------------------------------|
| | | <p>cate the point of measurement in figure 4 of section B.7.2. of the PDD. Generally figure 4 needs revision in order to specify the metering points of all monitoring parameters. The laboratory values for “COD outlet” presented at on-site audit vary significantly between in-house measurements (Lam Soon laboratory) and external laboratory data. Clarification is needed (see also para 12e of EB 41 report Annex 20). Please also clarify the responsibility of taking the samples in both cases.</p> <p>Generally it is to be noted that the PDD states on page 33 that the COD content of the wastewater is not subject to huge variations, however this statement is not in line with the results of the measurements.</p> | | | | |
| B.7.1.7. Parameter Title: S _{I,PJ,y} -amount of sludge treated in the project sludge system I, equipped with biogas recovery system (on dry basis) in year y (tonnes). (amount of sludge fed to each system I) | 1,2 | Not applicable See B.6.1.4.3. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| B.7.1.8.Parameter Title: S _{final,PJ,y} -amount of dry matter in final sludge generated by the project wastewater treatment systems in the year y (tonnes). | 1,2 | <p>Not applicable as the sludge is expected to be used for soil application in aerobic conditions in the project activity. See B.6.1.4.5.</p> <p><u>Corrective Action Request No.15.</u></p> <p>PDD includes S_{final,PJ,y} as a parameter “amount of final sludge generated. The monitoring however should address the end use of the final sludge rather than the amounts (paragraph 39 of AMS III.H.). Please correct.</p> | CAR | <input checked="" type="checkbox"/> | | |
| B.7.1.9.Parameter Title: Annual fossil fuel or electricity to operate the facilities or power auxiliary equipment | 1,2 | <p>The electricity consumption of the project facility and auxiliary equipment is to be monitored.</p> <table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr></table> | Monitoring Checklist | Yes / No | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | |

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| (Alternatively it shall be assumed that all relevant electrical equipment operate at full rate capacity, plus 10% to account for distribution losses, for 8760 hours per annum) | | Title in line with methodology? | Yes | | |
| | | Data unit correctly expressed? | Yes | | |
| | | Appropriate description of parameter? | No | | |
| | | Source clearly referenced? | Yes | | |
| | | Correct value provided for estimation? | No | | |
| | | Has this value been verified? | No | | |
| | | Measurement method correctly described? | Yes | | |
| | | Correct reference to standards? | Yes | | |
| | | Indication of accuracy provided? | No | | |
| | | QA/QC procedures described? | Yes | | |
| | | QA/QC procedures appropriate? | Yes | | |
| | | <u>Corrective Action Request No.16.</u> | | | |
| As per the methodology paragraph 19,26 and 30, the electricity consumption is to be monitored (or alternatively calculated based on full rated capacity) and not only grid electricity that is consumed by the facilities. In case recovered biogas is used for the electricity provisions the emission factor should be assumed to be zero. Therefore please provide a projection of electricity consumption of all devices used in the project activities wastewater treatment system and system used for biogas recovery and use. | | | | | |
| B.7.1.10. Parameter Title: BG _{burnt,y} Biogas combusted/flared in year y (m ³) | 1,2 | The volumetric flow rate of biogas leaving the digester (FV _{digester,y}) and the volumetric flow rate of biogas entering the power generation unit (FV _{electricity,y}) is included as monitoring parameter. Methodology applies the parameter title BG _{burnt} (equation 16 of AMS III.H.) | | CAR | <input checked="" type="checkbox"/> |
| | | Monitoring Checklist | Yes / No | | |
| | | Title in line with methodology? | No | | |

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|---|----------|---|--------------------------------|----------------------|---------------------------------------|---------------------------------|----------------------------|--------------------------------|--|---------------------------------------|-------------------------------|----------------------------|---|-----|-------------------------------------|----|----------------------------------|----|-----------------------------|-----|-------------------------------|-----|--|--|--|
| | | <table> <tr><td>Data unit correctly expressed?</td><td>Yes</td></tr> <tr><td>Appropriate description of parameter?</td><td>Yes</td></tr> <tr><td>Source clearly referenced?</td><td>Yes</td></tr> <tr><td>Correct value provided for estimation?</td><td>No</td></tr> <tr><td>Has this value been verified?</td><td>No</td></tr> <tr><td>Measurement method correctly described?</td><td>Yes</td></tr> <tr><td>Correct reference to standards?</td><td>NO</td></tr> <tr><td>Indication of accuracy provided?</td><td>NO</td></tr> <tr><td>QA/QC procedures described?</td><td>Yes</td></tr> <tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr> </table> | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | Yes | Correct reference to standards? | NO | Indication of accuracy provided? | NO | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | Yes | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | NO | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | NO | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <p>Flow rate will be measured on dry basis. No projections are given. This can be accepted as this value is not used for the ex-ante estimation of emission reduction. However further details of the monitoring procedure/equipment are needed. See B.7.1.1.</p> | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.11. Parameter Title: $w_{CH4,stream,y}$ —methane content of the gas (methane content) (biogas volume and methane content measurements shall be on the same basis (wet or dry) | 1,2 | <p>Methodology applies the parameter title $w_{CH4,stream,y}$ (equation 16 of AMS III.H.) as methane content in equation 16 for the determination of methane captured and destroyed (gainfully used), while the “Tool to determine project emissions from flaring gases containing methane” provides procedures to calculate the mass flow rate of methane based on the volumetric flow rate of biogas, the volumetric fraction of methane in the biogas and the density, which is the option applied by the project. See I.2.1.2.</p> <table> <tr> <th>Monitoring Checklist</th> <th>Yes / No</th> </tr> <tr> <td>Title in line with methodology?</td> <td>No</td> </tr> <tr> <td>Data unit correctly expressed?</td> <td>Yes</td> </tr> <tr> <td>Appropriate description of parameter?</td> <td>Yes</td> </tr> <tr> <td>Source clearly referenced?</td> <td>No</td> </tr> </table> | | Monitoring Checklist | Yes / No | Title in line with methodology? | No | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | No | CR | <input checked="" type="checkbox"/> | | | | | | | | | | |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | No | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | No | | | | | | | | | | | | | | | | | | | | | | | | |

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|--|----------|---|--|----------------------|-------------------------------|---------------------------------|---|--------------------------------|---------------------------------|---------------------------------------|----------------------------------|-------------------------------------|-------------------------------------|-----|-----------------------------|-----|-------------------------------|-----|--|--|--|
| | | <table><tr><td>Correct value provided for estimation?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>No</td></tr><tr><td>Monitoring Frequency compliant?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | Yes | Correct reference to standards? | Yes | Indication of accuracy provided? | No | Monitoring Frequency compliant? | Yes | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | Yes | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | Yes | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | No | | | | | | | | | | | | | | | | | | | | |
| Monitoring Frequency compliant? | Yes | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | Yes | | | | | | | | | | | | | | | | | | | | |
| | | <p>Clarification Request No. 11.</p> <p>From the description of parameter F_{CH_4} captured it is not clear if the methane content will be measured at two different metering points (biogas stream to flare and biogas stream to generator) and which one will be used for calculation. Specification is needed and a value should be provided for ER projection. In addition the description seems not to be consistent to figure 4. It should be specified if the measurements will be on a wet or a dry basis. It should also become more clear in which section of B.6.1. this parameter is applied. Please also define QA/QC measures as indicated by the tool to determine project emissions from flaring gases containing methane. In addition see B.7.1.1.</p> | | | | | | | | | | | | | | | | | | | |
| B.7.1.12. Parameter Title: T_{biogas} — temperature of the biogas in order to determine the density of methane - D_{CH_4} | 1,2 | <p>Redundant parameter. EB clarified that in case the biogas flow meter employed measures flow, pressure and temperature and displays normalised flow of biogas, there is no need for separate monitoring.</p> <table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr></table> | | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | |

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| | | Source clearly referenced? | Yes | | |
| | | Correct value provided for estimation? | NA | | |
| | | Has this value been verified? | NA | | |
| | | Measurement method correctly described? | Yes | | |
| | | Correct reference to standards? | NA | | |
| | | Indication of accuracy provided? | No | | |
| | | QA/QC procedures described? | Yes | | |
| | | QA/QC procedures appropriate? | Yes | | |
| | | No value of data has been specified. As the value is not relevant for projection of emission reduction this can be accepted. | | | |
| B.7.1.13. Parameter Title: p _{biogas} —pressure of the biogas in order to determine the density of methane -D _{CH4} | 1,2 | Redundant parameter | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | | Monitoring Checklist | Yes / No | | |
| | | Title in line with methodology? | Yes | | |
| | | Data unit correctly expressed? | Yes | | |
| | | Appropriate description of parameter? | Yes | | |
| | | Source clearly referenced? | Yes | | |
| | | Correct value provided for estimation? | NA | | |
| | | Has this value been verified? | NA | | |
| | | Measurement method correctly described? | Yes | | |
| | | Correct reference to standards? | NA | | |
| | | Indication of accuracy provided? | No | | |
| | | QA/QC procedures described? | Yes | | |
| | | QA/QC procedures appropriate? | Yes | | |
| | | No value of data has been specified. As the value is not relevant for projection of emission reduction this can be accepted. However see above B.7.1.13. | | | |

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|--|----------|--|-------------------------------------|-------------------------------------|---------------------------------|--|--------------------------------|--|---------------------------------------|--|----------------------------|--|--|--|-------------------------------|--|---|--|---------------------------------|--|----------------------------------|--|-----------------------------|--|-------------------------------|--|-----|-------------------------------------|
| B.7.1.14. Parameter Title: EF– Flare efficiency in year (fraction of time in which the gas is combusted in the flare, multiplied by the efficiency of the flaring process) | 1,2,5 | For the efficiency of the flaring process, default values as per the Flaring tool for open flares are applied. <u>Clarification Request No. 12.</u> The fraction of time in which the gas is combusted in the flare should be included as monitoring parameter (T _{flare operation} is provided on page 21 however has not been included as monitoring parameter in the monitoring plan) in case it is used for calculation. However see also B.6.1.4.8. | CR | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.15. In case sludge is controlled combusted, disposed in landfill with methane recovery or used for soil application: Parameter Title: End use of final sludge generated. | 1,2 | End use of final sludge generated should be monitored rather than only amount. See B.7.1.8 <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Correct value provided for estimation?</td><td></td></tr><tr><td>Has this value been verified?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr><tr><td>Correct reference to standards?</td><td></td></tr><tr><td>Indication of accuracy provided?</td><td></td></tr><tr><td>QA/QC procedures described?</td><td></td></tr><tr><td>QA/QC procedures appropriate?</td><td></td></tr></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | | Data unit correctly expressed? | | Appropriate description of parameter? | | Source clearly referenced? | | Correct value provided for estimation? | | Has this value been verified? | | Measurement method correctly described? | | Correct reference to standards? | | Indication of accuracy provided? | | QA/QC procedures described? | | QA/QC procedures appropriate? | | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B.7.1.16. In case of storage of biomass under anaerobic conditions which does not take place in the baseline situation: | 1,2 | Not applicable see B.6.1.4.8. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | |

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| Parameter Title: Biomass as per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" | | | | |
| B.7.2. Description of the monitoring plan | | | | |
| B.7.2.1. Is the operational and management structure clearly described and in compliance with the envisioned situation? | 1 | <p>Partially. The operation and monitoring structure will be incorporated in the existing ISO 9001:2000 scheme. During on-site audit it has been clarified that CDM manager of Lam Soon group will have the overall responsibility for the implementation of the monitoring plans. Mill managers will be responsible for reporting of local monitoring values. 5 persons shall be trained for the biogas monitoring. Work instructions for monitoring of the biogas system has been already set up by the technology provider and is expected to be integrated in the existing management system.</p> <p><u>Corrective Action Request No.17.</u></p> <p>The operation and management structure should be presented more clearly in the PDD. It could not be verified at the site that maintenance and calibration will be subcontracted as shown in the PDD (figure page 36). Please clarify if the external lab will be responsible for both, sample taking and analysis. A procedure defining role, responsibility, authority for measuring (which values by which department for example), data collection, monitoring, review and compilation of the parameters, reporting, archiving etc. should be described. Please note that all data collected should be electronically archived for a period of 2 years from the end of the crediting period (see EB 41 report Annex 40 para 12). Figure 5 (page 37 of the PDD) somehow defines the tasks (sample taking, reporting, supervision etc. but does not show the responsibilities. Details can be also included in Annex 4.</p> | CAR | <input checked="" type="checkbox"/> |

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| B.7.2.2. Are responsibilities and institutional arrangements for data collection and archiving clearly provided? | 1 | See B.7.2.1 | CAR | <input checked="" type="checkbox"/> |
| B.7.2.3. Does the monitoring plan provide current good monitoring practice? | 1 | The plan should be described more clearly, however as the company has implemented ISO 9001:2000 and ISO 14001:2004 and the CDM relevant monitoring is expected to be integrated into the existing systems current good monitoring practice is expected. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.7.2.4. If applicable: Does annex 4 provide useful information enabling a better understanding of the envisioned monitoring provisions? | 1 | No. Annex 4 refers to the description of the monitoring system above. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.8. Date of completion of the application of the baseline study and monitoring methodology an the name of the responsible person(s)/entity(ies) | | | | |
| B.8.1.1. Is there any indication of a date when the baseline was determined? | 1 | Yes. Completion date of baseline is 21/02/2009 in GSP PDD. However, the final PDD has completion date updated to 01.05.2011. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.8.1.2. Has dd/mm/yyyy format been used to indicate the date. | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.8.1.3. Is this consistent with the time line of the PDD history? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.8.1.4. Is the information on the person(s) / entity (ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation? | 1 | Yes. ENVIMA (Thailand) Co. Ltd. has applied the baseline and monitoring methodology. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| B.8.1.5. Is information provided whether this person / entity is also considered a project | 1 | Yes. ENVIMA (Thailand) Co. Ltd. is not a project participant. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| participant? | | | | |
| C. Duration of the project activity / crediting period | | | | |
| C.1. Duration of the project activity | | | | |
| C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable? | 1, 7, 23 | The starting date and operational lifetime are clearly defined. <u>Corrective Action Request No.18.</u> Start date needs to be revised. As per EB "The start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity...." | CAR | <input checked="" type="checkbox"/> |
| C.2. Choice of the crediting period and related information | | | | |
| C.2.1. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)? | 1 | Yes, fixed crediting period has been chosen for the project activity. <u>Clarification Request No. 13.</u> Start date of the crediting period can be the date of registration at the earliest. Therefore the date should be chosen more realistic taking into account the validation schedule. | CR | <input checked="" type="checkbox"/> |
| C.2.2. Has dd/mm/yyyy format been used to indicate the start date of the crediting period. | 1 | Yes, the start of crediting period has been indicated in the appropriate format. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| D. Environmental impacts | | | | |
| D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts | | | | |
| D.1.1. Are there any Host Party requirements | 1, 48 | Not directly, but the Thai DNA requires an Initial Environmental | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| for an Environmental Impact Assessment (EIA), and if yes, has an EIA been approved? | | Evaluation (IEE) for potential CDM projects, which has been prepared and submitted for LOA. Besides this there are no requirements. | | |
| D.1.2. Has the analysis of the environmental impacts of the project activity been sufficiently described? | 1 | Yes, as the project also will be submitted under Gold Standard and they require a high level of analysis of environmental impacts. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| D.1.3. Will the project create any adverse environmental effects? | 1,7, 14, 15 | No adverse environmental impacts are to be expected. In all environmental areas the project leads in sum to a reduction of GHG emissions and pollution in general. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| D.1.4. Were transboundary environmental impacts identified in the analysis? | 1 | No | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party | | | | |
| D.2.1. Have the identified environmental impacts been addressed in the project design sufficiently? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| D.2.2. Does the project comply with environmental legislation in the host country? | 1,7, 48, 49 | Yes. Approvals are in place. Moreover the issuance of LoA confirms that the project is in line with the regulations as Thai DNA is verifying this aspect within their approval procedure. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| E. Stakeholders' comments | | | | |
| E.1. Brief description how comments by local stakeholders have been invited and compiled | | | | |
| E.1.1. Have relevant stakeholders been consulted? | 1 | Yes. A comprehensive stakeholder consultation took place according to requirements of CDM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| E.1.2. Have appropriate media been used to invite comments by local stakeholders? | 1, 55, | Yes. Stakeholders were invited personally for stakeholder meetings. In addition the project and access to all documents, inviting | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| | 56, 48 | for comments, were announced through local press publications in Thai and English language on 31 st of May 2008. At the stakeholder meetings participants could provide there comments directly at the meetings as well as via questionnaires/ feedback forms. | | |
| E.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, 55, 56, 48 | Thai DNA requires a stakeholder consultation process and the issuance of LoA confirms that it has been taken place according to the requirements. Moreover as the project intends to apply for Gold Standard, an extensive Stakeholder Consultation Process as per GS guidance has been carried out. Seite: 50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| E.1.4. Is the undertaken stakeholder process that was carried out described in a complete and transparent manner? | 1 | Clarification Request No. 14. Project was announced in Matichon newspaper but the PDD states to Kom Chat Leuk newspaper. Please thoroughly review the description of the local stakeholder consultation and ensure consistency with the GS stakeholder consultation report. Clarify where the summary report of the initial stakeholder consultation was made available. | CR | <input checked="" type="checkbox"/> |
| E.2.Summary of the comments received | | | | |
| E.2.1. Is a summary of the received stakeholder comments provided? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| E.3.Report on how due account was taken of any comments received | | | | |
| E.3.1. Has due account been taken of any stakeholder comments received? | 1, 55, 56 | There were no concerns of environmental impacts through the project activity. Stakeholder comments with respect to provide further information about the biogas technology itself were responded adequately. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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| F. Annexes 1 – 4 | | | | |
| F.1. Annex 1: Contact Information | | | | |
| F.1.1. Is the information provided consistent with the one given under section A.3? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.1.2. Is the information on all private participants and directly involved Parties presented? | 1 | Yes. As per GSP PDD, the project is a bilateral project involving United Palm Oil Industry Public Company Limited (Thailand) and Carbon Asset Management Sweden AB (Sweden). However the annex-1 of the final PDD has been updated to keep only one PP, UPOIC. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.2. Annex 2: Information regarding public funding | | | | |
| F.2.1. Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project participants? | 1 | See A.4.1 | CAR | <input checked="" type="checkbox"/> |
| F.2.2. If necessary: Is an affirmation available that any such funding from Annex-I-countries does not result in a diversion of ODA? | 1 | Yes. Respective confirmations are included in Annex 2. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.3. Annex 3: Baseline information | | | | |
| F.3.1. If additional background information on baseline data is provided: Is this information consistent with data presented by other sections of the PDD? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.3.2. Is the data provided verifiable? Has sufficient evidence been provided to the | 1 | See A.2.5, B.4.4.6 and B.7.1.6 | CAR | <input checked="" type="checkbox"/> |

