



# VALIDATION REPORT

ENBW ENERGIE BADEN-WÜRTTEMBERG AG

BIOPOWER PROJECT AT CHAROENSUK  
STARCH CO. LTD, THAILAND

**Report No: 8000384863-10/288**

**Date: 2011-04-11**

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	Biopower project at Charoensuk Starch Co. Ltd, Thailand	2010-05-30		2010-09-30
<b>Client:</b>	EnBW Energie Baden-Württemberg AG		<b>Client ref:</b>	Ms. Christine Claashausen
<b>Project Participant(s):</b>	<b>Host Party:</b>		<b>Other involved parties:</b>	
	NP Biopower Co., Ltd.		EnBW Energie Baden-Württemberg AG	
<b>Applied methodology/ies:</b>	<b>Title:</b>	<b>No.:</b>	<b>Scope / TA:</b>	
	Methane recovery in wastewater treatment Thermal energy production with or without electricity Version 17 Grid connected renewable electricity generation Version 16	AMS III.H Ver 14 AMS I.C Ver 17 AMS I.D Ver 16	01&13/AD	
<b>Validation team / Technical Review and Final Approval</b>	<b>Validation Team:</b>		<b>Technical review:</b>	<b>Final approval:</b>
	TL Mr Saalmann Martin TM Dr Jochen Schubert TM Ms Saowalak Thongsong T Mr Nattapon Vasasmith		Ulrich Walter Eric Krupp	Eric Krupp
<b>Expected Emission reductions: [t CO<sub>2</sub>e]</b>	<b>Expected emission reductions over the first crediting period:</b>		<b>Expected project starting date:</b>	
	211,560 t CO <sub>2</sub> e		2011-03-01	
<b>Confidential content:</b>	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No	
<b>Summary of Validation Opinion:</b>	<input checked="" type="checkbox"/> Positive validation opinion		<input type="checkbox"/> Negative validation opinion	
	<p>EnBW Energie Baden-Württemberg AG has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: "Biopower project at Charoensuk Starch Co. Ltd, Thailand" with regard to the relevant requirements of the UNFCCC for CDM project activities, as well as criteria for consistent project operations, monitoring and reporting. UNFCCC criteria include article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakech Accords) and the relevant decisions by COP/MOP and CDM Executive Board</p> <p>In the course of the pre-validation 12 Corrective Action Requests (CARs) and 08 Clarification Requests (CLs) were raised and successfully closed. However, 01 Further Action Request (FAR) shall be closed during the first verification.</p> <p>The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.</p> <p>In detail the conclusions can be summarised as follows:</p> <ul style="list-style-type: none"> <li>- The project is in line with all relevant host country criteria (Thailand) and all relevant UNFCCC requirements for CDM. Project activity approval have been obtained from DNA of Thailand vide the Letter of Approval (HCA) dated 2010-09-30.</li> <li>- The Federal Environment Agency, DNA for the Germany issued the Letter of Approval (LoA) dated 2011-01-13 on the basis of this positive validation opinion.</li> <li>- The project additionality is sufficiently justified in the PDD.</li> </ul>			



Document information:	<ul style="list-style-type: none"><li>- The monitoring plan is transparent and adequate.</li><li>- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 211,560 tCO<sub>2</sub>e are most likely to be achieved within the fixed crediting period (10 y) crediting period.</li></ul> <p>The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.</p>	
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## Abbreviations

ABR	Anaerobic Baffled Reactor
ACC	ALLIED CARBON
AEP	Advance Energy Plus Co.,Ltd.
B.E.	Bhuddist Era
BOT	Bank of Thailand
CL	Corrective Action / Clarification Action Request
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
COD	Chemical oxygen demand
CP	Certification Program
CS	Charoensuk Starch (2005) Company Limited
DEDE	Department of Alternative Energy Development and Efficiency
DIW	Department of Industrial Work
EGAT	Electricity Generating Authority of Thailand
EnBW	EnBW Energie Baden-Württemberg AG
ERPA	Emission Reduction Purchase Agreement
GHG	Greenhouse gas(es)
HDPE	High Density Polyethylene
HFO	Heavy Fuel Oil
HRT	hydraulic retention time
IEE	Initial Environmental Evaluation
IPCC	Intergovernmental Panel on Climate Change
kW	Kilowatt
kWh	Kilowatt hour
MABR	Modified Anaerobic Baffled Reactor
MLR	Minimum Lending Rate
MOU	Memorandum of Understanding
MP	Monitoring Plan
Nm <sup>3</sup>	Normal Cubic Meter ( Normal = 273 K and 1 atm)



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NP	NP Biopower Company Limited
PEA	Provincial Electricity Authority
PDD	Project Design Document
QC/QA	Quality control/Quality assurance
ROE	Return of Equity
SSC	Small-Scale
TGO	Thailand Greenhouse Gas Management Organization (Thailand DNA)
TTSA	Thai Tapioca Starch Association
UNFCCC	United Nations Framework Convention on Climate Change
VSPP	Very Small Power Producer
WACC	Weighted Average Cost of Capital

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## 1 OBJECTIVE / SCOPE

The purpose of a validation is to have an independent third party assess the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with

- the requirements of Article 12 of the Kyoto Protocol;
- the CDM modalities and procedures as agreed in the Marrakech Accords under decision 3/CMP.1
- the annex to the decision;
- subsequent decisions made by COP/MOP & CDM Executive Board and
- other relevant rules, including the host country legislation and sustainability criteria

are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of certified emission reductions (CERs).

The validation scope is given as a thorough independent and objective assessment of the project design including especially: the correct application of the methodology, the project's baseline study, additionality justification, local stakeholder commenting process, environmental impacts and monitoring plan, which are included in the PDD and other relevant supporting documents, to ensure that the proposed CDM project activity meets all relevant and applicable CDM criteria.

The information included in the PDD and the supporting documents were reviewed against the requirements as set out by the UNFCCC. The validation team has, based on the requirements in the Validation and Verification Manual<sup>VVM</sup>, carried out a full assessment of all evidences to assess the compliance of the project with the key areas as outlined in section V.E. and V.F. of the VVM (version 01.2, EB 55).

The validation is based on the information made available to TÜV NORD JI/CDM CP and on the contract conditions. TÜV NORD JI/CDM CP can not be held liable by any entity for making its validation opinion based on any false or misleading information supplied to it during the course of validation.

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



## 2 GHG PROJECT DESCRIPTION

### 2.1 Project Characteristics

Essential data of the project is presented in the following Table 2-1.

**Table 2-1:** Project Characteristics

Item	Data
Project title	Biopower project at Charoensuk Starch Co. Ltd, Thailand
Project size	<input type="checkbox"/> Large Scale <input checked="" type="checkbox"/> Small Scale
Project Scope (according to UNFCCC sectoral scope numbers for CDM)	<input checked="" type="checkbox"/> 1 Energy Industries (renewable- /non-renewable sources)
	<input type="checkbox"/> 2 Energy distribution
	<input type="checkbox"/> 3 Energy demand
	<input type="checkbox"/> 4 Manufacturing industries
	<input type="checkbox"/> 5 Chemical industry
	<input type="checkbox"/> 6 Construction
	<input type="checkbox"/> 7 Transport
	<input type="checkbox"/> 8 Mining/Mineral production
	<input type="checkbox"/> 9 Metal production
	<input type="checkbox"/> 10 Fugitive emissions from fuels (solid, oil and gas)
	<input type="checkbox"/> 11 Fugitive emissions from production and consumption of halocarbons and hexafluoride
	<input type="checkbox"/> 12 Solvents use
	<input checked="" type="checkbox"/> 13 Waste handling and disposal
	<input type="checkbox"/> 14 Afforestation and Reforestation
	<input type="checkbox"/> 15 Agriculture
Applied Methodology	AMS III.H. Methane recovery in wastewater treatment Version 14 AMS I.C. Thermal energy production with or without electricity Version 17 AMS I.D. Grid connected renewable electricity generation Version 16
Technical Area(s)	AD
Crediting period	<input type="checkbox"/> Renewable Crediting Period (7 y) <input checked="" type="checkbox"/> Fixed Crediting Period (10 y)
Start of crediting period	2011.03.01 or the date of registration whichever come later.

### 2.2 Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity (Table 2-2).

**Table 2-2:** Project Parties and project participants

Characteristic	Party	Project Participant
Host party	Thailand	NP Biopower Co., Ltd.
Other involved party/ies	Germany	EnBW Energie Baden-Württemberg AG

## 2.3 Project Location

The details of the project location are given in table 2-3:

**Table 2-3:** Project Location

No.	Project Location
Host Country	Thailand
Region:	Kamphaeng Phet
Project location address:	188 Moo 7 Phraholothin Road, km 375, Tambol Phetchompoo, Amphor Kosumpee, Kamphaeng Phet Province, 62000
waste water treatment plant	
Latitude:	16°37'21.43"N
Longitude:	99°24'37.97"E

## 2.4 Technical Project Description

The technical key data are provided in table 2-4 below

**Table 2-4:** Technical data of the project activity

Parameter	Unit	Value	
Starch production	t/day	Average Capacity	123
		Maximum Capacity	200
Annual operation days	days	248	
Type of production line	-	Native starch	
Wastewater per unit starch production	m <sup>3</sup> /ton	14.76	
COD in wastewater	mg/l	17,639	
Wastewater	m <sup>3</sup> /day	1,811	
Average depth of open lagoon (Baseline)	m	5	
MABR COD removal efficiency	%	85	
Methane (CH <sub>4</sub> ) content in biogas	%	55 – 60	
Life time of MABR	years	15	
Radiant tube burner capacity	kW <sub>thermal</sub>	3,000	
Radiant tube burner rate	Nm <sup>3</sup> /hr	750	
Radiant tube burner efficiency	%	81	
Life time of radiant tube burner	years	10	
Biogas generator capacity	MW	1	
Biogas generator efficiency	kWh/m <sup>3</sup>	2.18	
Life time of biogas generator	years	15	

### 3 METHODOLOGY AND VALIDATION SEQUENCE

#### 3.1 Validation Steps

The validation of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the project design document (PDD)
- Desk review of the PDD and supporting documents
- Validation planning
- On-Site assessment
- Background investigation and follow-up interviews with personnel of the project developer and its contractors
- Draft validation reporting
- Resolution of corrective actions (if any)
- Final validation reporting
- Technical review
- Final approval of the validation

The sequence of the validation is given in the table 3.1 below:

**Table 3.1:** Validation sequence

Topic	Time
Assignment of validation	2010.06.09
Submission of PDD for global stakeholder commenting process	2010.07.17 – 2010.08.15
On-site visit	2010.08.30 – 2010.09.01
Draft reporting finalised	2010.09.24
Final reporting finalised	2010.12.10
Technical review on final reporting finalised	2010.12.22

### 3.2 Contract review

To assure that

- the project falls within the scopes for which accreditation is held,
- the necessary competences to carry out the validation can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

### 3.3 Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities a validation team, consistent of one team leader and 3 additional team members, were appointed. Furthermore also the personnel for the technical review and the final approval were determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 3-2 below.

**Table 3-2:** Involved Personnel

	Name	Company	Function <sup>1)</sup>	Qualification Status <sup>2)</sup>	Scheme competence	Technical competence <sup>4)</sup>	Host country Competence	Team Leading competence
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Saalmann Martin	TÜV NORD CERT	TL	SA	<input checked="" type="checkbox"/>	-	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Dr. Jochen Schubert	TÜV NORD CERT	TM	A	<input checked="" type="checkbox"/>	AD	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Saowalak Thongsong	TÜV NORD Thailand	TM	E	<input type="checkbox"/>	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Nattapon Vasasmith	TÜV NORD Thailand	-	T	<input checked="" type="checkbox"/>	AD	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Ulrich, Walter	TÜV NORD CERT	TR <sup>3)</sup>	E	<input checked="" type="checkbox"/>	AD	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Eric Krupp	TÜV NORD CERT	FA/TR	SA	<input checked="" type="checkbox"/>	-	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- 
- <sup>1)</sup> TL: Team Leader; TM: Team Member, TR: Technical review; FA: Final approval  
<sup>2)</sup> GHG Auditor Status: A: Assessor; E: Expert; SA: Senior Assessor; T: Trainee; TE: Technical Expert  
<sup>3)</sup> No team member  
<sup>4)</sup> As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

Certificates of appointment for the above mentioned team members are enclosed in annex 6 of this report.

### **3.4 Consideration of Public Stakeholder Comments**

Acc. to the modalities and procedures the draft PDD, as received from the project participants, has been made publicly available on the dedicated UNFCCC CDM website prior to the validation activity commenced. Stakeholders have been invited to comment on the PDD within the 30 days public commenting period.

In case comments are received, they are taken into account during the validation process. The comments and the discussion of the same are documented in annex 5 of this report.

### **3.5 Validation Protocol**

In order to ensure consideration of all relevant assessment criteria, a validation protocol is used. The protocol shows, in a transparent manner, criteria and requirements, means of validation and the results from pre-validating the identified criteria. The validation protocol reflects the generic CDM requirements each CDM project has to meet as well as project specific issues as applicable. The validation protocol serves the following purposes:

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

The validation protocol is described in Figure 1.

<b>Validation Protocol Table A-1: Requirement checklist</b>				
<b>Checklist Item</b>	<b>Validation Team Comment</b>	<b>Reference</b>	<b>Draft Conclusion</b>	<b>Final Conclusion</b>
<i>The checklist items in Table A-1 are linked to the various requirements the project should meet. The checklist is organised in various sections. Each section is then further sub-divided as per the requirements of the topic and the individual project activity.</i>	<i>The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the validation team and how the assessment was carried out. The reporting requirements of the VVM shall be covered in this section.</i>	<i>Gives reference to the information source on which the assessment is based on</i>	<i>Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft validation stage.</i>	<i>In case a corrective action or a clarification the final assessment at the final validation stage is given.</i>

**Figure 1:** Validation protocol table

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

### 3.6 Review of Documents

The published PDD (version 1) and supporting background documents related to the project design and baseline were reviewed.

Furthermore, the validation team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

### 3.7 Follow-up Interviews

The validation team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for CDM.

During validation the validation team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in table 3-3.

**Table 3-3:** Interviewed persons and interview topics

<b>Interviewed Persons / Entities</b>	<b>Interview topics</b>
Local Stakeholder	<ul style="list-style-type: none"> <li>- Roles and responsibilities</li> <li>- Chronological description stakeholder consultation meeting activity steps of implementation</li> </ul>

Interviewed Persons / Entities	Interview topics
	<ul style="list-style-type: none"> <li>- Group of people join in the stakeholder consultation meeting.</li> <li>- Stakeholder consultation meeting agenda</li> <li>- The sustainable development fund beneficial to the local community</li> <li>- Beneficial and impact before and after the project activity regard to environmental and social life</li> </ul>
Technology Provider (NP)	<ul style="list-style-type: none"> <li>- Roles and responsibilities</li> <li>- The feasibility for the project activity</li> <li>- Technology employed for the MABR system and main machines</li> <li>- Monitoring Procedure</li> <li>- Training</li> <li>- Project status and commissioning</li> </ul>
Project proponent representatives Project consultant	<ul style="list-style-type: none"> <li>- Chronological description of the project activity with documents of key steps of the implementation.</li> <li>- Current status of plant design</li> <li>- Technical details of the project realization, project feasibility, designing, operational life time, monitoring of the project</li> <li>- Host Government and Germany Approval</li> <li>- Approval procedures and status</li> <li>- Monitoring and measurement equipment and system.</li> <li>- Financial aspects and feasibility</li> <li>- Crediting period</li> <li>- Project activity starting date</li> <li>- CER allocation / ownership</li> <li>- Baseline study assumptions</li> <li>- Additionality</li> <li>- Sustainable development issues</li> <li>- Monitoring</li> <li>- Analysis of local stakeholder consultation</li> <li>- Roles &amp; responsibilities of the project participants w.r.t. project management, monitoring and reporting</li> <li>- Training and recording.</li> <li>- National Legislation</li> <li>- Editorial issues of the PDD</li> </ul>

A comprehensive list of all interviewed persons is part of section 7 'References'.