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| validation team? | | | | |
| F.3.3. Does the additional information substantiate / support statements given in other sections of the PDD? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.4. Annex 4: Monitoring information | | | | |
| F.4.1. If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD? | 1 | NA. Annex 4 refers to the description of the monitoring system above. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.4.2. Is the information provided verifiable? Has sufficient evidence been provided to the validation team? | 1 | NA. Annex 4 refers to the description of the monitoring system above. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| F.4.3. Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD? | 1 | NA. Annex 4 refers to the description of the monitoring system above. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Table 1b Checklist for component of project activity using AMS I.D.

| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
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| G. AMS I.D. version 16 | | | | |
| G.1. Justification of the choice of the project category | | | | |
| G.1.1. Is the applied methodology considered the most appropriate one? | 1,3 | Yes, AMS I.D. is considered to be most appropriate methodology for component of the project activity claiming emission reductions from renewable power generation. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.1.1.1. Criterion 1: This category com- | 1,3 | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|-----------------|--|-------------------------|-------------------------------------|-------------------------------------|-----|----------------------|-----|----------------------|-----|--|-------------------------------------|-------------------------------------|
| prises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. | | <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>The project activity is a biogas fuelled power plant, supplying electricity to the Thai grid.</p> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | Yes | Compliance provable? | Yes | Compliance verified? | Yes | | | |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | | |
| Criterion discussed in the PDD? | Yes | | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | | |
| G.1.1.2. Criterion 2: If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW. | 1,3, 14, 62, 40 | <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>Project activity involves two biogas genset with a rated capacity of 952 kW.</p> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | Yes | Compliance provable? | Yes | Compliance verified? | Yes | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | | |
| Criterion discussed in the PDD? | Yes | | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | | |
| G.1.1.3. Criterion 3: Biomass combined heat and power (co-generation) systems that supply electricity to and/or displace electricity from a grid are included in this category. To qualify under this category, the sum of all forms of energy output shall not exceed 45 MWthermal e.g. for a biomass based co-generating system the rating for all the boilers combined shall not exceed 45 MWthermal. | 1,3 | An electricity genset is applied without heat extraction. <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | NA | Compliance provable? | Yes | Compliance verified? | Yes | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | | |
| Criterion discussed in the PDD? | NA | | | | | | | | | | | | |
| Compliance provable? | Yes | | | | | | | | | | | | |
| Compliance verified? | Yes | | | | | | | | | | | | |
| G.1.1.4. Criterion 4: In the case of project activities that involve the addition of renewable energy generation units at an | 1,3, 14, 7 | The project involves the installation of a separate biogas driven genset. A biomass fired steam generation captive power plant is available for electricity supply to the palm oil mill, however the | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |

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| existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct1 from the existing units. | | plant does not supply electricity to the grid. See B.6.1.4.1. <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | NA | Compliance provable? | NA | Compliance verified? | NA | | |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | NA | | | | | | | | | | | |
| Compliance provable? | NA | | | | | | | | | | | |
| Compliance verified? | NA | | | | | | | | | | | |
| G.1.1.5. Criterion 5: Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW. | 1,3 | <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> Project activity does not involve retrofit or modify an existing facility. | Applicability checklist | Yes / No / NA | Criterion discussed in the PDD? | NA | Compliance provable? | NA | Compliance verified? | NA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Applicability checklist | Yes / No / NA | | | | | | | | | | | |
| Criterion discussed in the PDD? | NA | | | | | | | | | | | |
| Compliance provable? | NA | | | | | | | | | | | |
| Compliance verified? | NA | | | | | | | | | | | |
| G.2. Description of baseline and its development | | | | | | | | | | | | |
| G.2.1. Have all technically feasible baseline scenario alternatives to the project activity been identified and discussed by the PDD? Why can this list be considered as being complete? | 1,3 | The baseline scenario would be power generation at the grid as the recovered methane is used for electricity generation, that is fed into the grid. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| G.2.2. Does the project identifies correctly and excludes those options not in line with regulatory or legal requirements? | 1,3 | See B.4.1.2. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| G.2.3. Have applicable regulatory or legal requirements been identified? | 1,2,3 | Neither the project activity nor the baseline scenario is mandated by law. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| G.2.4. Does the PDD identify the most likely | 1,2,3 | See B.4.4.6. | CAR | <input checked="" type="checkbox"/> | | | | | | | | |

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| baseline scenario in absence of the project activity? | | | | |
| G.2.5. Is this identification supported by official and/or verifiable documents (e.g. studies, web pages, certificates, etc)? | 1 | See B.4.4.6. | CAR | <input checked="" type="checkbox"/> |
| G.2.6. Is the identified baseline scenario in line with regulatory or legal requirements? | 1 | Yes. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3. Emissions reductions | | | | |
| <i>G.3.1. Explanation of methodological choices</i> | | | | |
| G.3.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity? | 1,3 | Yes it has been explained. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.1.2. Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site? | 1,3, 6, 58, 8 | <p>Yes, the grid emission factor is calculated as combined margin as per the "Tool to calculate the emission factor of an electricity system". At on-site audit it has been clarified that the grid emission factor calculation shall be based on an official publication of Electricity Generating Authority of Thailand.</p> <p>Clarification Request No. 15. The applied "Tool to calculate the emission factor of an electricity system" should be mentioned in section B.1. Please provide the detailed link to the publication of "The estimation of emission factor for an electricity system in Thailand 2007" at EGAT website.</p> | CR | <input checked="" type="checkbox"/> |
| G.3.1.3. Determination of project emissions (Comment on any line answered "No") | | | | |
| G.3.1.3.1. Component 1: emissions from use of fossil fuel | 1,2,3 | See B.6.1.4.1. | CR | <input checked="" type="checkbox"/> |
| | | Project emission checklist | | |
| | | Component discussed in the PDD? | | |

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| | | Formulae correctly applied? No | | |
| G.3.1.4. Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameters to be used and / or monitored? | 1,2,3 | Yes, the simplified baseline is product of electricity supplied to grid and the grid emission factor. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.1.5. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored? | 1,2,3 | There is no transfer of equipment from another activity nor is any equipment transferred to another activity. Hence there is no leakage from transfer of equipment. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.1.6. Are the formulae required for the determination of emission reductions correctly presented? | 1,3 | Yes, the formulae have been correctly presented. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.2. Data and parameters that are available at validation | | | | |
| G.3.2.1. Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied methodology? | 1,3 | See below. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.2.2. Comment on any line answered with "No" | | | | |
| G.3.2.3. Parameter Title: Annual electricity supplied to the grid prior to retrofit (applicable only for retrofit and modification activities) | 1,3 | Not applicable. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| G.3.2.4. Parameter Title: Emission factor of the grid (CM) | 1,3 | EF _{y,grid} has been calculated as "Tool to calculate the emission factor of an electricity system". Data Checklist Yes / No | CAR | <input checked="" type="checkbox"/> |

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| | | Title in line with methodology? | Yes | | |
| | | Data unit correctly expressed? | Yes | | |
| | | Appropriate description of parameter? | Yes | | |
| | | Source clearly referenced? | Yes | | |
| | | Correct value provided? | Yes | | |
| | | Has this value been verified? | audit | | |
| | | Choice of data correctly justified? | partially | | |
| | | Measurement method correctly described? | NA | | |
| | | Combined margin grid emission factor has been calculated to be 0.51 t CO ₂ /MWh, as per the first submission to the assessment team. | | | |
| | | However, the same has been finally validated to be 0.52 tCO ₂ /MWh, after appropriately incorporating the corrections requested in the following CAR 19, in line with the latest version of the Tool to calculate emission factor of an electricity system. | | | |
| <u>Corrective Action Request No.19.</u> | | | | | |
| Please submit the Excel calculation sheet for EF calculation and copies of the source data. Data vintage applied should be specified (it seems that for OM calculation data from 2002-2003 are applied, however the latest available data should be used). EF calculation should follow each step of the “Tool to calculate the emission factor of an electricity system”. This information can be included in Annex 3 of the PDD (selection of ex-ante, ex-post option, demonstration that low-cost/must run resources constitute less than 50 % of total grid generation etc.). In case the calculations shall be based on official publications as “The estimation of emission factor for an electricity system in Thailand 2007” at EGAT website a respective link to the source shall be provided. Please note that the submitted document does not exactly follow | | | | | |

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|---|----------|--|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-----|----------------------------|-----|--|-----|-------------------------------|-------|---|-----|-----|-------------------------------------|
| | | the “Tool to calculate the emission factor of an electricity system”. It should be ensured that a) in case IPCC default values are applied the values taken should be the ones at the lower limit of the uncertainty at a 95 % confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 of IPCC 2006 (Annex EB 35 Report 12, p.19) b)in calculating the build margin the group of power units used for calculation should be either the set of 5 power units built most recently OR the set of power capacity additions that comprise 20% of the system generation and that have been built most recently – if 20% falls on part capacity of a unit, that unit is to be fully included. (Annex EB 35 Report 12, p.12). | | | | | | | | | | | | | | | | | | |
| G.3.3. Data and parameters monitored | | | | | | | | | | | | | | | | | | | | |
| G.3.3.1. Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology? | 1,3 | Yes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | |
| G.3.3.2. Comment on any line answered with “No” | | | | | | | | | | | | | | | | | | | | |
| G.3.3.2.1. Parameter Title: Electricity generated by the renewable technology | 1,3 | <div>The relevant amount of electricity is the electricity exported to the grid. $EG_{y,exported}$ is defined as monitoring parameter. See A.2.5 and B.7.1</div> <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>audit</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided for estimation? | Yes | Has this value been verified? | audit | Measurement method correctly described? | Yes | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | Yes | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | audit | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | |

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| | | Correct reference to standards? | Yes | |
| | | Indication of accuracy provided? | No | |
| | | QA/QC procedures described? | Yes | |
| | | QA/QC procedures appropriate? | Yes | |

Table 1c: Tool to calculate the emission factor for an electricity system

| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|--|-------|--------------|------------|-------------------------------------|
| H. Tool to calculate the emission factor for an electricity system (EB35) | | | | |
| H.1. Emissions reductions | | | | |
| H.1.1. Explanation of methodological choices | | | | |
| H.1.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity? | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.1.2. Is the relevant electric power system identified and justified? (step 1) | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.1.3. Is the choice of options to determine the operating margin justified in a suitable and transparent manner? (step 2) | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.1.4. Are the formulae required for the determination of the operating margin factor correctly presented, enabling a complete identification of parameter to be used and / or monitored? (step 3) | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.1.5. Is the cohort of power units to be included in the build margin appro- | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|--|-------|--------------|-------------------------------------|-------------------------------------|
| priately identified (step 4) | | | | |
| H.1.1.6. Are the formulae required for the determination of the build margin factor correctly presented, enabling a complete identification of parameter to be used and / or monitored? (step 5) | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.1.7. In case of alternative weighing factors for the Combined Margin: Is the quantification of the alternative weighing factor justified in a suitable and transparent manner? | 1,3,6 | Not applied | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| H.1.1.8. In case of alternative weighing factors for the Combined Margin: Is the guidance for the PDD concerning the acceptability of alternative weights considered in the discussion? | 1,3,6 | Not applied | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| H.1.2. Data and parameters that need to be monitored or need to be calculated only once for the crediting period and thus are available at validation, depending on the data vintage chosen | | | | |
| H.1.2.1. Is the list of parameters presented in chapter B.6.2/B.7.1 considered to be complete with regard to the requirements of the applied methodology? | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.2.2. Is the choice of ex-ante or ex-post vintage of OM and BM factors clearly specified in the PDD? | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |
| H.1.2.3. Is the calculation of the OM and BM factors documented electronically in a spreadsheet attached to the CDM-PDD including all data used for calculation as | 1,3,6 | See G.3.2.4. | CAR | <input checked="" type="checkbox"/> |

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|---|----------|--|----------------|-----------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|----|----------------------------|-----|-------------------------|----|-------------------------------|----|-------------------------------------|----|---|----|-----|-------------------------------------|
| per the tool (page 17,18)? | | | | | | | | | | | | | | | | | | | | | | |
| Fill in the required amount of sub checklists for monitoring parameter and comment any line answered with “No” | | | | | | | | | | | | | | | | | | | | | | |
| H.1.2.4. Parameter Title: FC _{i,m,y} ; FC _{i,y} ; FC _{i,j,y} ; FC _{i,n,y} ; FC _{i,n,h} amount of fossil fuel type i consumed by power plant/unit <i>m,j,k</i> or <i>n</i> (or in the project electricity system in case of FC _{i,y}) in year <i>y</i> or hour <i>h</i> (mass or volume unit) | 1,6 | See G.3.2.4 <table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Correct value provided?</td><td></td></tr><tr><td>Has this value been verified?</td><td></td></tr><tr><td>Choice of data correctly justified?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr></table> | Data Checklist | Yes / No | Title in line with methodology? | | Data unit correctly expressed? | | Appropriate description of parameter? | | Source clearly referenced? | | Correct value provided? | | Has this value been verified? | | Choice of data correctly justified? | | Measurement method correctly described? | | CAR | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | | | | | | | | | | | | | | | | | | | | | | |
| H.1.2.5. Parameter Title: NCV _{i,y} Net calorific value of fossil fuel type i in year y (GJ/mass or volume unit) | 1,6 | <table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Choice of data correctly justified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> <p>Net calorific values applied are given in Table 6 (PDD page 25), however as IPCC default values are applied, the values taken should be the ones at the lower limit of the uncertainty at a 95 % confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2</p> | Data Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | No | Source clearly referenced? | Yes | Correct value provided? | No | Has this value been verified? | No | Choice of data correctly justified? | No | Measurement method correctly described? | NA | CAR | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | No | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | No | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | No | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | NA | | | | | | | | | | | | | | | | | | | | | |

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|---|----------|--|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|----|----------------------------|-----|-------------------------|----|-------------------------------|----|-------------------------------------|----|---|----|-----|-------------------------------------|
| | | of IPCC 2006 (Annex EB 35 Report 12, p.19) | | | | | | | | | | | | | | | | | | | | |
| H.1.2.6. Parameter Title: EF _{CO2,i,y} ; EF _{CO2,m,i,y} CO ₂ emission factor of fossil fuel type i in year y | 1,6 | <table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Choice of data correctly justified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> See G.3.2.4 | Data Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | No | Source clearly referenced? | Yes | Correct value provided? | No | Has this value been verified? | No | Choice of data correctly justified? | No | Measurement method correctly described? | NA | CAR | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | No | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | No | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | No | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | NA | | | | | | | | | | | | | | | | | | | | | |
| H.1.2.7. Parameter Title: EG _{m,y} ; EG _y ; EG _{j,y} ; EG _{k,y} ; EG _{n,h} Net electricity generated and delivered to the grid by power plant/unit <i>m,j,k</i> or <i>n</i> (or in the project electricity system in case of EG _y) in year <i>y</i> or hour <i>h</i> (mass or volume unit) | 1,6 | See G.3.2.4 <table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Correct value provided?</td><td></td></tr><tr><td>Has this value been verified?</td><td></td></tr><tr><td>Choice of data correctly justified?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr></table> | Data Checklist | Yes / No | Title in line with methodology? | | Data unit correctly expressed? | | Appropriate description of parameter? | | Source clearly referenced? | | Correct value provided? | | Has this value been verified? | | Choice of data correctly justified? | | Measurement method correctly described? | | CAR | <input checked="" type="checkbox"/> |
| Data Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided? | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | | | | | | | | | | | | | | | | | | | | | | |
| Choice of data correctly justified? | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | | | | | | | | | | | | | | | | | | | | | | |
| H.1.2.8. Applicable for the dispatch data OM Parameter Title: EG _{PJ,h} | 1 | Not applicable. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | |

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| Electricity displaced by the project activity in hour h of year y | | | | |
| H.1.2.9. Parameter Title: $\eta_{m,y}$ average net energy conversion efficiency of power unit m in year y | 1 | Not applicable. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Table 1d Tool to determine project emissions from flaring gases containing methane

If biogas is flared the AMS III.H. methodology requires the use of the latest approved version of the “Tool to determine project emissions from flaring gases containing methane” to calculate related project emissions. PE_{flaring} is calculated on an annual basis or for the required period of time using this tool.

| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | PDD in GSP | Final PDD |
|--|-------|---|------------|-------------------------------------|
| I. Tool to determine project emissions from flaring gases containing methane (EB 28) | | | | |
| I.1. Emissions reductions | | | | |
| Integrate questions concerning methodological choices and selection of options, if necessary | | | | |
| I.1.1. Explanation of methodological choices | | | | |
| I.1.1.1. Is it explained how the procedures provided in the tool are applied by the proposed project activity? | 1,2,5 | Partially. PDD states that step 5 to 7 will be applied however does not explain how. See also B.6.1.4.7. Step 1 to 4 are not applicable as default values are applied for the methane combustion efficiency of the flare. The flare involves an automatic control system. Flare operation is dependant on the pressure of the gas system. Below a limit value the flare will be operated in stand by modus, with | CR | <input checked="" type="checkbox"/> |

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| | | <p>biogas pressure levels exceeding the limit value the flame operation will be started automatically.</p> <p><u>Clarification Request No. 16.</u></p> <p>Please provide further information on the manufacturers specification with respect to “proper operation of the flare” (which conditions – that shall be monitored - must be fulfilled for a proper operation of the flare. See also I.2.1.7.</p> | | |
| I.1.1.2. Is every selection of options offered by the tool correctly justified and is this justification in line with the situation verified on-site? | 1,2,5 | See B.6.1.4.7 | CR | <input checked="" type="checkbox"/> |
| I.1.1.3. Are the formulae required for the determination of project emissions from flaring correctly presented, enabling a complete identification of parameter to be used and / or monitored? | 1,2,5 | See B.6.1.4.7 | CR | <input checked="" type="checkbox"/> |
| I.1.1.4. Is the stated type of flare (open, enclosed) traceable due to the definitions mentioned in the tool? | 1,2,5 | <p>An enclosed flare is implemented.</p> <p><u>Corrective Action Request No.20.</u></p> <p>An enclosed flare system is implemented. Please revise the PDD accordingly.</p> | CAR | <input checked="" type="checkbox"/> |
| I.1.1.5. In case of open flare: Is there a device foreseen to demonstrate the flare is operational and are the default values (50% , 0%) in the calculation adapted? | 1,2,5 | NA | On-site audit | <input checked="" type="checkbox"/> |
| I.1.2. Is every selection of options offered by the tool correctly justified and is this justification in line with the situation verified on-site? | | | | |
| I.1.2.1. Are the constants used in equations | 1,2,5 | See B.6.1.4.8. | CAR | <input checked="" type="checkbox"/> |