### 3.8 Project comparison

The validation team has compared the proposed CDM project activity with similar projects or technology that have similar or comparable characteristics and with similar projects in the host country in order to achieve additional information esp. regarding:

- Project technology
- Additionality issues
- Reasons for reviews, requests for reviews and rejections within the CDM registration process.

### 3.9 Resolution of Clarification and Corrective Action Requests

#### 3.9.1 Definition

A **Corrective Action Request (CAR)** will be established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for validation of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered by the UNFCCC or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

#### 3.9.2 Draft Validation

After reviewing all relevant documents and taken all other relevant information into account, the validation team issues all findings in the course of a draft validation report and hands this report over to the project proponent in order to respond on the issues raised and to revise the project documentation accordingly.

#### 3.9.3 Final Validation

The final validation starts after issuance of the proposed corrective action (CA) of the CARs CLs and FARs by the project proponent. The project proponent has to reply on



those and the requests are “closed out” by the validation team in case the response is assessed as sufficient. In case of raised FARs the project proponent has to respond on this, identifying the necessary actions to ensure that the topics raised in this finding are likely to be resolved at the latest during the first verification. The validation team has to assess whether the proposed action is adequate or not.

In case the findings from CARs and CLs cannot be resolved by the project proponent or the proposed action related to the FARs raised cannot be assessed as adequate, no positive validation opinion can be issued by the validation team.

The CAR(s) / CL(s) / FAR(s) are documented in chapter 4.

### **3.10 Technical review**

Before submission of the final validation report a technical review of the whole validation procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the validation team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the validation opinion and the topic specific assessments as prepared by the validation team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

### **3.11 Final approval**

After successful technical review of the final report an overall (esp. procedural) assessment of the complete validation will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

Only after this step the request for registration can be started (in case of a positive validation opinion).

## 4 VALIDATION FINDINGS

In the following table the findings from the desk review of the published PDD, visits, interviews and supporting documents are summarised:

**Table 4-1:** Summary of CARs, CLs and FARs issued

Validation topic <sup>1)</sup>	No. of CAR	No. of CL	No. of FAR
General description of project activity (A) <ul style="list-style-type: none"> <li>- Project specification</li> <li>- Technical project description</li> <li>- Participation</li> <li>- Contribution to sustainable development</li> <li>- PDD editorial aspects</li> <li>- Technology to be employed</li> </ul>	2	-	1
Project Baseline, Additionality and Monitoring Plan (B) <ul style="list-style-type: none"> <li>- Application of the Methodology</li> <li>- Project Boundary</li> <li>- Baseline identification</li> <li>- Calculation of GHG emission reductions <ul style="list-style-type: none"> <li>Project emissions</li> <li>Baseline emissions</li> <li>Leakage</li> </ul> </li> <li>- Additionality determination</li> <li>- Monitoring Methodology</li> <li>- Monitoring Plan</li> <li>- Project management planning</li> </ul>	10	7	-
Duration of the Project / Crediting Period (C)	-	1	-
Environmental impacts (D)	-	-	-
Stakeholder Comments (E)	-	-	-
<b>SUM</b>	<b>12</b>	<b>8</b>	<b>1</b>

<sup>1)</sup> The letters in brackets refer to the validation protocol



The following tables include all raised CARs, CLs and FARs. For an in depth evaluation of all validation items it should be referred to the validation protocols (see Annex 1).

The findings of validation process are summarized in the tables below.

Finding	A1		
Classification	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The letter of approval from the host country has not been issued. The host country of the proposed project activity is Thailand. The letter of approval from the Annex I country has not been issued. The Annex I country of the proposed project activity is Germany.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Thai DNA has approved LoA for this project since 18 Aug 10. The TGO's announcement of this approval has been submitted in file "CAR1_TGO notification letter on LoA Approval for NP 300810.pdf". The final validation report is required in order to apply for the LoA from Annex I country Germany.		



Finding	A1
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The letter of approval from the host country, Thailand<sup>/HCA/</sup>, date: 2010-09-30 has been provided to the DOE. The letter of approval was issued by by Thailand Greenhouse Gas Management Organization (Public Organization) which is the Thailand' DNA. The host country DNA is listed in the UNFCCC CDM website and it is confirmed that the parties are the party to the Kyoto Protocol. The project participant in the HCA is NP Biopower Co., Ltd. Also, the statement in the letter of approval confirms that the participation of the Kingdom of Thailand is voluntary. The LOA from the host country, Thailand, also confirms that the project contributes to sustainable development in Thailand.</p> <p>The Letter of Approval from German DNA has been be issued upon the release of a final validation opinion in the final validation report. The Annex I country approval<sup>/LOA/</sup> dated 2011-01-13 issued by Federal Environment Agency, German Emissions Trading Authority DNA for Federal Republic of Germany has been submitted and following is mentioned:</p> <ol style="list-style-type: none"> <li>1. EnBW Energie Baden-Württemberg AG has been authorized to participate in the project activity.</li> <li>2. Grants its approval of the project within the framework of CDM.</li> <li>3. The project title is the same as in section A.1 of PDD</li> </ol> <p>The LoA confirms the following:</p> <ol style="list-style-type: none"> <li>1. The Federal Republic of Germany is a party to the Kyoto Protocol;</li> <li>2. Voluntarily participation to CDM and the notified project;</li> <li>3. The project does not cause severe adverse environmental impacts;</li> <li>4. The host country Kingdom of Thailand confirms with the LOA that the project will not be adverse to sustainable development taking into account social, economic and environmental aspects.</li> </ol> <p>The validation team concludes the LoAs issued by the host country DNA and Annex I country DNA are authentic and complies with the UNFCCC requirements.</p>
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	A2		
<b>Classification</b>	<input type="checkbox"/> CAR	<input type="checkbox"/> CL	<input checked="" type="checkbox"/> FAR



Finding	A2
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	By means of interview it was observed that the operational license from the provincial Department of Industrial Work is still pending. The DOE recommends that the official licence shall be available to verify during the 1 <sup>st</sup> verification.
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	NP plans to apply the operation license within few months. The operation license will be in place before the 1 <sup>st</sup> verification.
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The operational license from the provincial Department of Industrial Work, NP Biopower, is on approval processing. The DOE recommends that the official licence shall be available to verify during the 1 <sup>st</sup> verification.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input checked="" type="checkbox"/> To be checked during the first periodic verification <input type="checkbox"/> Appropriate action was taken <input type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements

Finding	A3								
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR								
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>The name of the project participant listed in section A3 and Annex 1 are not consistent.</p> <p>The project participant shall apply the 'Guidelines for completing the simplified project design document (CDM-SSC-PDD) and the form for proposed new small scale methodologies (CDM-SSC-NM) Version 05</p>								
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The name of the project participant in section A3 and Annex 1 have been revised to the same name that is "NP Biopower Co., Ltd"								
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The revised PDD<sup>/PDD2/</sup> is reviewed especially in Section A.3. and Annex 1. The name of the project participants in both Sections are listed below:</p> <table border="1"> <tr> <td>Section A.3.</td><td>NP Biopower Co., Ltd</td></tr> <tr> <td></td><td>EnBW Energie Baden-Württemberg AG</td></tr> <tr> <td>Annex 1</td><td>NP Biopower Co., Ltd</td></tr> <tr> <td></td><td>EnBW Energie Baden-Württemberg AG</td></tr> </table> <p>The name of the project participants in both section are relevant and consistent to each other. An adequate action has been taken; therefore, the CAR is closed.</p>	Section A.3.	NP Biopower Co., Ltd		EnBW Energie Baden-Württemberg AG	Annex 1	NP Biopower Co., Ltd		EnBW Energie Baden-Württemberg AG
Section A.3.	NP Biopower Co., Ltd								
	EnBW Energie Baden-Württemberg AG								
Annex 1	NP Biopower Co., Ltd								
	EnBW Energie Baden-Württemberg AG								
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements								



Finding	B1		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The project participant shall provide the excel spreadsheet for the grid emission factor to the DOE. The latest version, tool to calculate the emission factor for the electricity system version 02, shall be applied, as well as, the reference and the steps taken for the calculation.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The spreadsheet for the grid emission factor is shown in the attached file name "CAR B1 grid emission factor".		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The grid emission factor excel spreadsheet is provided by the project participants. The excel spreadsheet is traceable and all the sources of information using for the calculation are reference. The latest version of too to calculate the emission factor for the electricity system version 02 is applied for the proposed project activity. The latest 3 years data which is public available during the validation process are applied for calculation of the ex-ante OM and BM. An adequate action has been taken; therefore, the CAR is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements		

Finding	B2		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The boundary of the proposed project activity is not justified in the PDD. The existing HFO boiler shall be included in the boundary.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The existing boiler has been added in the project boundary of figure 5 in PDD.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD <sup>/PDD2/</sup> is reviewed. The existing boiler is included in the schematic proposed project activity diagram, Figure 5. The distinguishing between biogas steam, wastewater steam, heat steam, sludge, and electricity are demonstrated in the proposed project activity diagram. The COD measuring points, wastewater flow meters, Biogas flow meters, CH <sub>4</sub> content sampling point, and electricity power meters are allocated in the diagram. An adequate action has been taken; therefore, the CAR is closed.		

Finding	B2
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B3		
Classification	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The project emission shall be taken into account the back up HFO boiler consumption and also the LPG consumption for biogas boiler start up process.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	In PDD section B.3 table 6: GHG emissions in the proposed CDM project activity has been revised to include CO <sub>2</sub> emission from HFO back up HFO boiler consumption and also the LPG consumption for biogas boiler start up process. These parameters have been added in the monitored parameter in PDD section B.7.1 as well.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD is reviewed especially in Section B.3 Table 6 and Section B.7.1. The CO <sub>2</sub> emission from the existing HFO boiler, back up case, is included in the proposed project activity. The project boundary is confirmed with onsite validation. Moreover, the parameters listed below are indicated in the Section B.7.1:		
	Parameter	Unit	Description
	EG <sub>thermal,y</sub>	TJ/yr	Heat generation by the thermal oil heater is expressed as difference in the enthalpy between the hot oil supplied to and returned by the plant. In case of this method can not applied EG <sub>thermal,y</sub> will be calculated by multiplying the methane calorific energy input to the thermal oil heater with efficiency of the heater as a backup method; EG <sub>thermal,y</sub> = EG <sub>CH4</sub> x η <sub>CH4f</sub>
	FC <sub>i,j,y</sub>	Mass or volume unit per year	Quantity of fuel type i combusted in process j during the year y
	NCV <sub>i,y</sub>	TJ per mass or volume unit	Weighted average net calorific value of fuel type i in year y
	EF <sub>FF, CO2</sub>	tCO <sub>2</sub> / TJ	The CO2 emission factor of the fossil fuel that would have been used in the project activity
The revised PDD <sup>/PDD2/</sup> includes the emission from the existing HFO boiler and LPG consumption for biogas boiler during the start up process. By mean of assessments, the sources of GHGs emission are included as per the requirement of the applied methodologies. An adequate action has been taken, therefore; the CAR is closed.			





Finding	B3
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B4
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	1. During the onsite validation, one HFO invoice was not taken into account in the emission calculation excel spreadsheet. 2. The additional document shall be provided to substantiate the starch production for the recent past 3 years.
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	1. The yearly HFO consumption has been updated follow the invoice during onsite validation. The sample of HFO invoices have been submitted in file "CAR B4 (1) HFO invoice 2007", "CAR B4 (1) HFO invoice 2008", "CAR B4 (1) HFO invoice 2009". 2. The daily starch production for the past 3 years have been submitted in file "CAR B4 (2) CS production 2007", "CAR B4 (2) CS production 2008", "CAR B4 (2) CS production 2009".



Finding	B4																														
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The HFO invoices of selected months of year 2007, 2008 and 2008 were submitted to the DOE. The summary are listed below:</p> <table><tr><th>Year</th><th>HFO invoices by selected months</th><th>Quantity (liter)</th></tr><tr><td rowspan="3">2007</td><td>February</td><td>75,000</td></tr><tr><td>July</td><td>30,000</td></tr><tr><td>October</td><td>105,000</td></tr><tr><td rowspan="5">2008</td><td>February</td><td>120,000</td></tr><tr><td>June</td><td>59,874</td></tr><tr><td>July</td><td>15,000</td></tr><tr><td>August</td><td>29,802</td></tr><tr><td>October</td><td>104,902</td></tr><tr><td rowspan="4">2009</td><td>February</td><td>105,000</td></tr><tr><td>July</td><td>90,000</td></tr><tr><td>October</td><td>135,000</td></tr><tr><td>December</td><td>120,000</td></tr></table> <p>The above invoices are cross check with the emission calculation spreadsheet especially in “Fuel oil” tab. The correspondence between actual invoice and emission reduction spreadsheet are observed. An adequate action has been taken; therefore, the CAR is closed.</p> <p>The daily starch productions from the Charoensuk Starch (2005) Company Limited of year 2007, 2008 and 2009 were submitted to the DOE. The log sheets are cross check with the emission calculation spreadsheet especially in “Prod Data” tab. The correspondence between starch log sheets and emission reduction spreadsheet are observed. An adequate action has been taken; therefore, the CAR is closed.</p>	Year	HFO invoices by selected months	Quantity (liter)	2007	February	75,000	July	30,000	October	105,000	2008	February	120,000	June	59,874	July	15,000	August	29,802	October	104,902	2009	February	105,000	July	90,000	October	135,000	December	120,000
Year	HFO invoices by selected months	Quantity (liter)																													
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<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<div><input type="checkbox"/> To be checked during the first periodic verification</div> <div><input checked="" type="checkbox"/> Appropriate action was taken</div> <div><input checked="" type="checkbox"/> Project documentation was corrected correspondingly</div> <div><input type="checkbox"/> Additional action should be taken</div> <div><input checked="" type="checkbox"/> The project complies with the requirements</div>																														

Finding	B5
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>During the onsite validation, "the data and parameters that are available at validation" specify in the PDD is not consistent with the baseline.</p> <p><math>\eta_{th}</math> is based on the new biogas boiler not the existing HFO boiler.</p>



Finding	B5
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<p>According to option b of para 21 of AMS I.C. The boiler efficiency of existing boiler, in PDD section B.6.2 and ER excel spreadsheet, has been revised to 79% This data is based on the highest of the efficiency values provides by two manufacturers (SCHERRER and InPlan). The references from 2 manufacturers are shown in file "CAR B5 Thermal eff of Boiler (SCHERRER)" and "CAR B5 Thermal eff of Boiler (Inplan).</p>
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>According to the "Tool to determine the baseline efficiency of thermal or electric energy generation system" Version 01, EB48 Annex 12, Option D: Use the manufacturer's efficiency values, the project participant is requested to apply the maximum efficiency at the optimal operating conditions. The affirmation letters from two HFO boiler suppliers are provided to the DOE. The boiler efficiency is in the range of 77 – 79 %. The 79% efficiency is applied in the emission reduction calculation spreadsheet<sup>/XLS2/</sup> and in Section B.6.2 in the revised PDD<sup>/PDD2/</sup>. An adequate action has been taken, therefore; the CAR is closed.</p>
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B6
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>Clarification is requested according to the following statement on page 17 of the PDD:          "(...) project developers have considered a conservative benchmark in terms of CDM. (...) used the WACC formula (...)"</p> <ol style="list-style-type: none"> <li>1. It should be substantiated and further justified why this benchmark applied is appropriate, e.g. with regard to VVM 1.1, paragraph 111 c).</li> <li>2. It should be clarified why the benchmark is considered as "conservative".</li> </ol>