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| consistent to table 1 in the tool and considered to be complete with regard to the requirements of the applied tool? | | | | |
| I.1.3. Ex-ante calculation of project emission | | | | |
| I.1.3.1. Is the projection based on the same procedures as used for future monitoring? | 1,2,5 | See B.6.1.4.8. | CAR | <input checked="" type="checkbox"/> |
| I.1.3.2. Are the GHG calculations documented in a complete and transparent manner? | 1,2,5 | See B.6.1.4.8. and B.6.3.2. | CAR CR | <input checked="" type="checkbox"/> |
| I.1.3.3. Is the data provided in this section consistent with data as presented in other chapters of the PDD? | 1,2,5 | See B.6.3.4. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| I.1.4. Summary of the ex-ante estimation of project emissions | | | | |
| I.1.4.1. Is the data provided in this section in consistency with data as presented in other chapters of the PDD? | | See B.6.4.3. | CAR | <input checked="" type="checkbox"/> |
| I.2. Application of the monitoring methodology and description of the monitoring plan | | | | |
| I.2.1. Data and parameters monitored | | | | |
| I.2.1.1. Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied tool? | 1,2,5 | See below | CAR | <input checked="" type="checkbox"/> |
| I.2.1.2. Parameter Title: $fv_{i,h}$ Volumetric fraction of component i in the residual gas in the hour h where $i=CH_4, CO, CO_2, O_2, H_2, N_2$ | 1,2,5 | See B.7.1.11. | CR | <input checked="" type="checkbox"/> |

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|---|-------------|--|----------------------|-----------|---------------------------------|-----|--------------------------------|----|---------------------------------------|-----|----------------------------|-----|--|----|-------------------------------|----|---|-----|---------------------------------|-------------|----------------------------------|-------------|---------------------------------|-----|-----------------------------|-----|-------------------------------|-----|-----|---|
| I.2.1.3. Parameter Title: $FV_{RG,h}$ Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h (m³/h) | 1,2,5 | <p>The volumetric flow rate of biogas leaving the digester ($FV_{\text{digester},y}$) and the volumetric flow rate of biogas entering the power generation unit ($FV_{\text{electricity},y}$) is included as monitoring parameter. However the flow rate to the flare is missing.</p> <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>No</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>See B.7.1.1</td></tr><tr><td>Indication of accuracy provided?</td><td>See B.7.1.1</td></tr><tr><td>Monitoring Frequency compliant?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> <p><u>Corrective Action Request No.21.</u></p> <p>The correct data unit of the flow rate would be m³/h. Please see Flaring tool EB 28, Meeting report Annex 13 page 12. A value should be given for the estimation of project emissions due to flaring and an indication of accuracy should be provided (see also B.6.1.4.7).</p> | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | No | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Correct value provided for estimation? | No | Has this value been verified? | No | Measurement method correctly described? | Yes | Correct reference to standards? | See B.7.1.1 | Indication of accuracy provided? | See B.7.1.1 | Monitoring Frequency compliant? | Yes | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | Yes | CAR | ☑ |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct value provided for estimation? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Has this value been verified? | No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | See B.7.1.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | See B.7.1.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring Frequency compliant? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.2.1.4. In case the flare efficiency is continuously monitored Parameter Title: | 1,2,5 | Not applicable. | ☑ | ☑ | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|--|----------|--|-------------------------------------|-------------------------------------|---------------------------------|-----|--------------------------------|-----|---------------------------------------|-------------------------------------|----------------------------|-----|---|-----|---------------------------------|----|----------------------------------|----|---------------------------------|----|-----------------------------|-----|-------------------------------|----|-----|-------------------------------------|
| $t_{O_2,h}$ Volumetric fraction of O ₂ in the exhaust gas of the flare in the hour h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.2.1.5. In case the flare efficiency is continuously monitored Parameter Title: $f_{CH_4,FG,h}$ Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h (mg/m³) | 1,2,5 | Not applicable. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | |
| I.2.1.6. Parameter Title: T_{flare} Temperature of the exhaust gas of the flare | 1,2,5 | Temperature of the flare will be measured for flame detection. <table border="1"><thead><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr></thead><tbody><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>NA</td></tr><tr><td>Indication of accuracy provided?</td><td>NA</td></tr><tr><td>Monitoring Frequency compliant?</td><td>No</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>No</td></tr></tbody></table> See B.7.1.1. | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | Appropriate description of parameter? | Yes | Source clearly referenced? | Yes | Measurement method correctly described? | Yes | Correct reference to standards? | NA | Indication of accuracy provided? | NA | Monitoring Frequency compliant? | No | QA/QC procedures described? | Yes | QA/QC procedures appropriate? | No | CAR | <input checked="" type="checkbox"/> |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Appropriate description of parameter? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source clearly referenced? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement method correctly described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correct reference to standards? | NA | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indication of accuracy provided? | NA | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring Frequency compliant? | No | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures described? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA/QC procedures appropriate? | No | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.2.1.7. In the case of use of a default value for the flare efficiency Parameter Title: Other flare operation parameters including all data and parameters that are required | 1,2,5 | See I.1.1.1 <table border="1"><thead><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr></thead><tbody><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr></tbody></table> | Monitoring Checklist | Yes / No | Title in line with methodology? | Yes | Data unit correctly expressed? | Yes | CR | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | |
| Monitoring Checklist | Yes / No | | | | | | | | | | | | | | | | | | | | | | | | | |
| Title in line with methodology? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data unit correctly expressed? | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |

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| CHECKLIST TOPIC / QUESTION | Ref. | COMMENTS | | | PDD in GSP | Final PDD |
|---|-------|---|-----|--|------------|-----------|
| to monitor whether the flare operates within the range of operating conditions according to the manufacturer's specifications, including flame detector in case of open flares. | | Appropriate description of parameter? | Yes | | | |
| | | Source clearly referenced? | Yes | | | |
| | | Measurement method correctly described? | Yes | | | |
| | | Correct reference to standards? | Yes | | | |
| | | Indication of accuracy provided? | No | | | |
| | | Monitoring Frequency compliant? | Yes | | | |
| | | QA/QC procedures described? | Yes | | | |
| | | QA/QC procedures appropriate? | Yes | | | |
| Annex 4: Monitoring information | | | | | | |
| If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD? | 1,2,5 | There is no additional information about monitoring of project emissions from flaring provided in Annex 4 | | | ☑ | ☑ |
| Is the information provided verifiable? Has sufficient evidence been provided to the validation team? | 1,2,5 | See I.3.1.1. | | | ☑ | ☑ |
| Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD? | 1,2,5 | See I.3.1.1. | | | ☑ | ☑ |

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Table 2 Resolution of Corrective Action and Clarification Requests

| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|---|-----------------|--|---|
| <p><u>Corrective Action Request No.1.</u></p> <p>1) The description of the project should more clearly explain how the proposed project activity reduces GHG emissions (see SSC PDD guide section A2).</p> <p>2) Please transparently describe the project activity according to the latest planning (including PEA permit cap of 1 MW).</p> <p>3) Transparently describe the existing wastewater treatment system (specification of the existing wastewater treatment system and subsystems i – including loading rate COD in- and outflow etc) and the project wastewater treatment system and subsystems k (biogas plant/lagoon system expected amount of methane capture and electricity generation capacity, designed COD removal rates etc.).</p> <p>4) Clearly describe the purpose of electricity generation (in-house use and only surplus electricity to be fed into the grid). At on-site audit it has been clarified that the electricity system of the palm oil mill factory (which includes a biomass steam power plant and also purchases electricity from the grid) is connected to the biogas genset/wastewater</p> | A.2.5. | <p><u>1st response</u></p> <p>1) Section A.2 is revised to clearly explain ‘how the project reduces GHG emissions’.</p> <p>2) The project will produce electricity which will be utilized for biogas system itself and substitute imported electricity from grid to run the palm oil mill during non-operation of the biomass plant and the surplus electricity will be fed to the grid. The former PDD states that UPOIC will feed 2MW electricity to the grid while on-site audit found that the PEA contract for buying electricity from the project is only 1MW. According to the calculation (details in calculation sheet Attachment A 2.1), there will be</p> <ul style="list-style-type: none"> • 6,045 MWh/y of electricity generated • 697 MWh/y utilized in biogas project itself • 433 MWh/y substituted imported electricity from grid to palm oil mill • 4,915 MWh/y sell to the grid <p>Therefore; if the proposed project runs 300 days a year then the electricity fed to the grid = $4,915/300 = 16.4$ MWh/day. To comply with the permit contract of PEA, UPOIC will run the generators approx. 16 hours/day and this will result to obtain 1MW electricity to feed to the grid. However, the project explain before that they will feed 2MW to the grid because</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>1) Description of the project has now been included more transparently in the revised PDD</p> <p>2) The submitted response and units are not clear. Please further clarify.</p> <p>3) Baseline and project waste water system have now been added in the revised PDD along with required details in Section A.4.2 and B.2. Further please specify the designed COD loading rates for each lagoon in figure 5 of PDD.</p> <p>4) The electricity line diagram is not depicting the biomass plant, and it is not clear if it currently depicts the actual site situation. Please provide the electricity line diagram of the facility.</p> <p>5) The projections of the electricity used for captive purposes are based on operating hours,</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|--|---|
| <p>treatment system and that there is only one line connection to the electricity grid (electricity for the factory premises can be purchased from the grid OR supplied to the grid. Therefore it is expected that the electricity generated by the biogas system will be used to meet in-house demand first and only supply surplus electricity to the grid. The single line diagram submitted at on-site audit seems to only include the part of the biogas genset. A single line diagram of the complete factory should be submitted to the audit team showing transparently each electricity generation equipment connected to the captive grid.</p> <p>5) Please provide a projection of the amount of electricity used for captive purposes and the amount exported to the grid and transparently describe and justify these projections. Please ensure consistency with other sections of the PDD (also in regard to projections of FFB use, specific wastewater generation, quantity of wastewater generated, quantity of biogas etc.).</p> | | <p>they plan to generate electricity during the peak period to gain more benefit from selling electricity and this will take only 8 hours/day to generate electricity which the total amount of electricity per day or per year is the same whether 1MW or 2MW feeding to the grid. Indeed, the project will feed 1MW electricity according to the PEA contract and if the PEA expands the capacity of the electricity line in the future, the project will feed 2MW (during peak period) instead.</p> <p>3) The details of baseline and project scenarios are put in section A.2 to describe the existing wastewater treatment system and the project wastewater treatment system including flow rate and COD concentration. The detail of the treatment system is further explained in section 4.2.</p> <p>4) Please see answer 2. The rough description is in section A.2 and the detail is further explained in section B.6. The electricity single line is a bit adjusted to comply with the project activity as shown in Attachment A.2.2</p> <p>5) Please see answer 2. The biogas calculation sheet is designed to comply with the historical data as Attachment A.2.3.</p> <p><u>2nd Response:</u></p> <p>2) What should be added for further clarify?</p> <p>3) Add COD loading rate in Figure 5</p> | <p>please provide the basis of the operating hours taken into consideration.</p> <p><u>2nd Response:</u></p> <p>2) Based on contract with PEA it can be concluded that Project activity would supply electricity corresponding to 1 MW. Also PP has installed a separate energy meter for measuring the exported quantity to grid and the same is in the monitoring plan .However please correct the units of the parameter in page 48 & 49 of PDD</p> <p>3) COD loading rates for each</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|--|--|
| | | <p>4) Pls, see Re_attachment A 2.2_electrical flow_UPOIC</p> <p>5) The captive biomass plant is not related to the CDM project. The electricity is generated due to the palm oil production process require steam and the high pressure of the steam need to be adjusted to obtain the optimum pressure, the exceed pressure will run the turbine and generate electricity. The electricity from this captive plant will be utilized in the palm oil mill. When there is no operation of the palm oil plant, there will not be electricity generated as well. Thus, electricity used in the office building, wastewater treatment plant will be imported from the grid.</p> <p>-The basis of operating hour of the captive biomass plant (not relate to project) is based on production process which depends on season of raw material.</p> <p>- The basis of captive biogas plant (CDM project); since the biogas can be generated all the time but the system could store the gas and pipe it to the generator which planned to be run 16 hours a day</p> <p><u>3rd Response:</u></p> <p>2) Unit of parameter ID No. 21-25 is corrected</p> <p>5) please see attached folder "auxiliary power consumption"</p> <p>According to the evidence, the kW of some equipment has been adjusted to have the same values with the support documents. Thus the calculation sheet has been revised and effect to the amount of</p> | <p>lagoon has been described in the figure 5 of the PDD as suggested</p> <p>4) It is now clear and can be verified from the Re_attachment A2.2 that power generated from the Biogas will first be utilized inhouse and excess would be exported to grid</p> <p>5) By projection, validation team meant the auxiliary power consumption mentioned in the xl file. Therefore please provide supporting evidence from the technology provider against the auxiliary power consumption for fixing the value ex-ante.</p> <p><u>3rd Response:</u></p> <p>2) Units of the parameter have been corrected. And it has been justified that the power exported to grid would not be more than 1.2 MW.</p> <p>However, it is noted that the values provided in 1st response is not consistent with the final ER calculations file, for example, when comparing the final xl file, ER_Attachment A 2.1-V08</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|--|---|
| | | <p>CER, pls see Re_Attachment A.2.1_V04</p> <p><u>4th response:</u></p> <p>We have 2 numbers for electricity produced:</p> <ul style="list-style-type: none"> • 5,548 MWh/yr • 5,769 MWh/yr <p>The 1st one, 5,548 MWh/yr, is the value of the Bio Tech Thai proposal at the time of BoD decision, which is considered only in the Investment analysis (UPOIC financial feasibility BoD decision).</p> <p>The 2nd one, 5,769 MWh/yr is the value from ERDI, based on the '10days campaign', which is the 'real case'. This value is therefore used in the ER calculation and is mentioned throughout the PDD. Considering this value a second Investment Analysis has been done called 'UPOIC financial feasibility update'. The PDD is consequently based on the following values:</p> <p>5,769 MWh = electricity produced, based on ERDI design and '10days campaign'</p> <p>646 MWh/yr = electricity used for self supply of project activity (biogas plant), based on rated capacity of equipment.</p> <p>339 MWh/yr = electricity used for self supply for Palm Oil Factory, based on 3years average data of imported grid electricity.</p> <p>4,784 MWh/yr = calculated amount of electricity which is exported to the grid.</p> | <p>UPOIC_12-04-11.xlsx, the worksheet 'electricity produce' gives the value of 5769 MWh/y of electricity generation and 646 MWh/y of auxiliary consumption. Also, the PDD ver. 9 dated 05 April 2011 (sec. A.2) gives the value of electricity sold to the grid as 5100 MWh/y. In line with the above discrepancies, please clarify/ and correct the inconsistencies with supporting evidences for the audit team.</p> <p>5) Rating for all the auxiliary equipments stated in project emission calculation has been provided and has been verified.</p> <p><u>Conclusion</u></p> <p>The audit team could validate the values of electricity produced, which are presented in the 4th response, based on the Biotech Thai proposal and ERDI design values based on 10-day campaign earlier submitted to the assessment team. It is considered appropriate to include the values from ERDI in the ER calculations, in order to calculate the most likely number of ERs</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|--|---|
| | | | <p>during the crediting period. These real case values are also considered in the updated financial analysis, which has been validated by the assessment team. Hence, is accepted.</p> <p>Auxiliary consumption of the power plant is derived based on the rated capacity of the equipment, which could be validated based on name plates of the installed equipment provided by the manufacturer. Hence, is accepted.</p> <p>3 year historical record of electricity consumption has already been provided by the PP, which could support the amount of electricity taken for mill.</p> <p>Finally, the amount of electricity exported to the grid is calculated based on the above values. These values are found consistently used within the PDD and ER calculations. Hence, is accepted.</p> |
| <p><u>Clarification Request No. 1.</u></p> <p>The coordinates given in the PDD could not be verified. Please correct. Coordinates verified at on-site audit by GSP device are</p> | A.4.1. | The coordinate in PDD is adjusted to 8°9.2382' N; 99°1.4009 E. | <p><input checked="" type="checkbox"/></p> <p>The coordinates have been revised and verified</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|---|-----------------|--|--|
| 8°9.2382' N; 99°1.4009 E | | | |
| <p><u>Corrective Action Request No.2.</u></p> <p>The methane content in biogas is assumed to be 70 %. Please provide supportive documentation for this assumption. Technical design assumes 65 %. The designed COD removal efficiency is 90% rather than the Bio-gas production rate as stated on page 7 in the PDD. Please correct.</p> | A.4.2.3. | <p><u>1st response</u></p> <p>1) The methane content in biogas is assumed to be 65% and used in the technical data. The monitoring from another project of ERDI, which is now operating, found that the methane content is between 60-65%</p> <p>(Attachment A.4.1 is data of CH₄ gas analyzer of an operated project of ERDI.)</p> <p>2) The calculation sheet for design data (Attachment A.2.3) is checked and re-sent. The average wastewater amount applied is 350 m³/day (based on production rate). The COD removal efficiency is 90% (Attachment A.4.2) and the biogas production rate is still 25-30 m³/1 m³ of wastewater, please see the calculation sheet. The data is consistent.</p> <p><u>2nd Response:</u></p> <p>1) see Re_Attachment 4.1</p> <p>2) 584 is estimated production rate during the project activity. Since the DOE recommended that the production rate of the plant should not be largely changed from the historical data. Thus, we choose to fix the production rate and divide by the operation days of the crediting period = 175,232/300 = 584</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>1) The methane content has now been taken as 65% as per the technical design. Please provide us with the Attachment A.4.1</p> <p>2) Average waste water has been taken based on production rate. However as per Historical Production rate provided in attachment A.2.1, the average production rate comes out to be 660 tonnes per day(TPD) (= total production of last three years / total no. of operating days in last three yr). However ER sheet assumes 584 TPD as the average production rate, please clarify.</p> <p><u>2nd Response:</u></p> <p>1) Re-attachment A4.1 ,having the analysis of biogas composition at UPOIC, has been provided to further substantiate the methane content which is taken as 65%</p> <p>2) Since the last 3 years</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|--|---|
| | | <p>TPD. If 660 TPD during the baseline is applied then, the production rate during the crediting period will be $660 \times 300 = 198,000$ TPY which might cause a problem to identify the expansion of the project. This value is applied to estimate the amount of wastewater during the crediting period. The amount of baseline WW is obtained from flow rate of 10-day sampling multiply and the historical operating days as shown in A.2.1</p> <p>3rd Response: The technology provider makes a design based on 3-yr historical production rate divided by 300 days which assumed to be the project operating days. Even the planning operating date (300 days) is increase from the 3-yr historical data (266 days) but the production rate is still at the approx. rate as 3-yr historical data $= 584 \times 300 = 175,200$ TPY and it does not result in historical capacity increasing. Pls, refer to "2009_04_28_Annex_1_UPOIC.pdf, page 14, sent by TUV SUD" stated that "The project activity takes place at an existing wastewater treatment system. An additional sequential wastewater stage is included. The existing wastewater pond treatment system was designed for a capacity of 70 t FFB/h in 2004 and a wastewater flow rate of 1,000 m³/day. Historical FFB processing rates show that this capacity was not achieved within the last 10 years up to March 2009. The new system has a design capacity of 350 m³/day and thus it can be concluded that the project activity is not resulting in a capacity</p> | <p>historic record of FFB production has been taken, please also take the historic record of no. of operating days, for consistency.</p> <p>3rd Response: Since Historical production rate is used to calculate the waste water in project scenario (which should be ideally equal to the baseline scenario), please clarify why the same value as of baseline scenario (from 10 days campaign) has not been taken into consideration for project scenario as per the methodology</p> |