Finding	B6																				
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<div>1. WACC is the appropriate benchmark for project IRR. According to para 12 of guidelines on the assessment of investment analysis version 3, Weighted average costs of capital (WACC) is an appropriate benchmark for a project IRR. The following sentence has been added in PDD section B.5. "In essence, the project developer used the WACC as the benchmark for the project IRR. The following formula is used to calculate the WACC".</div> <div>2. The WACC, in the PDD, was calculated base on D/E ratio from the relevant industry at 1.08 but in the reality NP still did not get any loan approval from the bank. Therefore the actual NP's D/E is lower than 1.08 and it result to the actual NP's WACC is higher than our calculated WACC. Hence the WACC, in the PDD, is conservative.</div>																				
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<div>The revised PDD is reviewed. The project participant is selected the WACC as the benchmark for the proposed project activity. The WACC formula is shown in the Section B.5 of the revised PDD also in the IRR calculation spreadsheet. The parameters listed below are referenced and published available from the reliable sources in the host country:</div> <table><tr><th>Parameter</th><th>Value</th><th>Reference</th></tr><tr><td>Equity fraction</td><td>48%</td><td>Stock Exchange of Thailand</td></tr><tr><td>Debt fraction</td><td>52%</td><td>Stock Exchange of Thailand</td></tr><tr><td>ROE</td><td>17.2%</td><td>Stock Exchange of Thailand</td></tr><tr><td>MLR</td><td>6.95%</td><td>Bank of Thailand</td></tr><tr><td>Cooperate Tax</td><td>30%</td><td>Host country regulation</td></tr></table> <div>The relevant industry, Energy and Utility sector, from the Stock Exchange of Thailand was chosen in order to represent the benchmark of the proposed project activity. The vintage 3 years, 2007 – 2009, of the published available sources, Bank of Thailand and Stock Exchange of Thailand, for all parameters in the WACC calculation are averaged. The DOE has been accessed to all the information for WACC parameters input in order to cross check and with the revised PDD and the IRR calculation. The DOE concludes that the benchmark selected by the project participant is appropriated and conservative. An adequate action has been taken; therefore, the CAR is closed.</div>			Parameter	Value	Reference	Equity fraction	48%	Stock Exchange of Thailand	Debt fraction	52%	Stock Exchange of Thailand	ROE	17.2%	Stock Exchange of Thailand	MLR	6.95%	Bank of Thailand	Cooperate Tax	30%	Host country regulation
Parameter	Value	Reference																			
Equity fraction	48%	Stock Exchange of Thailand																			
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<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<div><input type="checkbox"/> To be checked during the first periodic verification</div> <div><input checked="" type="checkbox"/> Appropriate action was taken</div> <div><input checked="" type="checkbox"/> Project documentation was corrected correspondingly</div> <div><input type="checkbox"/> Additional action should be taken</div> <div><input checked="" type="checkbox"/> The project complies with the requirements</div>																				



Finding	B7		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	It should be clearly stated whether a project or equity IRR is calculated.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The project IRR was used in the PDD. The following sentence has been added in PDD section B.5 "the project IRR is selected as the financial indicator to be applied for the benchmark analysis for the project activity".		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD <sup>(PDD2/</sup> is reviewed especially in Section B.5. The project participant is selected the "Project IRR" for the proposed project activity and the "Project IRR" is stated in the revised PDD <sup>(PDD2/</sup> . An adequate action has been taken; therefore, the CAR is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements		

Finding	B8		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Clarification is requested why the input values for WACC calculation are considered as parameters that are "(...) standard in the market, considering the specific characteristics of the project type (...) " as per Additionality Tool substep 2 b) paragraph 5, bearing in mind that the proposed project mainly produces heat and companies listed produce electricity.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<p>As this project activity involves the producing and selling of energy and NP was established to implement this project. Therefore we can categorize NP is in energy &amp; utility industry. Moreover this project activity also can be implemented by any entities who has interest to do business in energy sector.</p> <p>According to the stock exchange of Thailand (SET), there are total 25 companies which are listed in energy &amp; utility sector consists of. 4 power producers, 14 oil/gas/coal producers, 5 machinery/equipment for generating energy producers and 2 utility service providers. Therefore this energy &amp; utility sector has covered companies who do the energy &amp; utility business.</p> <p>Moreover there are 3 registered projects, no. 2658, 2659, 2678, which also used the information from SET to calculate the WACC as the benchmark for project IRR.</p>		



Finding	B8
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The Stock Exchange of Thailand web link is reviewed. There are 8 main industries in Thailand Stock Exchange; financials, resources, property & construction, technology, services, agro & food industry, industrials, and consumer products. The project participant is chosen resources sector with the sub sector "energy and utility" to represent the benchmark of the proposed project activity. The input parameters are published available via the Stock Exchange of Thailand web link. An appropriate clarification has been demonstrated; therefore, the CL is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B9
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	It is requested to provide the exact sources of the different parameters for WACC calculation in table 8, i.e. document, author and page number.
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The source of all input parameters for WACC calculation in Table 8 have been mentioned in PDD footnote 19-22.