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|---|-----------------|--|--|
| | | <p>addition.”</p> <p>4th Response: The calculation is revised to have the same wastewater flow rate for both baseline and project activity. 3-yr historical data of the FFB used in production process is considered as a yearly basis (175,200 TPY). The wastewater generation rate is obtained from 10-day campaign (0.59 m3/ton FFB) thus the wastewater generated per year would be 103,368 m3/yr. This flow rate is applied in the calculation for both stage (please see Re_Attachment 2.1 V5 and section 6 in the PDD for the revise data).</p> <p>5th Response: Please also refer to Re_Attachment A 2.1 V5 file named “historical production rate”. The 3-yr historical record has the average production day of 266 days while the maximum operating day, in year 2006, is 285 days. Base on the design, the maximum operating day from historical record along with the safety factor are considered thus, the design engineer estimated that the operating day during the crediting period is 300 days therefore; it is applied for project calculation.</p> | <p>4th Response: Same values for COD and Wastewater quantity in baseline and project emission have now been taken for ER computation from 10 days campaign. However, as requested above, please justify why historic records of number of operating days has not been considered for computing average production per day</p> <p>5th Response: Historical production rate has been provided and it has been clarified that 300 operating days has been taken in the project design based on highest operating days in last three years. Further technical design specification from technology provider has also been provided to substantiate the same.</p> |
| <p>Clarification Request No. 2. Please document in the PDD the type of flare used. In case of applying a default value for the flare efficiency, the manufacturers specification for the operation of the flare should be also documented (see Flaring tool page</p> | A.4.2.3. | <p>1st response</p> <p>The detail of flaring system is described in A.4.2. Since the enclosed flaring tool is installed, the default value of 0.9 according to the flaring tool is ap-</p> | <p><input checked="" type="checkbox"/></p> <p>1st response Attachment A.4.3 does not talk about flare system provided to UPOIC, please submit the rele-</p> |

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|---|-----------------|--|---|
| 3). | | <p>plied. See the certified document from technology provider in Attachment A.4.3.</p> <p><u>2nd Response:</u> Attachment A 4.3 stated that “The 500 m3/hr BKE Biogas flares at Krabi and Trang ordered by UPOIC Company...”. Please note that Krabi site refer to UPOIC site and Trang refer to Lamsoon site which both are operated Lamsoon Company.</p> | <p>vant certificate.</p> <p><u>2nd Response:</u> Attachment A 4.3 has been provided and Technical description of flaring system been incorporated in the PDD along with parameters required for ensuring manufacturers specification</p> |
| <p><u>Clarification Request No. 3.</u> Annex 2 states that besides CER sales, financing will be through loan of a commercial Thai Bank, funding from “Energy Policy and Planning Office (EPPO). At on-site audit it has been clarified and substantiated that there will be no loan involved, thus please revise the PDD accordingly.</p> | A.4.4.2. | <p>It is corrected to “The project financing will be realized by UPOIC its own capital, the Energy Conservation Promotion fund from Energy Policy and Planning Office (EPPO), and the sale of generated CERs to private investors.</p> | <p><input checked="" type="checkbox"/></p> <p>Annex 2 of PDD has been revised as suggested. PP has also provided a certificate from Energy Policy and Planning office substantiating the same</p> |
| <p><u>Clarification Request No. 4.</u> The Tool to determine project emissions from flaring gases containing methane (EB28) is applied in order to calculate project emissions due to incomplete flaring in line with methodology AMS III.H. although in section B.1. it states that it is not applied. Please update the information. Also make reference to the Tool to calculate Emission Factor.</p> | B.1.1.1. | <p><u>1st response</u> Section B.1 is included the flaring tool.</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u> Section B.1 has been revised as suggested, however please correct the date mentioned for AMS III.H version 10 (the methodology was not valid on 26th September’08) Also include the version of “tool</p> |

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|--|-----------------|---|---|
| | | <p><u>2nd response:</u> See pg 14.</p> | <p>to calculate emission factor” used in the PDD</p> <p><u>2nd response:</u> Date and version have been changed as suggested. <i>However please refer to CAR 19</i></p> |
| <p><u>Clarification Request No. 5.</u> Please clearly define in section B2 which measures (as given in para 1 of the methodology) the project activity is comprising. The section should specify how the project is fulfilling the applicability criteria of the methodologies (rather than repeating the requirements of the methodologies).</p> | B.2.1.6. | <p><u>1st response</u> The applicability measures are defined and applicable criteria checklists are put in the PDD section B.2.</p> <p><u>2nd response</u> have been corrected</p> <p>According to the design in baseline-figure 5, these ponds are designed to be facultative pond and polishing ponds but based on the real situation, the wastewater is sampled and based on the criteria of</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u> Although applicability measures haven updated but please correct the them as per AMS.III.H version1 0 (correct “methane recovery” to “biogas recovery” on page 15 section B.2) Please correct ‘aerobic pond’ in Table 4, point 4, sub-para 2 since it refers to ‘anaerobic pond’</p> <p><u>2nd response</u> Applicability measures have been updated and ponds have been categorized as anaerobic or aerobic, as per the methodology. Hence, accepted</p> |

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| Clarifications and corrective action requests by validation team | Ref. to table 1 | Summary of project owner response | Validation team Conclusion |
|--|-----------------|---|---|
| | | the tool, it was found that these ponds falls into the type of “ aerobic, poor manage”. | |
| | | This is explained in table 4 as well. | |
| <u>Corrective Action Request No.3.</u> PDD should transparently describe the wastewater treatment facilities in the baseline and project scenario. Details on the pond system (pre-and post project scenario) should be included (information on capacity, COD, retention time etc.). The exclusion of sections or components that are considered as “not affected” should be justified (see ACM III.H. paragraph 13,14, page 3/23). | B.3.1. | <u>1st response</u> Section B.3 is revised. The figures to define baseline and project boundary are put in the PDD including the details of sections that ‘affected’ and ‘not affected’ by the CDM project (information on capacity, COD, retention time etc.) <u>2nd response</u> pls, see section B.3 and Figure 5 is revised. <u>3rd Response</u> Figure 3 and 4 has been adjusted. | <input checked="" type="checkbox"/> <u>1st response</u> Revised PDD now contains transparent description of baseline and project scenario. Further please include Palm oil plantation in the updated project boundary as per AMS.III.H. Also include the retention time and designed COD loading rate in figure 5 of PDD <u>2nd response</u> Project boundary has not been updated in the figures 3 &4. Please include Grass area as well as grid inside the project boundary. <u>3rd Response</u> Project boundary has been updated in the revised PDD And is in line with the methodology |
| <u>Corrective Action Request No.4.</u> The lagoon system as presented in figure 2 does not exactly comply with the situation on- | B.3.4. | Please see CAR 3. | <input checked="" type="checkbox"/> Each pond/ lagoon system, as |

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| site. Please clearly show each pond/lagoon and its function. See also CAR 1. | | | verified during on-site, has been clearly presented in the PDD, figure 4 and 5. Hence, acceptable. |
| <u>Clarification Request No. 6.</u> Please summarise in the PDD the applicable regulatory/ legal requirements and show that the continuation of current practice is not restricted (for example by discharge COD values/colour of the discharged water). | B.4.3. | <u>1st response</u> The applicable regulatory/ legal requirements are included in section B.4 to show that the continuation of current practice is not restricted. <u>2nd response</u> Pls, see attachment file named 'Factory Act B.E.2535' in Lamsoon attached file. | <input checked="" type="checkbox"/> <u>1st response</u> Please provide us with the factory Act B.E. 2535 from any publicly available source or certified document to substantiate the fact that project activity is not a legal requirement. <u>2nd response</u> PP has provided with the Factory Act B.E. 2535 and it can be verified that the continuation of current practice is in compliance with the Factory Act B.E. 2535 |
| <u>Corrective Action Request No.5.</u> As the project activity involves two components (wastewater treatment and grid electricity supply), please transparently describe the baseline for the two components of the project in section B.4. For the wastewater component the baseline description should include the specification of COD removal rates (COD removal efficiencies) of the baseline treatment systems i af- | B.4.4.6. | <u>1st response</u> Two project component; wastewater treatment system and electricity generation are clearly described in section B.4. The details of wastewater components and electricity components is included. UPOIC conducted a new measurement of COD in and out of every ponds in the system for 10 days (see Attachment A 2.1-WWW analysis) | <input checked="" type="checkbox"/> <u>1st response</u> <ol style="list-style-type: none"> Baseline for two components (wastewater treatment and grid electricity supply) has now been updated in section B.4. Also provide us with the |

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| <p>ected by the project in line with para 17/18 of the methodology (see also SSC_PDD guide section B.4.). At on-site audit it has been clarified that historical records are only available for the COD inflow before treatment in the lagoon system and COD outflow of the effluent. However this system includes an-aerobic, as well as facultative anaerobic and aerobic lagoons and therefore each treatment system needs to be considered separately. Respective measurements are to be undertaken as per para 18a of the methodology. Records of the measurement campaign should be submitted to the audit team.</p> | | <p><u>2nd Response:</u> 2) see Wastewater Analysis Report 3) Figure 5 is revised</p> <p><u>3rd Response:</u> For baseline data: 10-day sampling is applied to calculate the HRT and VLR. - HRT is calculated from Volume of pond divided by wastewater flow rate (all value is shown in the diagram) - VLR is calculated from kg of COD discharged to the pond divided by pond volume. (all value is shown in the diagram) For project data: The HRT and VLR are design by technology provider. All the values applied in baseline is from the “design data for the existing pond system” pls, refer to “2009_04_25_Annex_1_UPOIC.pdf sent by TUV SUD” stated about the proof documents during validation.</p> <p><u>4th Response:</u> - The COD applied in baseline calculation is obtained from 10-day campaign while the COD applied in the project calculation is based on the design of the technology provider (to be able to handle the optimum COD loading). To avoid the difference of the values applied in the PDD and the values of the supportive documents from the technology provider, the different COD values are used in baseline and project. Anyway, the calculation of the CER in PDD</p> | <p>Laboratory report from Trang Sure Lab for the 10-days campaign.</p> <p>3. Further as per AMS.III H version 10 paragraph 20, please include in the PDD the efficiency of each step involved in the baseline which would be required to calculate ex post baseline emissions</p> <p><u>2nd Response:</u> 2) Laboratory report for 10 days campaign from TrangSure lab has been provided and the same values have been used for baseline COD values determination as per the methodology 3) Efficiency of each step involved in the baseline has now been added in the PDD obtained by 10 days campaign. Further please provide evidences for VLR, HRT and pond volume values mentioned in the figure 5 of PDD for baseline scenario</p> <p><u>3rd Response:</u> 10-days sampling report can be</p> |

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| | | version 5 is revised to have the same COD values for both baseline and project scenario by using the COD values from 10-day campaign. The COD reduction in the project wastewater treatment system is based on the efficiency designed by the technology provider. Please see Figure 5 in the PDD. Also, the baseline design document is attached again, see "UPOIC_baseline design". | used to justify the COD values, however please provide evidence for the pond volume (which is used in calculation of VLR & HRT, in the baseline scenario) 4th Response: Certificate from professional engineer has been provided for pond volume used in baseline scenario |
| <p><u>Corrective Action Request No.6.</u></p> <p>Additionality discussion shall follow Attachment A of Appendix B of the simplified modalities and procedures for SSC CDM project activities (see http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentA.pdf). Please also take into consideration EB 35 report Annex 34 (non binding best practice examples to demonstrate additionality for SSC project activities).</p> <p>Transparent and documented evidence should be provided substantiating the barriers claimed. At on-site audit it has been clarified that the project faces investment barriers. In case investment barrier is claimed in the PDD, a detailed investment analysis should be provided in the PDD. The respective excel</p> | B.5.1. | <p><u>1st response</u></p> <p>The additionality demonstrated by applying the (c) Investment Barrier: a financially more viable alternative to the project activity would have led to higher emissions of the "Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities"</p> <p>At on-site Audit, some documents refer to this section has been submit to the audit team. The final excel calculation file and some additional documents was submitted to the audit team via email and in CD.</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>The Excel file having IRR calculation has been provided. However please find attached the list of findings in the IRR computation:</p> <ol style="list-style-type: none"> 1. Please take a consistent value for FFB production rate, Biogas produced, electricity produced, etc. throughout the PDD, IRR & ER sheet (Values taken in IRR sheet do not match with that of ER sheet) 2. As per "Guidance on the Assessment of Investment Analysis" verison 2, please |

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| calculation file detailing the calculations and the sources of reference for all input values should be submitted to the audit team. | | | <p>calculate IRR for 20 years. Also include the fair value of the project activity asset at the end of the assessment period</p> <p>3. Depreciation has not been taken into account in the sheet. Please include the same</p> <p>4. As per PDD pg 23 UPOIC received 5.9 million Thai Baht (THB) from Energy Conservation Promotion (ENCON) Fund, please incorporate the same in the IRR calculation</p> <p>5. Please clarify why Interest component has been taken into account in IRR sheet, because it was clarified at on-site audit that no loan is involved in the project activity</p> <p>6. Please provide supporting for all the annual expenditure taken into consideration of IRR calculation. Also justify the factors taken for Biogas production and Power generation from biogas</p> |

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| | | <p><u>2nd response</u></p> <p>1. The number indicated in the financial feasibility is the number they use when they made decision which is the number from Corporate Public Relations Consultant proposal (already submit during validation). These figures might different than in ER sheet as during development of technology design there are some changes, the calculation also different as the methodology is adjusted during the time.</p> <p>2. The calculation is extended to consider 20 years.) The assessment period extends until the end of the lifetime of the equipment, so the fair value of the project activity asset at the end of the assessment period can be considered zero.</p> <p>3. Depreciation is not a cash flow and therefore should not be included in the IRR calculation.</p> <p>4. The ENCON fund was received after they made the investment decision thus it was not included in</p> | <p>7. Please consider escalation in calculating Income from Power generation as per PEA agreement</p> <p>Also provide us with the working model for sensitivity analysis as well</p> <p><u>2nd response</u></p> <p>1. The proposals from 3 technology providers were verified during on-site based on which the values for feasibility were taken. However, the copy of these documents was not carried over by the audit team. Hence, please provide the scanned copies of the same, for records.</p> <p>2. Since it is considered as end of lifetime of the equipment, please provide some supporting documents for lifetime of the equipment</p> <p>3. Since the project activity is extended to maximum as-assessment period of 20 years</p> |

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| | | <p>the financial fease for project consideration</p> <p>5. It is a loan from shareholders of the company so that they need to calculate interest (revenue for the shareholder but as a cost of project. Anyway, the interest is removed.</p> <p>6. The documents has been submitted to audit team during site visit and after validation to Tuv Sud. The numbers used in the financial calculation are from technology provider proposals that calculate the approx. amount of biogas and electricity product from the facility. For the annual expense, the expense taken from equipment provider proposal.</p> <p>7. The price for selling electricity has two prices (peak and off peak. The number used in the calculation is an average price (at the selling date of the contract which is still valid now) as UPOIC intends to produce electricity feeding in the grid all day thus cover both peak and off peak. PEA only allow UPOIC to feed electricity to the grid for 1 MW therefore, there is no possibility for UPOIC to sell electricity only during peak time. There are both possibilities that the price can be decreased or increased in the future. The variation of this income is already considered in the 10% sensitivity analysis (the purchase agreement during the validation</p> | <p>and requires no tax calculation. Therefore Depreciation is not required in the IRR computation</p> <p>4. Since the ENCON fund was allocated to the project after the start date of the project activity, it is accepted to consider the same in the sensitivity analysis. Once the IRR in-put values are clarified, sensitivity would be re-checked with the subsidy included.</p> <p>5. Interest component has been removed from the IRR sheet. This is considered conservative, and hence, is accepted.</p> <p>6. Please provide a copy of the feasibility report. Further, all the input values in the xl sheet should be provided with the source of data, for transparency. Please clarify why the values have been changed for the parameter Biogas produced and Size of Biogas system. These are contradictory to the values provided during the on-site visit.</p> |

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| | | <p>Please find attached financial calculation UPOIC to Tuv Sud revis 1</p> <p><u>3rd Response:</u></p> <p>1) Please find "Biogas technology proposals 2) Please find in file "Palm CMU for Lamsoon 1-2" 4) Please find "financial UPOIC updated number" 6) The request file is provided with explanation There is no record of data source of the original</p> | <p>Please update and re-submit the financial calculations.</p> <p>7. Please provide the source of values taken for inflation rate, increasing rate of energy cost and increasing rate of labor cost. Further, inflation should be included in the revenue from electricity, or else, please provide evidence to confirm that there are no possibilities of increasing electricity tariff prices.</p> <p>8. Since the design values are substantially different than the values available at the time of investment decisions, please provide sensitivity analysis with the actual design data based on ERDI system design.</p> <p>9. Please provide actual contracts value to cross-check the project investments estimated in the IRR.</p> <p>10. Please provide documentary evidence to confirm the prevailing practice barrier, with English translation, as referred in the PDD.</p> |

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| | | <p>data, some are from experience of the engineer. In order to be able to explain the calculation some figures need to be adjusted to be provable. However, the numbers are in the same range. Please find "Financial calculation UPOIC updated number" file</p> <p>7) Please find "2006 inflation rate", the energy increasing cost and labor cost are follow the Corporate Relation Consultant" in the biogas technology proposal file. The original financial fease. file for board consideration has not included increasing of electricity tariff as we as increasing for system operation cost. However, within the updated financial fease. the increasing rate is considered.</p> <p>8) Please find in the financial calculation UPOIC updated number which is considered number input from the PDD that has been proven by other section.</p> <p>9) The actual payment record is provide for cross check in Payment record of UPOIC</p> <p>10) There are two file start with "CAR B5 with prevailing practice" attached for consideration</p> | <p>3rd Response:</p> <p>1) Since all the Additionality documents would be uploaded in the UNFCCC website, please provide us with the translated scanned pdf copy of the three feasibility reports (no photographs) used in the computation of IRR</p> <p>2) It can be verified from the "Palm CMU for Lamsoon 1-2" that the technical lifetime of the equipment installed is 20 years</p> <p>4) IRR computation with subsidy has been provided</p> <p>6) Please send us the clear translated copy (no photographs) of feasibility report</p> <p>7) Source of the inflation has been provided and increase in electricity tariff has been considered, however clear copy of feasibility report from 'Corporate Relation consultant' is required</p> <p>8) Financial calculation with updated input values have been provided</p> <p>9) Simple excel file cannot be used to crosscheck the project</p> |