Finding	B9																												
<p><b>DOE Assessment #1</b></p> <p><i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<p>The revised PDD<sup>/PDD2/</sup> is reviewed especially in Section B.5. Table 8. The parameters indicated in the Table 8 are referenced as a footnote 19 – 22 on the bottom of page 19.</p> <p>For footnotes 19, 20 and 21 <a href="http://www.set.or.th/en/market/market_statistics.html">http://www.set.or.th/en/market/market_statistics.html</a></p> <p>For footnotes 22 <a href="http://www.bot.or.th/english/statistics/financialmarkets/interestrate/layouts/application/interest_rate/IN_Rate.aspx">http://www.bot.or.th/english/statistics/financialmarkets/interestrate/layouts/application/interest_rate/IN_Rate.aspx</a></p> <table><tr><th>Footnote</th><th>Parameter</th><th>Value</th><th>Reference</th></tr><tr><td>19</td><td>E / (E+D): Equity fraction in the Project</td><td>48%</td><td>Stock Exchange of Thailand</td></tr><tr><td>20</td><td>D / (E+D): Debt fraction in the Project</td><td>52%</td><td>Stock Exchange of Thailand</td></tr><tr><td>21</td><td>Re: Rate of expected return by shareholders</td><td>17.20%</td><td>Stock Exchange of Thailand</td></tr><tr><td>22</td><td>Rd: Rate of expected return by loan providers</td><td>6.95%</td><td>Bank of Thailand</td></tr><tr><td>-</td><td>T: Corporate tax rate</td><td>30%</td><td>Law and regulation of host country</td></tr><tr><td>-</td><td>WACC: Weighted average cost of capital</td><td>10.82%</td><td>Calculation</td></tr></table> <p>The project participants are requested to reference and identify the information using for WACC calculation to the file level. The link to the Stock Exchange of Thailand web page is an index page. The overall listed companies results by industry group at year ended for 2007, 2008 and 2009 can be found on the following link: 2007 at year ended <a href="http://www.set.or.th/th/market/files/industry/year_2550_TE.xls">http://www.set.or.th/th/market/files/industry/year_2550_TE.xls</a> 2008 at year ended <a href="http://www.set.or.th/en/market/files/year_2008_TE.xls">http://www.set.or.th/en/market/files/year_2008_TE.xls</a> 2009 at year ended <a href="http://www.set.or.th/en/market/files/attach1_year09.xls">http://www.set.or.th/en/market/files/attach1_year09.xls</a></p> <p>Also for the footnote 22, the page that provided in the revised PDD<sup>/PDD2/</sup> is the daily interest rate of a commercial bank in Thailand page. The <a href="#">Interest Rates in Financial Market (2005- present)</a> can be found on the following interactive pop-up link: <a href="http://www.bot.or.th/English/Statistics/FinancialMarkets/InterestRate/Pages/StatInterestRate.aspx#">http://www.bot.or.th/English/Statistics/FinancialMarkets/InterestRate/Pages/StatInterestRate.aspx#</a></p> <p>The 30% corporate tax rate was applied for the WACC calculation. The input value is applicable under the host country law and regulation. An adequate action has been taken; therefore, the CAR is closed.</p>	Footnote	Parameter	Value	Reference	19	E / (E+D): Equity fraction in the Project	48%	Stock Exchange of Thailand	20	D / (E+D): Debt fraction in the Project	52%	Stock Exchange of Thailand	21	Re: Rate of expected return by shareholders	17.20%	Stock Exchange of Thailand	22	Rd: Rate of expected return by loan providers	6.95%	Bank of Thailand	-	T: Corporate tax rate	30%	Law and regulation of host country	-	WACC: Weighted average cost of capital	10.82%	Calculation
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Finding	B9
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B10																										
Classification	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR																								
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	It is requested to provide the exact sources of the different parameters for investment analysis in table 9, i.e. document, author and page number.																										
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The source of all input parameters for Project IRR calculation in Table 9 have been mentioned in PDD footnote 23-26. The details also have been added in IRR spreadsheet.																										
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<div>The revised PDD and the IRR spreadsheet were reviewed. The parameters for the project IRR calculation were referenced and clarified in the footnote 23 – 26. The summary of revise Section B.5 Table 9 are listed below:</div> <table><tr><th>Item</th><th>Input value</th><th>Reference</th></tr><tr><td>Initial investment cost</td><td>85 Million THB</td><td>Proposal from the biogas supplier</td></tr><tr><td>Average O&amp;M cost</td><td>12.75 Million THB</td><td>Proposal from the biogas supplier</td></tr><tr><td>Biogas selling price</td><td>6.0 Bath/m<sup>3</sup>biogas</td><td>Calculation as per conversion of biogas/fuel oil at 0.53 litre/m<sup>3</sup>, fuel oil price at 15.41 baht/liter and discount rate at 20%</td></tr><tr><td>Electricity selling price</td><td>2.9 Bath/kWh</td><td>Export to grid buying scheme of the host country</td></tr><tr><td>Project expected lifespan</td><td>15 year</td><td>Proposal from the biogas supplier</td></tr><tr><td>Project IRR (thermal and electricity generation scenario)</td><td>4.31%</td><td></td></tr><tr><td>Project IRR (only thermal generation scenario)</td><td>5.29%</td><td>the total investment will be reduced to 60 Million baht</td></tr></table> <div>The references listed in table 9 were justified by the validation team. An adequate action has been taken; therefore, the CAR is closed.</div>			Item	Input value	Reference	Initial investment cost	85 Million THB	Proposal from the biogas supplier	Average O&M cost	12.75 Million THB	Proposal from the biogas supplier	Biogas selling price	6.0 Bath/m <sup>3</sup> biogas	Calculation as per conversion of biogas/fuel oil at 0.53 litre/m <sup>3</sup> , fuel oil price at 15.41 baht/liter and discount rate at 20%	Electricity selling price	2.9 Bath/kWh	Export to grid buying scheme of the host country	Project expected lifespan	15 year	Proposal from the biogas supplier	Project IRR (thermal and electricity generation scenario)	4.31%		Project IRR (only thermal generation scenario)	5.29%	the total investment will be reduced to 60 Million baht
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Finding	B10
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B11
<b>Classification</b>	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>With regard to the input parameter the following needs to be clarified:</p> <ol style="list-style-type: none"> <li>1. In the IRR calculation spreadsheet cell B15 three values are summarized to form the input value for "Biogas System". It is requested to specify the values applied.</li> <li>2. Further cell A16 defines a "Boiler System". Clarification is requested whether this system only refers to the electricity part or also to the heat part.</li> <li>3. It should be justified and evidenced how the gas selling price is determined.</li> <li>4. Since heat will be supplied to the starch company it is not clear why a price is not determined to create another revenue stream. In this context it is not clear why NP Biopower is selling the CH<sub>4</sub> to the starch company.</li> <li>5. The PP is requested to back-up the total investment costs, the annual average O&amp;M costs and expected project lifetime with further documented evidences.</li> <li>6. Explanation is requested why no increase rate for the electricity tariff is assumed.</li> <li>7. To calculate the O&amp;M costs from Euro to Thai Baht the exchange rate from 29<sup>th</sup> January has been applied. Clarification is requested why the exchange rate of this date was applied even though the management decision was taken later. In this context it shall be clarified why the O&amp;M costs are expressed originally in EURO.</li> <li>8. The use of the Excel sheets "Overhaul GE (GUASCOR)", "FOREX 290110" and "MLR 290110" need to be explained.</li> </ol>
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<ol style="list-style-type: none"> <li>1. The breakdown of investment cost has been added in sheet "Inv cost" in IRR spreadsheet.</li> <li>2. The cost for boiler system at 6.0 M.TH.B is the total cost for the new heater. This name has been changed to Thermal generation system in the revised IRR spreadsheet.</li> <li>3. NP management set the biogas selling price by comparing the heating value between biogas and fuel oil and give discount rate at 20%. NCV fuel oil = 39.77 MJ/litre</li> </ol>



Finding	B11
	<p>NCV biogas = 20.93 MJ/m<sup>3</sup>  Conversion ratio = 0.53 litre/m<sup>3</sup> biogas  Fuel oil price = 15.41 baht/litre (average 3 historical years)  Discount rate = 20%  Then biogas selling price = 15.41 * 0.53 * (1-20%) = 5.95 or 6.0 baht/m<sup>3</sup> biogas.  However this level or concept of this selling price is same as the proposals which NP used to get from other investors for BOT scheme such as  (1) SPC proposed to sell biogas to CS at the price equivalent to oil price at 6.0 Baht/litre.  (2) TBEC proposed to sell biogas to CS at the price equivalent to oil price discount at 25%.  The sample of term sheet from these 2 investors have been submitted in file "CAR B11 (3) TS from SPC" and "CAR B11 (3) TS from TBEC".</p> <p>4. There are several reasons that even NP supplied heat to CS but set the selling price base on biogas amount as follows: (1) This concept is same as all other BOT investors. (2) Practical to measure. Moreover even setting the price base on heat amount but finally NP also can't measure amount of heat directly, it also have to calculate from biogas amount. Therefore NP chose to set price base on the biogas amount.</p> <p>5. The total investment cost at 85 M.THb is based on the proposal from Premier energy dated 4 Jan 10. The O&amp;M cost for biogas system and operation cost of power generation are based on the proposal from Premier energy dated 4 Jan 10. The maintenance cost for power generation is based on quotation from Gauscor's supplier.  NP management chose Premier energy as their technology provider due to the total cost from Premier energy is the lowest price if comparing to other 2 suppliers, Papop and Global water. The comparison of proposed cost and their support evidences from all suppliers have been summarized in file "CAR B11 Compare Inv Cost".</p>
<p><b>Corrective Action #1</b></p> <p><i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i></p>	<p>6. There are 2 approaches for conducting the Financial Analysis, with and without inflation. In case of inflation to be concerned, we must concern both revenue and expense item in the same rate. In this case, we choose to use without inflation approach therefore all revenue and expense are fixed for the whole period. Refer to the actual historical electricity price as shown in file "CAR B11 (6) Historical electricity price (EPPO)", it also shows that electricity price didn't always increase it also decrease in some periods. The average increasing rate of the electricity price during y 07-09 is 1.8%. However if we look at the electricity price fluctuation, the price was increase from year 2006 and reach the highest level at 2.58 baht/kWh in August 2006 and start to decrease continuously to the lowest level in December 2007 and then stay quite stable during year 2008. Then electricity price has increased again in y 2009 and decrease again in January of 2010. No business owner could have predicted this and they would make decision based on an unpredictable figure. Therefore</p>

Finding	B11
	<p>the only way, which business owners could do, is using the past historical figure to predict. From this point, if we assume that the electricity price will increase at 1.8% annually, then the IRR will increase to 5.34% which is also still lower than the benchmark at 10.82%</p> <p>7. NP management board decided to implement this project on 3 Feb 10. Therefore FOREX in the IRR calculation were based on the last working day of January 2010 which is 2 days before decision date. There are 3 main parts of equipment in the project activity, MABR, boiler and gas engine. Only MABR and boiler are fabricated in Thailand but gas engine will be imported from Europe. Therefore most of the spare parts of this gas engine are also imported from abroad. In order to avoid the foreign exchange risk for both supplier and client, the quotation of the maintenance plan by the supplier was developed on EURO basis.</p> <p>8. The objective of sheet "Overhaul GE (GUASCOR) is to show the breakdown maintenance cost for GUASCOR engine which are based on the quotation from supplier. The objective of sheet "FOREX290110" is to show the exchange rate of EURO against Thai Baht on 29 Feb 10 which is the last working day of Jan 10. The FOREX on 29 Jan and 3 Feb are 46.5216 baht/EUR and 46.5047 baht/EUR respectively. The objective of sheet "MLR290110" is to show the average MLR of all commercial bank in Thailand. Generally MLR or Minimum loan rate is the indicative interest for Long term loan in Thailand. The average MLR on 29 Jan and 3 Feb is the same figure.</p>