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| | | <p><u>4th Response:</u></p> <p>1. Referring to Response 2nd no.1 and the 3rd response no.1, 5, 8, 11, 12 ; The proposal with cover of Corporate Public Relation (CPR) contains two</p> | <p>investment values, kindly provide the appropriate documents</p> <p>10) Documents for prevailing practice has been provided, however please submit the full translated document (not in comment box) and source because the same has to be uploaded in the UNFCCC website</p> <p>Also please clarify which input values are finally considered for the project IRR, because the final design values are to be considered only for sensitivity analysis (not for final project IRR).</p> <p>Further, project activity would sell the electricity to grid after in-house consumption, so please deduct the in-house consumption component from gross generation and at the same time remove 'electricity cost for equipments of biogas system' taken as expense in the computation of IRR</p> <p><u>4th Response:</u></p> |

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| | | <p>parts; first is the power point presentation of the proposal, second is the official proposal from Biotech Thai Corporation which is the mother company of the CPR. As the later is more official it is scanned and submitted as "Biotech Thai Corporation Proposal" file and "UPOIC financial fease propose by Biotech Thai" file (a clearer scanned of financial fease calculation of page 9 of the proposal)</p> <p>The financial fease of UPOIC using for BoD consideration is mainly based on this proposal. However, there are some additional references to support financial calculation of UPOIC i.e. Rate of electrical fee, adder electrical, 2006 inflation rate files are provided with appropriate translation of the relevant part as agreed on 25 Nov.</p> <p>2. referring to the 2nd response no.5; ENCON fund is included in the actual financial calculation "UPOIC financial updated" file</p> <p>The UPOIC budget Biogas is summarized and translated as "UPOIC Actual payment" the scanned P.O. is also provided to prove the calculation.</p> <p>4. refer to the 2nd response no.7 and the 3rd response no.7; The financial fease. of UPOIC are provided 2 files; one is "UPOIC financial fease during BoD consideration", another one is "UPOIC financial fease updated". The input values are transparently explained in the "description" sheet in the file. The value of size of biogas in this file is based on production capacity record from year 2002-06 which is different than the de-</p> | <p>1. "UPOIC financial fease propose by Biotech Thai" file (a clearer scanned of financial fease calculation of page 9 of the proposal), as stated in the reply is not attached with the protocol, please send us the file to review the same</p> <p>2. "UPOIC financial updated" file as discussed in the response is not attached with the protocol. Please send us the file to review the same</p> <p>4. Please refer to point 2</p> <p>5. Source of inflation has been verified and hence accepted. The benchmark supporting documents are available. However, complete translation of the same is not provided. Interpretation is also included in the translation, which is not accepted. Please provide complete translation of the documents, for proper understanding of the audit team.</p> |

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| | | <p>sign value of ERDI provided during site visit. The calculation is recomputed with the increasing rate of electricity fee of 3%, and the in house consumption is deducted from electricity produced of up dated calculation but for BoD calculation the proposal proposed to sell produced electricity to the grid and buy electricity back for biogas system thus there is the cost of electricity in the “cost” section.</p> <p>5. refers to the 2nd response no.8. the source of inflation rate is from Bank of Thailand as mentioned in the comment box of file “2006 inflation rate”, the increasing rate of electricity and labour are taken from the Biotech Thai proposal. The source of values input in the financial calculation is provided in the “description” sheet of the file. The a benchmark of Independent Power Producer from “IPP Bidding” by Ayudhya Securities Public company limited which is the same as the IRR benchmark recommended by the Palm Oil Crushing Mill Association to consider for biogas investment that the IRR of the project shall not be lower than 15% attaché file “Benchmark IRR” and “letter from Palm oil crushing mill association” The IPP bidding reference is used the same as the registered plam oil biogas project Thachana palm oil</p> <p>6. refers to the 2nd response no. 10; The ERDI design value is considered in the “UPOIC financial fease. updated” file</p> | <p>Letter from Palm Oil Crushing Mill Association has been provided to support 15% benchmark. However, please clarify if the association could be considered as a National authority. The letter confirms that it is a project IRR calculated for the similar kind of project activity, i.e. bio-gas systems.</p> <p>The other document submitted to substantiate the benchmark is a research work for a certain bidding process. However, it is not clear how the same is relevant for the project. Please provide the complete translation of the article and also provide the source of this paper, if its available in public domain.</p> <p>Please justify the benchmark clearly in line with Investment guidelines (EB 51, Annex 58), para 12 and 13.</p> <p>6. Please refer to point 2</p> <p>7. Refer to point 2</p> |

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| | | <p>7. Refers to the 2nd response no. 11; the project is not a turn key project. Thus there is no single contract that described all payment. The summary of payment record with support P.O. are provided to prove the actual payment.</p> <p>refers to the 2nd response no.12 and the 3rd response no.12, the prevailing practice part is taken out as only the investment analysis is sufficient enough to prove additionality</p> <p>5th response:</p> <ol style="list-style-type: none"> 1. The file is provided in the attachment. 2. Please explain where the project cost shall be corrected as the PDD has already mentioned (in page 22) about the actual payment. The actual payment UPOIC. Pdf has the same number as UPOIC actual payment (27-11-09-Tuv Sud). 3. - 4. The file "UPOIC biogas (27-11-09-Tuv Sud) has been provided as file (UPOIC actual payment (27-11-09-Tuv Sud) and is attached again this time. The description in the UPOIC financial fease up-dated is changed accordingly. 5. The article in English version is provided in the attachment <p>.In Thailand Associations are underlying a rough registration regulation and all associations are not independent but always related and associated to</p> | <p>Prevailing practice has been removed from the discussion since this is a small scale project activity. Therefore, the justification of additionality based on investment analysis alone is accepted.</p> <p>5th Response:</p> <p>1. "UPOIC financial fease propose by Biotech Thai" has been provided by the PP. This feasibility report has been used as a source for input values for project investment and operational cost. The same has been verified and as a conservative measure project IRR with actual investment values has also been computed by PP.</p> <p>2, 4. "UPOIC financial fease up-dated" has been provided. Please correct the project cost as per 'actual-payment-UPOIC.pdf'. Further 'UPOIC biogas (27-11-09-TUV SUD)' file referred in description of IRR sheet updated has not been provided.</p> |

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| | | <p>National Authorities, such as Ministry of Industry, Ministry of Energy and Ministry of Environment. Thus they are always registered as a part of a National Authority and thus not independent. Please find attached the regulation of Associations of the Royal Government of Thailand.</p> <p>The article in Eng. Version taken from http://www.ays.co.th/Uploads/Research/eng/Energy_071119_U.pdf is provided. The indicative rate is sourced from "IPP Bidding" by Ayudhya Securities Public Company Limited, which cites the benchmark level of 15% for an Independent Power Producer (IPP) which is a private entity who owns facilities to generate electric power for sale to the grid system the same as UPOIC. This benchmark is used and approved by UNFCCC for the biogas of palm oil plant project no. 2644: Thachana Palm Oil Company Wastewater Treatment Project in Thailand on 06/2009 which is the same type of UPOIC project.</p> <p>6th Response: The requested documents are provide in attached.</p> | <p>5. It can be verified from the provided attachment that all the association needs to be registered under Ministry of Economic affairs. Operation of these associations is also governed by registrar. Hence 15% benchmark values provided by the association can be considered in the investment analysis. Further the benchmark value is also substantiated by publically available article on 'Independent power producer' from 'AYS ayudhya securities'.</p> <p>The assessment team has considered the latest EB guidelines, EB 62 report Annex 05, Guidelines on the assessment of investment analysis (ver. 05) para 14, and considers that 15% as the expected returns on the investment by the PP could be applied as appropriate benchmark as the project could be developed by only one possible project developer, UPOIC, and has been demonstrated to have been used for similar projects in the palm oil sector in Thailand.</p> |

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| | | | <p>As UPOIC does not have any past experience of implementation of such (electricity generation) projects, hence, other similar projects in Thailand could be considered for selecting the benchmark, as per the guidelines. PP provides the reference to registered CDM project, Thachana Palm Oil Company Wastewater Treatment Project in Thailand (Reg. No. 2644) which is a similar project in Thailand using 15% benchmark. Hence, the assessment team considers 15% benchmark as appropriate for the project activity.</p> <p>Further, as a conservative approach, cross-check of benchmark has also been done with the Guidelines on the assessment of Investment Analysis ver. 05 (Annex 05, EB 62 report), wherein for Thailand Group 1 industry sector, Appendix document prescribes benchmark of 11.2%. The assessment team validated that the IRR results, including the sensitivity analysis, are lower than the default value. Hence, the project is considered</p> |

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| | | | <p>additional.</p> <p><u>6th Response:</u></p> <p>2. Please provide/clarify the sources for following items in 'UPOIC biogas (27-11-09-TUV SUD)' 2.13, 2.29, 3.4, 3.9, 3.22, 4.4, 4.30, 5.6, 6.18, 6.19, 6.21, 6.22, 7.4</p> <p><u>Conclusion:</u></p> <p>2. Revised 'UPOIC biogas (27-11-09-TUV SUD)' has been provided as per the available purchase orders. Investment values from this sheet has been used to compute project IRR using latest available inputs.</p> |
| <p><u>Corrective Action Request No.7.</u></p> <p>Please revise the start date of the project activity and include within the section of additionality discussion an implementation timeline of the project activity. The timeline should include the date when the investment decision was made and the date when construction works started and when commissioning is expected. In addition to this implementation timeline please include a timeline of events and actions, which have been taken to achieve CDM registration, with description of the evidence used to support these actions.</p> | B.5.13 | <p><u>1st response</u></p> <p>The project timeline is added in the section of additionality discussion. The relevant references are submitted in CD.</p> <p><u>2nd Response:</u></p> <p>Please find an updated timeline and we have men-</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>The project timeline has been incorporated in the revised PDD. However the description of evidences in the timeline is still not transparent in the PDD, please include it and provide the relevant evidences to us.</p> <p>And please refer to CAR 18 for start date of the project activity</p> |

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| | | <p>tioned proved evidences that have been sent to Tuv Sud during and after validation in the file LS timeline as well as additional info. PEA letter to UPOIC for COD meeting to start purchase electricity.(invitation for COD meting)</p> <p><u>3rd Response:</u></p> <p>1- please find "the PIN selection letter project" file. 4- find "UPOIC letter apply ENCON fund" file 8 – find "UPOIC contract with contractor" file 9 – find "UPOIC contract with ERDI" file 12 – find "UPOIC contract with EPPO" The date is changed regarding to the contract. 16 – deleted as it was the expectation commissioning date. The real commissioning date is the start selling electricity date (the previous no. 17) which is prove by the letter from PEA mention the first date of selling electricity</p> | <p><u>2nd Response:</u></p> <p>Description of all the evidences in the timeline has been up-dated, further please provide us with the documentary proof for step 1,4,8,9,12 & 16 mentioned in the timeline of the PDD</p> <p><u>3rd Response:</u></p> <p>CDM consideration can be verified from the documents received corresponding to the stated PDD timeline</p> |
| <p><u>Clarification Request No. 7.</u></p> <p>At on-site audit it has been clarified that the electricity system of the palm oil mill factory is connected to the biogas genset/wastewater treatment system. The electricity of the factory is provided by a biomass steam power plant, a diesel genset and also purchases electricity from the grid. Therefore the source of electricity supply for the project activity facilities system can be a) a turbine (steam generated by biomass), b) a (diesel?) gen-</p> | B.6.1.4.1. | <p><u>1st response</u></p> <p>Please see CAR 1. The electricity generated from captured biogas will be self-utilized in palm oil factory and the surplus electricity will be fed to the grid. The projection of the amount of electricity used on-site and the amount exported to the grid is shown in Attachment A.2.1.</p> <p>(1) the amount of electricity used in biogas system is estimated from the electricity required of the equipments; (2) the amount of electricity supplied to palm oil</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>The given response does not cover the electricity generated by the baseline biomass system, which was supplied to the palm oil mill.</p> <p>Please explain transparently in the PDD how it is ensured that the electricity generated from the</p> |

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| erator, c) the project activity or d) grid electricity. Please clarify if the project emission calculation will take into account this different electricity sources and if yes, how. The single line diagram submitted at on-site audit seems to only address the part of the biogas genset. A single line diagram of the complete factory should be submitted to the audit team showing transparently each electricity generation equipment connected to the captive grid (see also CAR1). | | <p>plant is estimated from 3-yr average historical data of electricity imported; and</p> <p>(3) the amount of electricity fed to the national grid is determined from the total electricity generation minus self-consumption and minus electricity supplied to palm oil plant.</p> <p><u>2nd Response:</u> See section B.4-Electricity Generation-PDD pg 20. Moreover, there are some technical reasons i.e. the biomass plant can't be connected directly to the grid system or the biogas system due to there is no synchronize system. Moreover, the economic reason, selling electricity to the grid gain more benefit than consume in the project itself thus, there is no reason to substitute biomass electricity by biogas electricity.</p> <p>As the palm oil plant requires steam in the production process, the FFB is used as a biomass fuel to heat up the water. The pressure of steam is high enough to generate electricity used in biomass plant. Thus, electricity will be produced due to the production process. The capacity of the biomass power plant depends on the production rate of the palm oil mill, not relevant to the biogas plant.</p> <p>At the moment, 3-year statistics of the electricity supplied from the national grid for in-house demand</p> | <p>biogas system is not replacing the baseline biomass system.</p> <p>Would the biomass system still be operating at the same capacity as the baseline or would it be substituted by the biogas system with the project activity?</p> <p>Please explain how this is considered conservatively in calculating the ERs</p> <p><u>2nd Response:</u> It has been clarified that the 2 systems would be distinct and not affected with each other's operation. Further, it is ensured that biomass boiler would be generating electricity during the project implementation at the same capacity as the baseline scenario. Hence, is accepted, and concluded that biomass electricity would not be substituted with biogas electricity. Further please provide us with the Historical Power generation data from Biomass system</p> <p><u>3rd Response:</u> PP has provided the historical</p> |

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| | | <p>is estimated for electricity consumption (this electricity used in office buildings and the open pond system only). The actual data will be metered during the monitoring period and it could be checked that the electricity from biogas plant will be fed to meet the in-house demand during non-operation of the biomass plant.</p> <p>3rd Response: Pls, see attached files "electricity consumption of steam turbine" Pls, noted that electricity consumption and generation of the biomass plant will be the same.</p> | <p>records for last three years which can be used in subsequent verification to cross check whether the Biomass power has been replaced or not. Please refer to FAR 1</p> |
| <p><u>Corrective Action Request No.8.</u></p> <p>Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation should be included. See also B.3.1.</p> | B.6.1.4.2. | <p><u>1st response</u></p> <p>PE_{ww,treatment} is included in section B.6.1</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>Methane emissions from wastewater treatment systems has been incorporated as PE_{ww,treatment,y}. However please find attached the following corrections in PE_{ww,treatment,y} calculation:</p> <ol style="list-style-type: none"> 1. Please account for Methane emissions from the Cooling pond in PE_{ww,treatment,y} as COD is reduced by 6000 mg/L in the cooling pond. 2. Correct the uncertainty factor to 1.06 as per |

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| | | <p>2nd Response:</p> <p>1. The technology provider stated that the COD reduced in the cooling pond is from the sedimentation of nonsoluble material which could not be biodegraded. This is an agreement during the validation that the project does not need to count for this part.</p> <p>2. The ER sheet is revised and this results in CER changing to 12,645 tCO₂/y</p> <p>3. OK</p> <p>3rd Response:</p> <p>They are not the same conditions. In physical, the cooling pond is adapted from the existing storage pond but the function is changed from storing wastewater to adjusting temperature of wastewater before feeding wastewater into the digester. Pond volume and VLR is stated in figure 5. HRT can be controlled by the pumping system. Please see attached file "suction pump1" in folder "auxiliary power consumption". With the capacity of 60m³/hr and the designed wastewater amount 350 m³/hr thus, the wastewater can be pumped into digester within 6 hours. Thus, we the PDD HRT is less than 1 day.</p> | <p>AMS.III.H which is taken as 0.94 in the calculation</p> <p>3. Correct the Parameter COD_{removed,y} to COD_{removed,PJ,k,y} as per the methodology</p> <p>2nd Response:</p> <p>1) Please clarify if the conditions in the cooling pond in project activity are identical as the storage pond in baseline.</p> <p>2) Uncertainty factor has been corrected as per the methodology</p> <p>3) Parameter has been updated and is in line with the methodology</p> <p>3rd Response:</p> <p>Since the conditions of the storage pond in baseline are different than the cooling pond in the project activity, it is considered to be affected with the project activity. Therefore, please account for the project emissions from cooling pond considering MCF values (aerobic or anaerobic)</p> |

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| | | <p>4th Response:</p> <p>- According to the Methodology, the cooling pond does not meet the criteria of anaerobic pond (the pond is deeper than 2 meters, without aeration, ambient temperature above 15°C, at least during part of the year, on a monthly average basis, and with a volumetric loading rate of COD above 0.1 kgCOD.m⁻³.day⁻¹. But the minimum interval between two consecutive sludge removal events is less than 30 days as in respond 3rd, the HRT is less than 30 days and the sludge will be removed out within 30 days.) Thus, the cooling pond is considered as aerobic poor manage and the MCF 0.3 is applied. The calculation sheet and CERs in the PDD (pg 28, 34) is revised. Please see Re_Attachment 2.1 V5. Also, see CAR no.5, 4th respond for the clarification.</p> | <p>robic) based on the pond conditions as per methodology para 26 because cooling pond results in change of COD value</p> <p>Also please clarify as to why different inlet COD values of wastewater are used in baseline and project scenario. Because as per the methodology, 10 days campaign have been organized and the same value has to be taken for baseline and project scenario for emission reduction estimation</p> <p>4th Response:</p> <p>Project emissions from cooling pond has now been accounted and COD values for project emission has also been considered from 10 days campaign. Hence, is accepted.</p> |

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| <u>Clarification Request No. 8.</u> Please exactly use the formulae given in the tool to determine $PE_{flaring,y}$ ($= PE_{flare}$) and explain any assumptions made. In case of applying a default value for the flare efficiency step 5 to 7 shall be applied. See also Validation protocol section I. | B.6.1.4.7. | The formulae given in the tool to determine $PE_{flaring,y}$ is used and the assumptions are described in PDD section B.6.1. | <input checked="" type="checkbox"/> Step 5 to 7 has now been applied in revised PDD as per "Tool to determine project emissions from flaring gases containing methane" considering default efficiency value for flaring |
| <u>Clarification Request No. 9.</u> The electrical system allows the electricity supply by a) a turbine (steam generated by biomass), b) a generator (0.8 MW), c) the project activity or d) grid electricity. Beyond this background the exclusion of this potential emission source should be based on a brief assessment on the likeliness that the electricity generated by biogas might replace biomass generated electricity. | B.6.1.4.8. | <u>1st Response</u> The electricity generated by biogas will be used to substitute electricity bought from the grid only, not substitute electricity generated by biomass. Please see CAR 1. <u>2nd Response:</u> Please see CR7 | <input checked="" type="checkbox"/> <u>1st Response</u> It is not clear how it could be validated that the electricity requirement of the palm oil mill, which was met by the baseline biomass system would not be affected with coming up of the project activity. Also provide us with the historical Power consumption record of Mill, which was supplied by Biomass power plant. <u>2nd Response:</u> As replied in CR 7, Further please provide us with the Historical Power generation data from Biomass system <u>3rd Response:</u> |

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| | | 3rd Response: See CR7 | Please refer to FAR 1 |
| <u>Corrective Action Request No.9.</u> As per the methodology for cases 1 (vi) ex-post emission reductions shall be based on the lowest value of <ul style="list-style-type: none"> c) the amount of biogas recovered and flared during the crediting period, that is monitored ex post d) Ex-post calculated baseline, project and leakage emissions Please take into account formulae 15 ff of the meth III.H. within section B.6.1.1. | B.6.1.6. | <u>1st response</u> Formulae 15 and 16 of the meth III.H. are included in the PDD section B.6.1 <u>2nd Response:</u> add methane gainfully used under formula 15 pg 26. | <input checked="" type="checkbox"/> <u>1st response</u> Formula 15 of AMS III.H has been incorporated for calculation of ex post emission reduction. However as mentioned in the PDD, MD _y not only consist of Methane flared but it also take into consideration the amount of methane gainfully used. Therefore please include the Methane component gainfully used in MD _y computation <u>2nd Response:</u> MD _y has been updated to contain gainfully used component and is now in line with the methodology |
| <u>Clarification Request No. 10.</u> Excel sheet for the calculation of emission reductions should be submitted | B.6.3.2. | The excel sheet is shown in Attachment A.2.1 | <input checked="" type="checkbox"/> Excel sheet for Emission Reduction calculation has been submitted |
| <u>Corrective Action Request No.10.</u> As per the SSC-PDD guidance please includes also a separate table for each of the component (AMS III.H. and AMS I.D.) that is | B.6.4.3. | <u>1st response</u> The separated tables of baseline emissions and project emissions for each component are included | <input checked="" type="checkbox"/> <u>1st response</u> Although separate table has been included for each compo- |

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| applied. | | <p>in section B 6.4.</p> <p><u>2nd Response:</u> Pls, see Table in section B 6.4. - BE_{power,y} is electricity consumed in baseline - EG_{y,exported} is the net electricity generated by biogas and could substitute grid electricity. (5,348 MWh/year is the net electricity already, pls, see calculation sheet The unit of MW/yr is changed to MWh/yr</p> <p><u>3rd Response:</u> 99.7 MWh/yr is deleted from the BE_{power}, see Re-Attachment A 2.1_V04 and the calculation part in PDD-section 6.)</p> | <p>nent but in the calculation of BE_{power,y} only EG_{y,exported} has to be included. Considering 99.7 MWh/yr for electricity used in baseline from grid (as per AMS III.H) would be double counting since the same has been accounted in 5,348 MWh/yr as per AMS I.D)</p> <p>Also please correct the units of the parameter defined in the PDD</p> <p><u>2nd Response:</u> The baseline component of AMS III.H (99.7 MWh/yr) is already included in the baseline computation as per AMS I.D (since it contain total power consumption from grid based on last three year record). Therefore to avoid double counting, 99.7 MWh/yr from AMS III.H has to be removed. Please correct the same</p> <p><u>3rd Response:</u> Computation of BE_{power,y} has been revised to avoid double counting and is in line with the methodology</p> |
| <u>Corrective Action Request No.11.</u> | B.7.1.1. | <u>1st response</u> | <input checked="" type="checkbox"/> |

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| <p>Please make sure that for all the monitoring parameters all information/specification as indicated in SSC-guide is presented in the tables of parameters:</p> <ul style="list-style-type: none"> - measurement methods and procedures should be described - applied industry standards or national or international standards should be specified - measurement equipment should be specified - how the measurement is undertaken (including a specification of for example sampling/analysis of COD– which internationally recognised procedures are applied) - which calibration procedures are applied - accuracy of the measurement method - who is the responsible person / entity that should undertake the measurements - measurement/recording interval. | | Please see B.7.1 | <p>1st response</p> <p>Please make the following corrections in updated monitoring plan:</p> <ol style="list-style-type: none"> 1) Please correct $Q_{ww,j,y}$ to $Q_{ww,y}$ on page 39 as used in the calculation of PDD assuming the quantity of water treated to be the same in all the treatment process. 2) Please include the “instruction from the supplier” to calibrate the equipment as mentioned in pg-40 of PDD for measuring $COD_{ww,untreated,y}$ 3) Please correct the parameter $COD_{ww,removed,y}$ to $COD_{removed,PJ,k,y}$ on page 30 as per AMS.III.H 4) Please correct the parameter $COD_{ww,discharged,y}$ to $COD_{ww,discharge,PJ,y}$ as per AMS.III.H 5) $FV_{RG,h}$ can't be treated as $BG_{burnt,y}$ as specified in pg-44 of PDD. $FV_{RG,h}$ is hourly volumetric flow rate where as $BG_{burnt,y}$ is biogas flared annually. Please correct the |

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| | | <p><u>2nd Response:</u></p> <p>1. OK 2. The suppliers do not provide the calibration instruction and UPOIC is in the stage of setting its own laboratory. UPOIC lab will be managed in the same way as Lamsoon Lab which the calibration frequency is based on the 'Guideline for the determination of calibration intervals of measuring instruments' and all equipments is calibrated by the certified agency for equipment calibration. Also, PDD pg-40 is revised. By the way, UPOIC lab is set to analyze parameters in order to control the biogas system only. For the COD values used in the calculation will be obtained from the external accredited lab.</p> | <p>same.</p> <p>6) Correct $f_{v,i,h}$ on pg 44 to $f_{v,CH_4,RG,h}$ as per "tool to determine project emissions from flaring gases containing methane"</p> <p>7) Please include monitoring frequency for T_{flare} parameter in the PDD</p> <p>8) Please include D_{CH_4} and FE in the monitoring plan as mentioned on PDD page 33</p> <p>Please mention the Calibrating frequency, procedure and accuracy level for all the monitoring equipments used in the project activity</p> <p><u>2nd Response:</u></p> <p>1) Parameter has been corrected as per the methodology</p> <p>2) Please send us the 'guidelines for the determination of calibration intervals of measuring instruments' discussed in the reply</p> <p>3) Parameter, COD removed by treatment</p> |

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| | | <p>3. OK 4. OK 5. Revised in PDD pg 44 6. OK 7. OK 8. DCH4 and FE is added in monitored table</p> <p>see monitoring table</p> <p>3rd Response: 2) Pls, see email "PDD_Lamsoon version03 (Attach5)" sent by Narumon on 28/10/2009. The file is attached. 7) Tflare is continuous measured and recorded. parameter Tflare is revised-pg-43 of PDD. 9) The table of summary of the calibration frequency for CDM monitoring instruments is included in Annex 4.</p> | <p>system, has been updated as per the methodology</p> <p>4) Parameter, COD of the final treated water discharged, has been updated as per the methodology</p> <p>5) Computation of $BG_{burnt,y}$ has been revised in the PDD and is in line with the methodology</p> <p>6) Parameter $fv_{i,h}$ has been updated as per the tool</p> <p>7) Recording frequency for T_{flare} is still not included in the PDD</p> <p>8) As suggested, DCh4 and FE has been added in the monitoring table of the PDD</p> <p>9) Calibration frequency for all the parameter has still not been updated in the monitoring plan Please update the same</p> <p>3rd Response:</p> |

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| | | | <p>2) Guidelines for determination of calibration frequency for laboratory equipments has been provided and the same shall used for laboratory equipments</p> <p>7) Monitoring frequency of Tflare is now been included in the revised PDD</p> <p>9) Annex 4 of PDD has been updating with the summary of calibration frequency for all the monitoring equipments</p> |
| <p>Clarification Request No. 11.</p> <p>From the description of parameter F_{CH_4} captured it is not clear if the methane content will be measured at two different metering points (biogas stream to flare and biogas stream to generator) and which one will be used for calculation. Specification is needed and a value should be provided for ER projection. In addition the description seems not to be consistent to figure 4. It should be specified if the measurements will be on a wet or a dry basis. It should also become more clear in which section of B.6.1. this parameter is applied. Please also define QA/QC measures as indicated by the tool to determine project emissions from flaring gases containing methane. In addition see B.7.1.1.</p> | B.7.1.11. | <p>1st response</p> <p>The monitoring diagram is revised as shown in Figure 6 of the PDD. The methane content ($W_{CH_4,biogas}$) will be measured when the biogas come out at the outlet of the digester before piped to H₂S scrubber and at the biogas steam to flare and generator, the average results of CH₄ content will be applied for the project calculation. Based on flaring tool, the parameter of fvi,h must be monitored as well to determine the volumetric fraction of residual gas going to be flared. Please see details in monitored table.</p> <p>2nd Response:</p> <p>The parameter $W_{ch4,biogas,y}$ is changed to $W_{ch4,y}$. From Figure 6, I.D.11 is measure methane content of the captured biogas.</p> | <p><input checked="" type="checkbox"/></p> <p>1st response</p> <p>Please correct the parameter $W_{CH_4,biogas}$ to $W_{CH_4,y}$ as per the methodology. Also it is not clear in the Figure 6 of PDD where are the two locations of monitoring the methane content.</p> <p>2nd Response:</p> <p>As per the last response, there are two equipments installed to</p> |

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| | | <p>3rd Response: Pls, see the revised in monitoring table "ID no.11" There are three point of WCH4,biogas measuring-1 at the outlet of the digester and 2 at the inlet pipes of generators. Only data obtained from the outlet pipe of the digester will be applied to the project while other two points, the continuous gas analyzer are installed just to control the generator system not for the CDM monitoring purpose</p> | <p>measure methane content (mass fraction) and the average of them is considered for the calculation. Please clarify the two equipments in the figure 6 of PDD</p> <p>3rd Response: PDD has been revised to clarify which equipment would be used to monitor the methane content as per the methodology</p> |
| <p>Clarification Request No. 12. The fraction of time in which the gas is combusted in the flare should be included as monitoring parameter ($T_{\text{flare operation}}$ is provided on page 23 however has not been included as monitoring parameter in the monitoring plan) in case it is used for calculation. However see also B.6.1.4.8.</p> | B.7.1.14. | T flare operation is included in the monitored table. | <p><input checked="" type="checkbox"/></p> <p>$T_{\text{flare operation}}$ is now included in the monitoring plan as per the methodology</p> |
| <p>Corrective Action Request No.12. Correct title of the parameter is $COD_{\text{ww,untreated,y}}$ rather than $COD_{\text{ww,PJ,y}}$. Projections should be given for the COD values of the wastewater before entering the treatment system k (see para 34b of the methodology III.H.).</p> | B.7.1.3. | <p>1st response Parameter $COD_{\text{ww,PJ,y}}$ is changed to $COD_{\text{ww,untreated,y}}$. The sampling and analysis procedure is based on the specification of the measuring equipment and the international standard. UPOIC laboratory used standard method of the examination of water and wastewater, APHA, AWWA and WEF. The future</p> | <p><input checked="" type="checkbox"/></p> <p>1st response Parameter has been changed however refer to CAR 5 point 3 conclusion. Please elaborate the abbreviations used in the response,</p> |

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| The sampling and analysis procedures should be specified. Which "internationally recognised procedures" will be applied? Accuracy of the measurement method should be provided, too. | | accredited lab suppose to use the similar or equal method in order to cross-check the results of analysis with UPOIC. <u>2nd Response</u> see pg 39 | APHA, AWWA and WEF. <u>2nd Response</u> It has been clarified in the PDD that Standard Method of the Examination of Water and Wastewater, American Public Health Association (APHA), American Water Works Association (AWWA) and Water Environment Federation (WEF) will be used. Hence, is accepted. |
| <u>Corrective Action Request No.13.</u> COD _{ww,treated,y} (COD outflow) of the treatment system k in the project is to be monitored as well as the resulting parameter COD _{ww,removed,PJ,k,y} . | B.7.1.4. | <u>1st response</u> COD _{ww,treated,y} is put in the monitored parameter with its details, please see section B.7.1. <u>2nd Response:</u> The parameter named has been changed for the whole PDD | <input checked="" type="checkbox"/> <u>1st response</u> COD _{ww,treated,y} has been included in section B.7.1. However please correct the parameter COD _{ww,removed,y} to COD _{removed,PJ,k,y} in the PDD as mentioned earlier <u>2nd Response:</u> Parameter has been updated as per the methodology |
| <u>Corrective Action Request No.14.</u> COD _{ww,discharge,PJ,y} is defined as the COD of the final treated wastewater discharged into the sea, river or lake rather than COD of the treated wastewater. Please revise the de- | B.7.1.6. | <u>1st response</u> The existing COD analysis results are significantly different between Lamsoon Laboratory and the external laboratories. This might be the affect of differ- | <input checked="" type="checkbox"/> <u>1st response</u> Please provide audit team with the lab reports and the standards followed for examination |

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|---|-----------------|---|--|
| <p>scription and indicate the point of measurement in figure 4 of section B.7.2. of the PDD. Generally figure 4 needs revision in order to specify the metering points of all monitoring parameters. The laboratory values for "COD outlet" presented at on-site audit vary significantly between in-house measurements (Lam Soon laboratory) and external laboratory data. Clarification is needed (see also para 12e of EB 41 report Annex 20). Please also clarify the responsibility of taking the samples in both cases.</p> <p>Generally it is to be noted that the PDD states on page 33 that the COD content of the wastewater is not subject to huge variations, however this statement is not in line with the results of the measurements.</p> | | <p>ent test method since Lamsoon Lab applied the Standard Methods for the Examination of Water and Wastewater APHA 20th Edition 1998, Item 5220 Chemical Oxygen Demand (COD), 5220B. Open Reflux Method while the external labs (there are more than 1 external lab) applied other different methods. For this, there might be the error during sampling and reservation of the sampled since both Lamsoon lab and the external labs are located in other city. However, the project decided to make a 10-day campaign according to the tool in case 1 year historical data is not available and hire the accredited lab to take care of the analysis. Thus, the sampling, transporting and analyzing are handled by the accredited lab. The 10-day campaign results are used in baseline calculation as shown in Attachment A 2.1. The average wastewater generation rate measured in 10-day campaign on-site of 0.59 m³/ton FFB is cross checked with the benchmarking implementation of GTZ study which is between 0.45-0.76 during years 2005-2006 as shown in Attachment B.7.1.</p> <p>2nd Response: see wastewater analysis report</p> | <p>by external lab.</p> <p>2nd Response: All the COD values have been taken from 10 days campaign report from external laboratory as per the methodology. The reports have been submitted and verified</p> |
| <p><u>Corrective Action Request No.15.</u></p> <p>PDD includes $S_{final,PJ,y}$ as a parameter "amount of final sludge generated. The monitoring however should address the end use of the final sludge rather than the amounts</p> | B.7.1.8. | <p>The end-use of sludge is described and the details of measurements and QA/QC are included as per paragraph 39, AMS III.H.</p> | <p><input checked="" type="checkbox"/></p> <p>The revised PDD now includes the details of measurement and QA/QC measures for $S_{final,PJ,y}$ as per AMS.III.H</p> |

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| (paragraph 39 of AMS III.H.). Please correct. | | | |
| <p><u>Corrective Action Request No.16.</u></p> <p>As per the methodology paragraph 19,26 and 30, the electricity consumption is to be monitored (or alternatively calculated based on full rated capacity) and not only grid electricity that is consumed by the facilities. In case recovered biogas is used for the electricity provisions the emission factor should be assumed to be zero. Therefore please provide a projection of electricity consumption of all devices used in the project activities wastewater treatment system and system used for biogas recovery and use.</p> | B.7.1.9 | <p><u>1st response</u></p> <p>The projection of electricity consumption of all devices used in the project activities is shown in calculation sheet 'electricity used' and the amount of electricity consumption is detailed in monitored table.</p> <p><u>2nd Response:</u></p> <p>The basis operation of equipment is provided. Pls, see Re-Attachment A 2.1</p> <p><u>3rd Response:</u></p> <p>pls see CAR1</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>The projection of electricity has been provided. However please provide the basis for operating hours for various item taken into consideration for project emission in attachment A2.1- electricity use.</p> <p><u>2nd Response</u></p> <p>Though the projection is included in the monitoring plan, please provide supporting evidence from the technology provider against the auxiliary power consumption for fixing the value ex-ante.</p> <p><u>3rd Response:</u></p> <p>Supporting evidence against power consumption has been provided and verified</p> |
| <p><u>Corrective Action Request No.17.</u></p> <p>The operation and management structure should be presented more clearly in the PDD. It could not be verified at the site that maintenance and calibration will be subcontracted as shown in the PDD (figure page 36).</p> | B.7.2.1. | <p><u>1st response</u></p> <p>The operation and management structure is revised to comply with the real situation of UPOIC. The results from external lab is used in order to compare</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>Appropriate operation and management structure is now included, however it is still not</p> |

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| Please clarify if the external lab will be responsible for both, sample taking and analysis. A procedure defining role, responsibility, authority for measuring (which values by which department for example), data collection, monitoring, review and compilation of the parameters, reporting, archiving etc. should be described. Please note that all data collected should be electronically archived for a period of 2 years from the end of the crediting period (see EB 41 report Annex 40 para 12). Figure 5 (page 37 of the PDD) somehow defines the tasks (sample taking, reporting, supervision etc. but does not show the responsibilities. Details can be also included in Annex 4. | | <p>the result of internal lab. The details of the roles is explained in this section and the sustainability monitoring plan is excluded from Annex 4.</p> <p><u>2nd Response</u></p> <p>It must be sub-contracted and calibrated by the third party. The management structure is revised by adding the sub-contracted of equipment calibration-see figure 7.</p> <p>It is stated in section B 7.2-data storage.</p> | <p>clarified that the calibration of equipments would be subcontracted or not.</p> <p>Also include in Annex 4 that all the internal Audit reports and project performance review reports would be archived and shall be subjected to verification during issuance.</p> <p><u>2nd Response</u></p> <p>PDD has been revised and is now clearly mentioned that calibration would be done by external certified agencies and internal audit reports would be subjected to verification by DOE</p> |
| <p><u>Corrective Action Request No.18.</u></p> <p>Start date needs to be revised. As per EB "The start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity...."</p> | C.1.1. | <p><u>1st response</u></p> <p>05/03/08 UPOIC contract TUV Sud for validation DOE</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>Please transparently explain in section C.1.1 of the PDD which activity depicts the start date of project.</p> <p>Please refer to EB 41, meeting report, para 67 for start date guidance. From the given timeline in section B.5, it is evident that project start date could be taken as 25/2/2008.</p> <p><u>2nd Response:</u></p> |