Finding	B11
<p><b>DOE Assessment #1</b></p> <p><i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<p>The revised IRR calculation Excel spreadsheet<sup>/IRR2/</sup> is reviewed. The following corrective action 1 assessments are below:</p> <ol style="list-style-type: none"> <li>1. The breakdown investment costs are included in the revised IRR calculation spreadsheet. The figures in feasibility analysis by Premier Energy Co., Ltd<sup>/ADD3/</sup> are listed in the revised IRR calculation Excel spreadsheet<sup>/IRR2/</sup>. An adequate has been clarified; therefore, the CL is closed.</li> <li>2. The distinguishing between type of boiler system, heat and electricity boiler, is revised in the IRR calculation<sup>/IRR2/</sup>. The 6.0 M.THB is the cost of hot air boiler. The boiler is not involved in electricity generating activity. The specification of biogas boiler<sup>/TD/</sup> is provided by the project participant. An adequate action has been taken; therefore, the CL is closed.</li> <li>3. The biogas selling price calculating method is demonstrated in the revised PDD<sup>/PDD2/</sup> Section B.5. Footnote 25. Also, the calculating models from two biogas suppliers, SPC<sup>/TS/</sup> and TBEC<sup>/TS/</sup>, are provided. The energy balance is using for calculating the HFO replacement by biogas with 20% discount rate. An adequate action has been taken; therefore, the CL is closed.</li> <li>4. The calculating models from two biogas suppliers, SPC<sup>/TS/</sup> and TBEC<sup>/TS/</sup>, are provided. The revenue scheme by using biogas selling concept was notified in both quotations. The clarification and relevant evidences were demonstrated, therefore, the CL is closed.</li> </ol>

Finding	B11																																				
	<p>5. The proposal from others suppliers<sup>/ADD/</sup>, PAPOP and GLOBAL WATER ENGINEERING, were provided by the project participants. The breakdown cost is listed below:</p> <table><tr><th>Technology Supplier</th><th>Premier Energy</th><th>PAPOP</th><th>GLOBAL WATER</th></tr><tr><td>Proposal Date</td><td>2010-01</td><td>2010-06</td><td>2010-07</td></tr><tr><td>Land preparation</td><td>8.0</td><td>Not Included</td><td>Not Included</td></tr><tr><td>Biogas Digester</td><td>39.0</td><td>60.0</td><td>74.8</td></tr><tr><td>Biogas Cleaning System</td><td>Including</td><td>Not Included</td><td>Not Included</td></tr><tr><td>Thermal Generation System</td><td>6.0</td><td>Not Included</td><td>Not Included</td></tr><tr><td>Electricity Generation System</td><td>25.0</td><td>29.5</td><td>Not Included</td></tr><tr><td>Engineering Fees</td><td>7.0</td><td>Including</td><td>Including</td></tr><tr><td>Total Cost</td><td>85.0</td><td>89.5</td><td>74.8</td></tr></table> <p>Note: Cost is in Million Bath</p> <p>The selected technology supplier is the lowest price comparing to other providers. The clarification is supported with the relevant documents. Therefore, the CL is closed.</p> <p>6. The historical electricity price year 2006 - 2009 from the EPPO is provided by the project participant. The peak price is on year 2006 and started to decrease during the year 2007. The project participant is clearly explained and compared the fixed price demonstrate in the spreadsheet with the host country statistic situation. The electricity price is not only increasing but the decreasing can be observed in the host country market. An adequate explanation has been taken; therefore, the CL is closed.</p> <p>7. The foreign exchange rate is provided by the project participant. The source of information is from the Bank of Thailand on 2010-01-29. The breakdown gas engine maintenance cost is provided by the project participant. The price was quoted in the EURO currency. The clarification and relevant evidences were demonstrated, therefore, the CL is closed.</p> <p>8. The revised spreadsheet is reviewed. The project participant is clearly explained the objective of three tabs demonstrated in the spreadsheet: "Overhaul GE (GUASCOR)", "FOREX 290110" and "MLR 290110". Also, the references of three tabs are provided. The gas engine overhaul is provided from the technology provider. The exchange rate and the minimum lending rate are from the Bank of Thailand. An adequate action has been taken; therefore, the CL is closed.</p>	Technology Supplier	Premier Energy	PAPOP	GLOBAL WATER	Proposal Date	2010-01	2010-06	2010-07	Land preparation	8.0	Not Included	Not Included	Biogas Digester	39.0	60.0	74.8	Biogas Cleaning System	Including	Not Included	Not Included	Thermal Generation System	6.0	Not Included	Not Included	Electricity Generation System	25.0	29.5	Not Included	Engineering Fees	7.0	Including	Including	Total Cost	85.0	89.5	74.8
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Thermal Generation System	6.0	Not Included	Not Included																																		
Electricity Generation System	25.0	29.5	Not Included																																		
Engineering Fees	7.0	Including	Including																																		
Total Cost	85.0	89.5	74.8																																		



<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements
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Finding	B12											
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR									
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	It should be made clear which scenario is applied, i.e. electricity generation and heat supply or only heat. It is recommended to show additionality of both scenarios.											
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The initial intention of NP is to utilize biogas for both thermal and power generation. However the IRR for the scenario of only thermal application has been developed and shown in file "IRR Calculation (heat only).xls" In this scenario, the project IRR is 5.29% which is also lower than the benchmark.											
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The project IRR calculation sheet, in case the proposed project activity is only generating heat to the starch mill, is provided by the project participant. Two scenarios for the project IRR calculation is summarized below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Scenario</th> <th style="text-align: center;">Total Investment Cost (Million Bath)</th> <th style="text-align: center;">Project IRR (%)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Heat Only</td> <td style="text-align: center;">60</td> <td style="text-align: center;">5.29</td> </tr> <tr> <td style="text-align: center;">Heat and Electricity</td> <td style="text-align: center;">85</td> <td style="text-align: center;">4.31</td> </tr> </tbody> </table> <p>The benchmark, WACC, selected by the project participant is 10.82%. Both selected scenarios project IRR are below the benchmark. The heat generation only scenario is stated and clarified in the revised PDD<sup>PDD2</sup> Section B.5. Footnote 27.          An adequate action has been taken; therefore, the CL is closed.</p>			Scenario	Total Investment Cost (Million Bath)	Project IRR (%)	Heat Only	60	5.29	Heat and Electricity	85	4.31
Scenario	Total Investment Cost (Million Bath)	Project IRR (%)										
Heat Only	60	5.29										
Heat and Electricity	85	4.31										
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements											

Finding	B13		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Clarification is requested why a range of $\pm 10\%$ is assumed to be reasonable. Therefore it is recommended to discuss the likeliness of increasing/ decreasing of certain parameters.		



Finding	B13
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	PDD section B.5. has been revised in the following points, <ol style="list-style-type: none"><li>1. Range of sensitivity has been changed to <math>\pm 15\%</math></li><li>2. Add explanation about the range of sensitivity analysis such as historical of oil price for the range of biogas selling price etc.</li><li>3. Add breakeven point for each scenario.</li></ol>