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| | | <p><u>2nd Response:</u></p> <p>Please see C.1.1. The date that UPOIC contact EN-VIMA is not considered as the start date as per EB 41 “minor pre-project expenses, e.g. the contracting of services/payment of fees for feasibility studies or preliminary surveys, should not be considered in the determination of the project.”) Since Envima start with the service of feasibility study and the real contract for CDM consultant came later.</p> <p><u>3rd response</u></p> <p>The 10.03.2008 is mentioned in the PDD as date of “start of construction”, because:</p> <ul style="list-style-type: none"> • 10.3.2008 was the signing date of the contract for preparation the site • 11.03.2008 preparation of device, equipment and sent man power to the site • 12.03.2008 start of excavations <p>Following evidence documents are provided:</p> <ul style="list-style-type: none"> • contract between UPOIC and Know How Transfer (=company for site preparation, excavation) was signed on 10.03.2008 (Total 11,500,000 THB – 9 payments) • purchase order from UPOIC about the total amount of 11,500,000 THB was made on 13.03.2008 • invoice from Know How Transfer for the first payment about 1,150,000 THB on | <p>The start date of project activity has now been correctly identified as the date of signing construction contract by PP. Since there is no prior date when any other non-returnable action on the project could have been taken, it is accepted as the project start date.</p> <p>However, please further clarify and provide suitable evidence to support the fact that start date, which is taken as the signing of construction contract, is also the same date as the start of construction.</p> <p><u>Conclusion</u></p> <p>The start date of the project has been confirmed and corrected in the revised PDD as 10th March 2008. The submitted documents and justification presented by PP could be validated based on the original contract document reviewed on-site, which mentions 10th March as the date of start of construction, as one of the conditions of the contract. Also, P.O. was made from UPOIC within 3</p> |

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| | | <p>15.05.2008 – paid on 26.05.2008 by UPOIC</p> <ul style="list-style-type: none"> 1st delivery report on 15.05.2008 – first payment about 1,150,000 THB. <p>There have not been any financial commitments before the start of construction. Starting the same or nearly same date with preparing and excavation as the contract is signed, is normal business in Thailand and depends on negotiation and credit of the owner.</p> | <p>days, which confirms that the condition of the contract regarding start of construction was fulfilled. Hence, the start date is accepted by the assessment team.</p> |
| <p><u>Clarification Request No. 13.</u></p> <p>Start date of the crediting period can be the date of registration at the earliest. Therefore the date should be chosen more realistic taking into account the validation schedule.</p> | C.2.1. | <p><u>1st response</u></p> <p>01/02/2010 UPOIC contract TUV Sud for validation DOE</p> <p><u>2nd response</u></p> <p>Correct to 01/02/2010</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>This Clarification request talks about the “start date of crediting period” mentioned at C.2.2.1 not about the “start date of project activity”. Please correct accordingly</p> <p><u>2nd Response:</u></p> <p>Start date of the crediting period has now been revised and is realistic.</p> <p>Start date of the crediting period has been revised again from 01/02/2010 to 01/09/2011.</p> |
| <p><u>Clarification Request No. 14.</u></p> <p>Project was announced in Matichon newspaper but the PDD states to Kom Chat Leuk newspaper.</p> | E.1.3. | <p><u>1st response</u></p> <ul style="list-style-type: none"> - Project was announced in Matichon newspaper only. - The summary report of the initial stakeholder con- | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u></p> <p>PDD has been revised as suggested. Please provide the Eng-</p> |

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| Please thoroughly review the description of the local stakeholder consultation and ensure consistency with the GS stakeholder consultation report. Clarify where the summary report of the initial stakeholder consultation was made available. | | <p>sultation was made available through the draft minute of the local stakeholder consultation report in local language (Thai). This report had been published after the initial meeting about one to two months as mention in step 2 (section E1). However, no comment or feedback was received. The summary report has been added into the section E1 of PDD and will be revised through the GS local stakeholder consultation report. Attachment E 1.1 is the minute of the local stakeholder consultation report.</p> <p><u>2nd response:</u> Pls, see Minutes of local stakeholder consultation_UPOIC-2008</p> <p><u>3rd Response:</u> Please see Attached file "UPOIC-Invitation letter-1st stakeholder consultation also explain in the PDD page 61.</p> | <p>lish translation of the document (Attachment E.1.1) for validation.</p> <p><u>2nd response:</u> The minutes of meeting with the English translation has been provided. Please provide the information on invitation sent to the stakeholders for the meeting. Also, explain the same transparently in the PDD.</p> <p><u>3rd Response:</u> PDD has been revised to include the details of the stakeholder invitation and other relevant documents related to stakeholder meeting has also been provided</p> |
| <p><u>Clarification Request No. 15.</u> The applied "Tool to calculate the emission factor of an electricity system" should be mentioned in section B.1. Please provide the</p> | G.3.1.2. | <p><u>1st response</u> The applied "Tool to calculate the emission factor of an electricity system" is mentioned in section B.1. The detail of calculation is in annex 3 and the excel</p> | <p><input checked="" type="checkbox"/></p> <p><u>1st response</u> The applied "Tool to calculate the emission factor of an elec-</p> |

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|---|-----------------|---|---|
| detailed link to the publication of "The estimation of emission factor for an electricity system in Thailand 2007" at EGAT website. | | sheet for EF is in Attachment G 3.1 <u>2nd response:</u> see CAR 19 | tricity system" is now incorporated in section B.1. However link in footnote 14 of PDD is not correct. Please correct the same. <u>2nd response:</u> Please refer to CAR 19 |
| <u>Corrective Action Request No.19.</u> Please submit the Excel calculation sheet for EF calculation and copies of the source data. Data vintage applied should be specified (it seems that for OM calculation data from 2002-2003 are applied, however the latest available data should be used). EF calculation should follow each step of the "Tool to calculate the emission factor of an electricity system". This information can be included in Annex 3 of the PDD (selection of ex-ante, ex-post option, demonstration that low-cost/must run resources constitute less than 50 % of total grid generation etc.). In case the calculations shall be based on official publications as "The estimation of emission factor for an electricity system in Thailand 2007" at EGAT website a respective link to the source shall be provided. Please note that the submitted document does not exactly follow the "Tool to calculate the emission factor of an electricity system". It should be ensured that a) in case IPCC default values are applied | G.3.2.4. | <u>1st response</u> Please see Attachment G 3.1. The detail is included in Annex 3. | <input checked="" type="checkbox"/> <u>1st response</u> Excel calculation sheet for EF computation has been provided. Further please provide us with the copies of the source data used for estimation of EF. Also check link in footnote no 14. Please specify the source for yearly power generation from Lignite and imported coal on pg 73 of PDD because the link provided in footnote no. 12 gives combined data for Coal & Lignite. Also provide us with the source of fuel consumption data for imported coal considered on pg 75 of PDD. And please describe option-1 chosen for vintage of data in step 4 as per "Tool to calculate the emission factor for an elec- |

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| <p>the values taken should be the ones at the lower limit of the uncertainty at a 95 % confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 of IPCC 2006 (Annex EB 35 Report 12, p.19)</p> <p>b)in calculating the build margin the group of power units used for calculation should be either the set of 5 power units built most recently OR the set of power capacity additions that comprise 20% of the system generation and that have been built most recently – if 20% falls on part capacity of a unit, that unit is to be fully included. (Annex EB 35 Report 12, p.12).</p> | | <p><u>2nd Response:</u> Footnote 14, the weblink can't be accessed anymore. Thus, the file is attached in the folder "Grid emission data". Other data used in the calculation are included in the same folder Please see the grid emission factor of Lamsoon project since it is the same.</p> <p>Table 5.2-4Y and its footnote (weblink) is added in the PDD</p> <p>add in Annex 3-the grid emission factor calculation_step 4</p> <p><u>3rd Response:</u> Version 2 is applied instead version 1. See details of re-calculation in Annex 3-Grid emission factor. The calculation sheet of grid emission factor is not changed; The spread sheet G.3.1 is still applicable.</p> <p><u>4th response</u> The calculation of BM has been revised and is now presented clearly and transparently in the PDD.</p> | <p>tricity system".</p> <p><u>2nd Response:</u> Source to the input values used in the calculation has been provided and has been verified. However, Version 2 of tool has been released with EB 50, which should now be applicable for the project.</p> <p><u>3rd Response:</u> The reference to the tool has been updated to the latest version. However, it is observed that the option chosen for Build Margin calculations in the PDD are not clearly specified in line with the "Tool to calculate the emission factor for an electricity system" ver. 2.2. Please provide the same clearly and transparently in the PDD.</p> <p><u>Conclusion</u> The revised PDD clearly and transparently provides the options considered in line with the latest version of the Tool. Hence,</p> |

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| | | | is accepted. |
| <p><u>Clarification Request No. 16.</u> Please provide further information on the manufacturers specification with respect to “proper operation of the flare” (which conditions – that shall be monitored - must be fulfilled for a proper operation of the flare. See also I.2.1.7.</p> | I.1.1.1. | <p><u>1st response</u> Please see Attachment A.4.3: The certified document for flaring system from technology provider.</p> <p><u>2nd response:</u> see CR no.2</p> | <p><input checked="" type="checkbox"/> <u>1st response</u> Attachment A.4.3 does not talk about flare system provided to UPOIC, please submit the relevant document.</p> <p><u>2nd response:</u> Document for Manufacturers’ specification has been provided to the audit team and T_{flare} has also been included in monitoring parameters to ensure proper operation of flare.</p> |
| <p><u>Corrective Action Request No.20.</u> An enclosed flare system is implemented. Please revise the PDD accordingly</p> | I.1.1.4. | The PDD is revised due to the change of flaring system. Please see details in calculation part. | <p><input checked="" type="checkbox"/> The revised PDD and ER sheet has been updated according to enclosed flare system</p> |
| <p><u>Corrective Action Request No.21.</u> The correct data unit of the flow rate would be m³/h. Please see Flaring tool EB 28, Meeting report Annex 13 page 12. A value should be given for the estimation of project emissions due to flaring and an indication of accuracy should be provided (see also B.6.1.4.7).</p> | I.2.1.3. | <p><u>1st response</u> The unit of flow rate of gas to be flared is corrected to be m³/h.</p> | <p><input checked="" type="checkbox"/> <u>1st response</u> The unit of the flow rate has now been corrected to m³/h. Further please transparently justify the reason in the PDD monitoring plan, as stated in attachment A.2.1, for considering T_{flare,operation} ex-ante value as zero</p> <p><u>2nd Response:</u></p> |

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|--|-----------------|---|--|
| | | <u>2nd Response:</u> pls see PDD pg 33 | Appropriate justification for taking T _{flare} operation have been included in the revised PDD and the parameter is considered in the monitoring plan |
| Open issue Letter of approval from the Thai DNA and Swedish DNA should be provided to the DOE. | | <u>1st Response:</u> The Letter of approval from the Thai DNA (LoA) is attached <u>2nd Response:</u> Thai DNA has correct the project named shown in the following website: http://www.tgo.or.th/index.php?option=com_content&task=view&id=36&Itemid=40&limit=1&limitstart=2 | <input checked="" type="checkbox"/> <u>1st Response:</u> LoA of Thai DNA and LoA of Swedish DNA have been submitted to the audit team. However the title of the project activity does not match with the title of the project in the Thai DNA website. Please clarify the inconsistency. <u>2nd Response:</u> Title of the project in the Thai DNA website has been revised and the same is now consistent with PDD and issued LOA |
| <u>Forward Action Request No. 1</u> The PP has provided the three year historical data of power consumption in the Palm oil by biomass power plant which is 4,022,173 KWh for 2006, 2,754,348 KWh for 2007 and 4,945,426 KWh for 2008. Average of last three years comes out to be 3,907,316 KWh | B.6.1.4.1. | | Power consumption record during the monitoring period needs to be cross-checked at periodic verification with the average mentioned in the FAR. |

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| and It needs to be cross checked with the consumption in the Palm oil plant from Bio-maas power plant during the crediting period to confirm that the power generation from project activity has not replaced power generation from Biomass power plant | | | |
| <p><u>Corrective Action Request No.22.</u></p> <p>Subsequent to the Request for Review for the project, following issues have been raised by the assessment team:</p> <ol style="list-style-type: none"> 1. Please clarify and correct the inconsistency in the electricity savings due to avoided electricity imports from the grid used in the financial calculations (93.9 MWh/year) and the amount of electricity imports used in emission reductions calculations (433 MWh/year). Revised calculations should be submitted. 2. It is noticed that the Ft value has not been included in the electricity tariff calculations for savings incurred by avoiding import of grid electricity in the project. Please correct and provide suitable evidence for the same, valid at the time of investment decision. 3. PEA document from 2005 has been considered for the electricity price, which is considered acceptable, as it | Request for Review | <p><u>Client's 1st response</u></p> <ol style="list-style-type: none"> 1. Revised financial calculation, considering 433 MWh/year as savings, the same value as in ER calculation. The new financial calculation is submitted. 2. The Ft value has now been taken into account, when calculating the savings. The Ft value is 0.6842 THB/unit and is proved by electricity bills of UPOIC at the time of BoD decision from June to August 2007. The calculated tariff for the savings is now 2.3876 THB/Unit (1.7034 THB = base tariff plus Ft=0.6842 THB). Evidence documents (electricity bills from June to August 2007) are submitted. 3. The Tariffs from EPPO for VSPP have been attached to the Investment Analysis. The average wholesale tariff for VSPP from 2002 to Aug 2007 has been calculated with 2.2031THB/unit. Please see details in Investment Analysis. | <p><u>Conclusion</u></p> <ol style="list-style-type: none"> 1. The inconsistency has been corrected in the revised financial analysis submitted by the PP, which considers 433 MWh/year as savings. Hence, is accepted. 2. The electricity price calculations have been revised to consider the Ft component, which could be confirmed from the invoices from PEA. The revised tariff is in the same range as the price of selling electricity to the grid. Hence, is accepted. 3. Based on the submitted documents, it could be re-confirmed that the tariffs taken for savings, as well as for the export to the grid, are in range with EPPO documents. Hence, is accepted. |

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| could be confirmed that there has been no further revisions proposed since 2005 by PEA. However, further comparison with the power purchase tariff document from EPPO is requested by the assessment team to re-confirm the appropriateness of the tariff values taken in the investment analysis. | | | |




Annex-2: Information Reference List

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|--------------|------------|--|-----------------|---|
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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|----------------------------|--|
| 1 | 10/03/2009 | PDD, v.1 “UPOIC Wastewater Treatment for Energy Generation, Krabi” | ENVIMA (Thailand) Co.,Ltd. | PDD for GSP |
| 2 | - | AMS III.H. “Methane Recovery in Wastewater Treatment” version14, sectoral scope 13 AMS III.H. “Methane Recovery in Wastewater Treatment” version15, sectoral scope 13 | UNFCCC | - |
| 3 | - | AMS I.D. “Grid connected renewable electricity generation” version16, sectoral scope 01, EB36 | UNFCCC | - |
| 4 | 26/08/2008 | “Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities” | UNFCCC | Used to demonstrate Additionality of the project activity |
| 5 | 12/2006 | Tool to determine project emissions from flaring gases containing methane, version 01 (EB 28) | UNFCCC | Used to determine project emissions from flaring of biogas in the project scenario |
| 6 | 19/10/2007 | Tool to calculate the emission factor for an electricity system, version 02 (EB 50) | UNFCCC | Used to compute the emission factor for Thai grid |
| 7 | | Participant list of on-site interviews. On-site interviews conducted by TÜV SÜD on 23 rd & 24 th April 2009 Validation Team: Alexandra Babeck – Lead Auditor, TUV SUD Industrie Service GmbH Nanda Madhuri – Auditor, TUV SUD Industrie Service GmbH Wisanee Thanapiyawannitch – Auditor, TUV SUD PSB (Thailand) | TÜV SÜD | Evidence for onsite visit/validation |

| | | | | |
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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|-----------------------|--|
| | | Interviewed Persons: Sawang Lertthanasuntorn – Engineering manager Sansanee Vilaidaraga - Management supervisor Ladapron Khunikakorn - CDM consultant / ENVIMA Narumon Tiangvirjya - CDM consultant / ENVIMA Usama Chalermwan – Journalist “Kontrang newspaper” Bodin Luelurtyot – Engineer consultant / ERDI | | |
| 8 | 2009 | Spreadsheet for computing Grid emission factor | UPOIC | Spreadsheet to compute EF as per “Tool to calculate the emission factor for an electricity system” |
| 9 | 2008 | Spreadsheet for computing Project IRR during Investment decision | UPOIC | Computation of project IRR at the time of investment decision |
| 10 | 2009 | Spreadsheet for computing project IRR based on latest available input values | UPOIC | Computation of project IRR using latest available values |
| 11 | 2009 | CER calculation sheet (including the details of the projection of the amount of electricity used on-site and the amount exported to the grid, 10 days wastewater analysis) | UPOIC | Emission reduction calculation sheet as per applied methodologies |
| 12 | 10/08/2007 | Internal board approval for the project activity using CDM | UPOIC | Serious consideration for CDM revenues from the |

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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|--------------------------------------|---|
| | | | | project activity |
| 13 | 22 nd June'09 | Contract with PEA to buy electricity from UPOIC | PEA | - |
| 14 | 2009 | Technology description for UPOIC | Assistant of Head Organization, ERDI | Used to substantiate the technological details mentioned in the PDD, and to confirm the operational lifetime of equipments. |
| 15 | - | Calculation sheet at UPOIC, Krabi (Pretreatment, biogas system, post treatment | ERDI | Design data |
| 16 | 12th May'09 | Certificate by Technology provider of Biogas flaring setup, BKE combustion controls Co. Ltd., to prove the flare efficiency as 90% | BKE combustion Controls Co. Ltd | Description of Technical specifications required to be maintained |
| 17 | 2005 | Baseline Design document from certified Engineer | - | Used to determine the technical parameters before the installation of project activity |
| 18 | 22/02/2008 | Letter from PEA, 22/02/2008, accept to buy electricity from UPOIC | PEA | Approval for grid electricity supply |
| 19 | 01/04/2008 | Contract between ERDI and UPOIC for Biogas system design and construction | ERDI & UPOIC | - |
| 20 | 11/2007 | Biogas technology promotion plan of 2008-2011, to support investment (20% of consultant and construction cost) page 5 (www.thaibiogas.com/industry/industry.html or www.thaibiogas.com/promotion) | EPPO | Used in timeline of PDD |

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|--------------|------------|--|-----------------|---|


| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|------------------------------------|--|
| 21 | 2007 | Corporate Public Consultant proposal to UPOIC (feasibility study for the project activity) | Corporate Public Consultant | One of the proposal received by Lam Soon/UPOIC for the project activity |
| 22 | 26 th dec'07 | Application submitted to EPPO for ENCON fund | UPOIC | Used to prove that subsidy by EPPO for the project activity was not declared and was in process under EPPO during investment decision |
| 23 | 10/03/2008 | Contract between UPOIC and Biogas Constructor name "Know-How Transfer company limited" (The agreement mentioned the start date of construction on 10/03/2008 and the P.O. was issued on 13/03/2008) | UPOIC | Used as start date for the project activity. Since date is not mentioned in the contract hence 10 th March 2008 is taken as start date for the project activity |
| 24 | 2009 | UPOIC production capacity record 2002-06 UPOIC Production record – 2007,2008 | UPOIC | Used as a source of FFB production in CER and IRR computation. |
| 25 | 2009 | Electricity Flow diagram | UPOIC | Used to present the current and future scenario of power distribution |
| 26 | 07.10.2005 | Letter of confirmation from Institute for Global Environmental Strategies for reviewing the PIN in Integrated Capacity Strengthening | Institute for Global Environmental | Used to demonstrate serious consideration of |

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|--------------|------------|--|-----------------|--|
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|--------------|------------|--|-----------------|--|


| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|--|--|
| | | for CDM (ICS-CDM) Project Design Document (PDD) Preparation Programme | Strategies (IGES) | CDM by an attempt to develop PIN for the project activity |
| 27 | 27/03/2008 | Letter to TGO to ask progression of LoA for CDM project (Lamsoon and UPOIC) | Factory director, Lamsoon & UPOIC | Used to demonstrate serious consideration of CDM |
| 28 | 8/04/2008 | Confirm letter to receive submitted documents, UPOIC's CDM project | Executive director / TGO | Used to demonstrate serious consideration of CDM |
| 29 | Dec'05 | Study on Electricity Sector Baseline in Thailand | ECON Centre for Economic Analysis (ECON) | Data for NCV has been sourced from this document |
| 30 | - | 'Electricity Tariff Rate' | Provincial Electricity Authority (PEA) | Used as source of tariff for power exported to grid. Also verified the rate of purchase of electricity from grid to calculate energy savings. |
| 31 | - | Web link for Power generation data from Thai grid: http://www.eppo.go.th/info/stat/T05_02_02-2.xls | EPPO | Most recent 3-years data of electricity generation in Thailand has been sourced from this link |
| 32 | Oct'05 | Study on CDM case studies on Thailand by ONEP | ONEP | Benchmark for Investment analysis |
| 33 | 8 th Dec'2009 | Letter from Palm Oil Crushing Mill Association | Palm Oil Crushing | Benchmark for Investment |

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|--------------|------------|--|-----------------|---|


| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|---|--|
| | (Submission to DOE) 17 th July 2007 (issued by Palm Oil Mill association) | | Mill Association | analysis |
| 34 | 2009 | Regulation for associations of royal Government of Thailand | Trade Association at Thailand | To prove that all associations including 'Palm Oil Crushing Mill Association' has to go through registration under Government of Thailand and are operated by Government as well |
| 35 | 2009 | Actual purchase orders for investment incurred in the project activity | Different suppliers and vendors | Used to compute project IRR with latest available values during validation |
| 36 | 2007 | Assessment of Palm oil mill effluent as Biogas Energy source in Thailand | 33 rd Congress on Science and Technology of Thailand | Used as source for estimating COD values for Pal Oil mill effluent |
| 37 | 28 th October'09 | 10 days waste water analysis report from Trang Sure Laboratory | Trang Sure Laboratory | Values from this report are used for baseline emission calculation |
| 38 | 2009 | Analysis on Generator proposal | Lamsoon & UPOIC | - |
| 39 | 25 th Feb'08 | Document from Department of Alternative Energy Development and Efficiency | | Source for considering added revenue for biogas based power generation = |

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|--------------|------------|--|-----------------|---|
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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|---|--|
| | | | | 0.3 THB/kWh |
| 40 | 01/2008 | GUASCOR SFGLD 560 / 55'C Biogas Genset (1.500 R.P.M.) for Lamsoon & UPOIC | Guascor | Technical details of biogas genset |
| 41 | 03/08/2007 25/02/2008 | CDM Proposal by Envima to Lam Soon Invoice from ENVIMA to Lam Soon & UPOIC on 25.02.2008 & respective approval on 28/02/2008 | ENVIMA | Used to prove serious consideration of CDM |
| 42 | 23 rd Feb'07 | Proposal from Smart Energy Co. Ltd. for the project activity | Smart Energy Co. Ltd. | - |
| 43 | 16/06/2008 – 15/06/2011 | ISO 9001:2000 certificate_UPOIC | | - |
| 44 | 13/07/2007 – 21/03/2010 | ISO 14001:2004 certificate_UPOIC | | - |
| 45 | 2009 | Letter from PEA to confirm that electricity export from UPOIC has been started | PEA | - |
| 46 | 23/06/2006 | Thai-German Program for Enterprise competitiveness, Eco-efficiency benchmarking in the Palm Oil Industry Benchmarking implementation report (Energy consumption) for UPOIC, period of September 2005 – May 2006 | | Used to prove serious consideration of CDM |
| 47 | 2008 | Electricity bill_UPOIC | UPOIC | To calculate the historical power consumption from grid for pal oil mill |
| 48 | 30 th April'09 | LOA from DNA of Thailand (host Country) | Ministry of Natural Resource and Environment, | Project has been approved by the DNA of the Host Country |

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| Final Report | 13-10-2011 | Validation of the UPOIC Wastewater Treatment for Energy Generation, Krabi Information Reference List | Page 8 of 12 |  |
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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|------------------------|---|
| | | | Thailand | |
| 49 | 4 th September'09 | LOA from DNA of Sweden | Swedish Energy Agency | LoA by Swedish Energy Agency to 'Carbon Asset Management Sweden AB' |
| 50 | 11/06/2007 | Proposal from Biotech Thai Corporate for project activity (feasibility report) | Biotech Thai Corporate | Used for computation of project IRR at the time of investment decision |
| 51 | 19 th October'09 | Certificate from UPOIC to state that there is no income from treated Waste water and sludge | UPOIC | - |
| 52 | 28 th October'09 | Copy of Factory Act B.E.2535 | | To verify that the project activity is in compliance with local laws and regulation |
| 53 | 2009 | Maintenance schedule of generator | UPOIC | - |
| 54 | 28 th October'09 | Historical Data of power consumption in the palm oil plant supplied by Biomass power plant | UPOIC | Used as a reference data to cross verify that UPOIC should not replace electricity generated by biomass power plant |
| 55 | 26 th May'08 | Minutes of Local stakeholder meeting | UPOIC | Stakeholder documents |
| 56 | May'08 | Sample invitation letters for stakeholder meeting | UPOIC | Stakeholder documents |
| 57 | 2009 | Calibration Interval Plan for Monitoring equipments | UPOIC | Calibration interval plan for installed monitoring equipments |

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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|--|---|
| 58 | 2008 | Annual Electricity Generation (by type of power plants) | Electricity Generating Authority of Thailand | Used to calculate emission factor of Thai grid as per 'Tool to calculate the emission factor for an electricity system' |
| 59 | 17.09.2008 | Emission reduction Purchase Agreement (ERPA) with Tricorona | - | Used to demonstrate serious consideration of CDM |
| 60 | 2009 | Compiled excel file of actual project investment based on purchase orders | UPOIC | Used as investment cost to compute project IRR using latest available inputs |
| 61 | 2009 | Document from Pollution Control Board (PCB) & ONEP for EIA | PCB & ONEP | Used to demonstrate the requirements in host country for EIA |
| 62 | 2009 | Generator proposal from Guascor S.A. & efficiency calculation of Biogas Engine based on Guascor proposal | Guascor S.A & UPOIC | Used to source the efficiency value of 2.2 kWh/Nm3 of biogas from installed biogas engine. |
| 63 | 30th May'08 | Contract between EPPO and UPOIC | EPPO & UPOIC | This contract is used prove that subsidy element was not available during investment decision |
| 64 | 13.09.2010 | Filled form of 'Modalities of Communication' | UPOIC | To communicate the focal |

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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|-----------------------|---|
| | | | | point for this project activity |
| 65 | July'04 | Certified Layout diagram of the baseline scenario | UPOIC | To verify the baseline lagoons |
| 66 | 11th Jan'07 | Email communication between Lam Soon and Envima (CDM consultant) | Lam Soon | To verify prior consideration of CDM. Since UPOIC is a part of Lam Soon, hence this communication can be accepted for the corresponding step of timeline presented by PP. |
| 67 | 20th June'06 | Email communication between Lam Soon and Asia Palm oil plant, and Minutes of Meeting of the visit to Asia Palm oil plant | Lam Soon | To verify prior consideration of CDM. Since UPOIC is a part of Lam Soon, hence this communication can be accepted for the corresponding step of timeline presented by PP. |
| 68 | 27th July'07 | Proposal from Papop for biogas project | Papop | Used to demonstrate serious consideration of CDM |
| 69 | 18/07/2007 | Letter from Energy research and Development Institute (ERDI), Chiang Mai University for benchmark & unsuitability of MLR | ERDI | To verify that MLR is not suitable for the project activity. |

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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|--|-----------------------|---|
| 70 | 10/04/2011 (Submission to DOE) | a. Invoice for the electricity sold to grid (for Nov 2010 to Jan 2011) b. Invoice for electricity purchased from the grid (July 2009 to Sept. 2009) | UPOIC | a. To verify the peak & off-peak tariff rate with the latest available values. b. To verify the rate of purchase of electricity from grid to calculate energy savings. |
| 71 | 10/04/2011 (Submission date to DOE) | Actual purchase order to determine O&M for the period of Sept2009 to March 2011 | UPOIC | To crosscheck the O&M cost in the investment analysis |
| 72 | 21/03/2011 | Letter from ERDI confirming no change in O&M cost | ERDI | To cross verify the change in O&M from the investment decision. |
| 73 | 10/04/2011 (Submission to DOE) | Photographs of nameplate of all the installed pumps & aerator installed in baseline scenario. Letter of confirmation for running hours of pumps & aerator in the baseline scenario. | UPOIC | Used to calculate the amount electricity used in baseline scenario. |
| 74 | July 2006 | Inflation rate document by Bank of Thailand | Bank of Thailand | To use inflation rate in the investment analysis |
| 75 | 5th April'11 | Final version of PDD, version 9 | UPOIC | Final version of PDD to be uploaded for request for registration |
| 76 | 31.05.2011 | Final version of PDD, after incompleteness, ver. 10 | UPOIC | Final version of PDD |

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| Final Report | 13-10-2011 | Validation of the UPOIC Wastewater Treatment for Energy Generation, Krabi Information Reference List | Page 12 of 12 |  |
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| Ref. No. | Issuance and/or submission date(dd/mm/yyyy) | Title/Type of Document | Author/Editor/ Issuer | Additional Information (Relevance in CDM Context) |
|----------|---|---|------------------------------------|---|
| | | | | uploaded for request for registration after incompleteness from UNFCCC. |
| 77 | 19.11.2007 | Ayudhya Securities Sector update dated 19.11.2007 | Ayudhya Securities Public Co. Ltd. | Benchmark |
| 78 | 11.10.2011 | Final version of PDD ver. 11, after the Request for Review from UNFCCC | UPOIC | Final PDD |
| 79 | 11.10.2011 | Final IRR calculation sheets: UPOIC financial feasibility update 11.10.11.xlsx and UPOIC financial feasibility BoD decision 11.10.11.xlsx | UPOIC | Final investment analysis sheets (Additionality support) |

Validation of the CDM Project:
UPOIC Wastewater Treatment for Energy Generation, Krabi



Industrie Service

Annex-3: Appointment Certificates



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Kleiser, Thomas, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 25.03.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 25.03.11 | 25.03.11 | 25.03.11 | 25.03.11 | |

| Other qualification | | | | | |
|---------------------|----------|---|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 25.03.11 | | | | |
| Financial Expertise | | | | | |
| Date | 25.03.11 | | | | |

| Qualification in technical areas | |
|--|----------|
| Technical Area | Date |
| 1.1_4.10_Thermal energy generation... | 25.03.11 |
| 1.2_Energy generation from renewable energy source | 25.03.11 |
| 4.1_Cement sector | 25.03.11 |
| | |
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This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0027/00.

| Date | Signature |
|----------|-----------|
| 25.03.11 | |
| | |
| | |
| | |



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Castro, Javier, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 22.03.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 22.03.11 | 22.03.11 | 22.03.11 | 22.03.11 | |

| Other qualification | | | | | |
|---------------------|----------|----------|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 22.03.11 | 22.03.11 | | | |
| Financial Expertise | | | | | |
| Date | 22.03.11 | | | | |

| Qualification in technical areas | |
|--|----------|
| Technical Area | Date |
| 1.2_Energy generation from renewable energy source | 22.03.11 |
| 5.1_4.9_11.1_12.1_Chemical process industries | 22.03.11 |
| 13.1_Waste handling and disposal | 22.03.11 |
| 13.2_15.2_Animal waste management | 22.03.11 |
| | |
| | |

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0003/00.

| Date | Signature |
|----------|---------------------|
| 22.03.11 | <i>Thomas Klein</i> |
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Industrie Service

CERTIFICATE OF APPOINTMENT

Ms Nanda, Madhuri, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 30.03.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 30.03.11 | 30.03.11 | 30.03.11 | 18.04.11 | |

| Other qualification | | | | | |
|---------------------|----------|---|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 30.03.11 | | | | |
| Financial Expertise | | | | | |
| Date | 30.03.11 | | | | |

| Qualification in technical areas | |
|----------------------------------|----------|
| Technical Area | Date |
| 13.1_Waste handling and disposal | 12.04.11 |
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This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0035/00.

| Date | Signature |
|----------|--------------|
| 12.04.11 | Thomas Kleis |
| 18.04.11 | Christoph |
| | |
| | |

CERTIFICATE OF APPOINTMENT



Industrie Service

Mrs. Babeck, Alexandra, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 11.05.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 11.05.11 | 11.05.11 | | | |

| Other qualification | | | | | |
|---------------------|----------|---|----------|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 11.05.11 | | 11.05.11 | | |
| Financial Expertise | | | | | |
| Date | 11.05.11 | | | | |

| Qualification in technical areas | |
|--|----------|
| Technical Area | Date |
| 1.2_Energy generation from renewable energy source | 11.05.11 |
| 4.8_Food, beverages and tobacco industry | 11.05.11 |
| 13.1_Waste handling and disposal | 11.05.11 |
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This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0056/00.

| Date | Signature |
|----------|----------------------|
| 11.05.11 | <i>Thomas Reiser</i> |
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Industrie Service

CERTIFICATE OF APPOINTMENT

Ms Waikinat, Iris, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 12.04.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 12.04.11 | 12.04.11 | 12.04.11 | 12.04.11 | |

| Other qualification | | | | | |
|---------------------|----------|---|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 12.04.11 | | | | |
| Financial Expertise | | | | | |
| Date | 12.04.11 | | | | |

| Qualification in technical areas | |
|-----------------------------------|----------|
| Technical Area | Date |
| 13.2_15.2_Animal waste management | 12.04.11 |
| 15.1_Agriculture | 12.04.11 |
| | |
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This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0043/00.

| Date | Signature |
|----------|----------------------|
| 12.04.11 | <i>Thomas Kersch</i> |
| | |
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Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Agarwal, Nikunj, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 22.03.11 | | | | | |

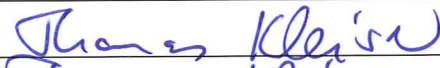

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 22.03.11 | 22.03.11 | 22.03.11 | 22.03.11 | |

| Other qualification | | | | | |
|---------------------|----------|---|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 22.03.11 | | | | |
| Financial Expertise | | | | | |
| Date | 29.03.11 | | | | |

| Qualification in technical areas | |
|--|----------|
| Technical Area | Date |
| 1.2_Energy generation from renewable energy source | 22.03.11 |
| 13.1_Waste handling and disposal | 12.04.11 |
| 3.1_Energy demand | 27.04.11 |
| 13.2_15.2_Animal waste management | 21.07.11 |
| | |
| | |

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH. In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0001/05.

| Date | Signature |
|----------|--|
| 27.04.11 |  |
| 21.07.11 |  |
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Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Tausche, Konrad, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 30.03.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 30.03.11 | 30.03.11 | 30.03.11 | 30.03.11 | |

| Other qualification | | | | | |
|---------------------|----------|---|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 30.03.11 | | | | |
| Financial Expertise | | | | | |
| Date | 30.03.11 | | | | |

| Qualification in technical areas | |
|---|----------|
| Technical Area | Date |
| 1.1_4.10_Thermal energy generation... | 30.03.11 |
| 5.1_4.9_11.1_12.1_Chemical process industries | 30.03.11 |
| 13.1_Waste handling and disposal | 30.03.11 |
| | |
| | |
| | |

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0035/00.

| Date | Signature |
|----------|-----------|
| 30.03.11 | |
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Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Tolcach, Eric Rodolfo, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

| Qualification applicable to | | | | | | |
|-----------------------------|----------|----|----|-----|-----|-------|
| Standard | CDM | JI | GS | VCS | VER | Other |
| Date | 23.03.11 | | | | | |

| Qualification as | | | | | | |
|------------------|---------|-----------|----------|-------------|--------------------|------------------|
| Status | Trainee | Validator | Verifier | Team Leader | Technical Reviewer | Technical Expert |
| Date | | 23.03.11 | 23.03.11 | 23.03.11 | | |

| Other qualification | | | | | |
|---------------------|----------|----------|---|---|---|
| Country Expertise | | | | | |
| Region | 1 | 2 | 3 | 4 | 5 |
| Date | 23.03.11 | 23.03.11 | | | |
| Financial Expertise | | | | | |
| Date | | | | | |

| Qualification in technical areas | |
|----------------------------------|----------|
| Technical Area | Date |
| 13.1_Waste handling and disposal | 23.03.11 |
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This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0014/01.

| Date | Signature |
|----------|-----------------------|
| 23.03.11 | <i>Thomas Kleiser</i> |
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