Finding	B13												
<p><b>DOE Assessment #1</b></p> <p><i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<p>The revised PDD is reviewed especially in Section B.5 Table 10. The range <math>\pm 15\%</math> of sensitivity analysis of five parameters; Investment cost, Biogas selling price, Electricity price, Biogas generation, and O&amp;M cost of biogas are demonstrated in the revised PDD. The clarifications of individual parameters are stated in the remark section. Moreover, the breakeven points of each parameter are clarified in the Table 10. The breakeven point is the magnitude of sensitivity which makes the project IRR, 4.31%, equal to the selected benchmark, WACC, 10.82%. The breakeven points of each parameters are listed below:</p> <table border="1"> <thead> <tr> <th>Variables</th><th>Breakeven point</th></tr> </thead> <tbody> <tr> <td>Investment cost</td><td>Decreasing 36%</td></tr> <tr> <td>Biogas selling price</td><td>Increaseing 31%</td></tr> <tr> <td>Electricity price</td><td>Increaseing 88%</td></tr> <tr> <td>Biogas generation</td><td>Increaseing 26%</td></tr> <tr> <td>O&amp;M cost of biogas</td><td>Decreasing 40%</td></tr> </tbody> </table> <p>As per the "Guidelines on the assessment of investment analysis" version 03 EB51 Annex 58 para 18, the project participant is requested to demonstrate the sensitivity analysis at least covers a range of +10% and .10%, therefore <math>\pm 15\%</math> range is acceptable for the sensitivity analysis model.</p> <p>The project participant is also demonstrated the tendency, increasing or decreasing, of individual variables in the revised PDD. For the investment cost, the variable is tended to be increased due to the price of construction material, therefore, decreasing -15% of investment cost is conservative manner.</p> <p>For the biogas selling price, the project participant is using 3 years vintage, 2007 – 2009, fuel oil price in the host country in order to demonstrate the tendency of pricing. The fluctuation on the oil price can be observed, therefore, in order to demonstrate the conservativeness of this variable, the project participant is chosen the increasing +15% of biogas selling price in case the oil price in the market is decreased.</p> <p>For the electricity price, the project participant is using the pricing scheme from the host country authority published available website. The wholesale price from the website is 0.8% higher than the estimate price in feasibility estimation. The increasing +15% of the electricity price is beyond the market price; therefore, the selected range is conservative.</p> <p>For the biogas generation, the likelihood of the biogas production is tendency to decreasing than increasing due to the experience in system operational. The +15% increasing in biogas is the maximum that the project can achieve beyond the grantee efficiency, 85%, from the technology supplier; therefore, the selected range is conservative and applicable for this variable.</p>	Variables	Breakeven point	Investment cost	Decreasing 36%	Biogas selling price	Increaseing 31%	Electricity price	Increaseing 88%	Biogas generation	Increaseing 26%	O&M cost of biogas	Decreasing 40%
Variables	Breakeven point												
Investment cost	Decreasing 36%												
Biogas selling price	Increaseing 31%												
Electricity price	Increaseing 88%												
Biogas generation	Increaseing 26%												
O&M cost of biogas	Decreasing 40%												





Finding	B13
	<p>For the O&amp;M cost of biogas, the tendency of the O&amp;M is likely increasing over the operational of the project lifetime. The -15% decreasing of O&amp;M cost is reflected the possible range of variable comparing to the breakeven point, -40%.</p> <p>An adequate action has been taken, however, the IRR spreadsheet is requested to demonstrate the transparency and explanation of the equation and key input parameters for breakeven point column. Therefore, the CL is still opened.</p>
<b>Corrective Action #2</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<p>The breakeven point is determined by trial-and-error method. The following sentence "The breakeven point is the magnitude for sensitivity of the variable parameters that will make IRR equal to the benchmark" has been stated in PDD section B.5 and IRR spreadsheet. The explanation on how to simulate the magnitude for sensitivity has been stated in IRR spreadsheet.</p>
<b>DOE Assessment #2</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The revised IRR calculation spreadsheet is reviewed especially in the "Summary &amp; Assumption" tab. The explanation of the breakeven point is demonstrated in A16. The cells D10 – D14 are adjustable. The project IRR will be equaled or exceeded the benchmark, B15, when the value in cells D10 – D14 is equal to the values in cells E10 – E14. An adequate action has been taken; therefore, the CL is closed.</p>
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<p> <input type="checkbox"/> To be checked during the first periodic verification  <input checked="" type="checkbox"/> Appropriate action was taken  <input type="checkbox"/> Project documentation was corrected correspondingly  <input checked="" type="checkbox"/> Additional action should be taken  <input checked="" type="checkbox"/> The project complies with the requirements         </p>

Finding	B14
<b>Classification</b>	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>The technological barrier addressed in the PDD is not convincing. Compared to other biogas systems like UASB the maintenance is easier. According to the contract with the technology supplier the project will be supervised for one year by qualified person who is also training staff from NP power.</p> <p>PP is requested to further justify the barrier.</p>
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<p>The updated PDD was ignored the technology barrier.</p>



Finding	B14
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The revised PDD<sup>PDD2/</sup> is reviewed especially in Section B.5. The project participants are only using the investment barrier in order to demonstrate the additionality of the proposed project activity. According to the Appendix B of the simplified modalities and procedures for small-scale CDM project activities, Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, the proposed project activity is requested to demonstrate the project activity would not have occurred anyway due to at least one of the following barriers:</p> <ul style="list-style-type: none"> <li>• Investment barrier</li> <li>• Technological barrier</li> <li>• Barrier due to prevailing practice</li> <li>• Other barriers</li> </ul> <p>An adequate action has been clarified; however, on the revised PDD<sup>PDD2/</sup> Section B.5. page 18 para 3 bullets 2 and 3 is still mention the Technology barrier and Barriers due to prevailing practice. Therefore, the CL is still opened.</p>
<b>Corrective Action #2</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	<p>The Technological barrier and Barrier due to prevailing practice have been removed from PDD section B.5.</p>
<b>DOE Assessment #2</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The revised PDD was reviewed especially in Section B.5. page 18 para 3. The technology barrier and barriers due to prevailing practice bullets were removed. An adequate action has been taken; therefore, the CL is closed.</p>
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<p> <input type="checkbox"/> To be checked during the first periodic verification  <input checked="" type="checkbox"/> Appropriate action was taken  <input checked="" type="checkbox"/> Project documentation was corrected correspondingly  <input type="checkbox"/> Additional action should be taken  <input checked="" type="checkbox"/> The project complies with the requirements         </p>

Finding	B15
<b>Classification</b>	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p>The barrier due to prevailing practice as presented in the PDD is not conclusive. Considering the following sentence: "Hence, from the view of compliance with the national requirements on wastewater treatment, there is no reason for the proponent to change its prevailing practice." it should be noted that a possible reason for changes is the savings of heavy fuel oil to reduce costs. It is requested to provide a clarification upon this.</p>

Finding	B15
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The updated PDD was ignored the barrier due to prevailing practice.
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD <sup>/PDD2/</sup> is reviewed especially in Section B.5. The project participants are only using the investment barrier in order to demonstrate the additionality of the proposed project activity. According to the Appendix B of the simplified modalities and procedures for small-scale CDM project activities, Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, the proposed project activity is requested to demonstrate the project activity would not have occurred anyway due to at least one of the following barriers: <ul style="list-style-type: none"> <li>• Investment barrier</li> <li>• Technological barrier</li> <li>• Barrier due to prevailing practice</li> <li>• Other barriers</li> </ul> An adequate action has been clarified; however, on the revised PDD <sup>/PDD2/</sup> Section B.5. Page 18 Para 3 bullets 2 and 3 is still mention the Technology barrier and Barriers due to prevailing practice. Therefore, the CL is still opened.
<b>Corrective Action #2</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The Technological barrier and Barrier due to prevailing practice have been removed from PDD section B.5.
<b>DOE Assessment #2</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD was reviewed especially in Section B.5. page 18 para 3. The technology barrier and barriers due to prevailing practice bullets were removed. An adequate action has been taken; therefore, the CL is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	B16
<b>Classification</b>	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The biogas treatment process, sulphur and humidity, are not included in the project boundary.
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The biogas treatment process has been added in section B.3 and figure 5 of the revised PDD.



Finding	B16
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD <sup>/PDD2/</sup> is reviewed. The biogas treatment process is included in the schematic proposed project activity diagram, Figure 5. An adequate action has been taken; therefore, the CAR is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements

Finding	B17
<b>Classification</b>	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The project participant shall describe and indicate the following responsible person and methods below: <ol style="list-style-type: none"> <li>1. Supervisor: Biogas boiler</li> <li>2. Data recording and archiving for the whole crediting period plus 2 years</li> <li>3. COD measurement</li> <li>4. Training procedure for supervisors and operators: MABR technology, laboratory, gas engine, and biogas boiler</li> </ol>
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	PDD section B.7.2 is revised to add the position of “biogas project supervisor” and “Boiler operator” in the operation and management structure. Data recording and archiving, training for operational team and work instruction for COD measurement has been added in the revised PDD as well.
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The revised PDD <sup>/PDD2/</sup> is reviewed especially in Section B.7.2. The responsible people for biogas system and biogas boiler are included in the monitoring plan. The project participant, NP Biopower, is the responsible person for monitor the COD measurement of the proposed project activity. The training procedure will be developed by the project participant with assistance from the technology suppliers: MABR technology, Biogas Boiler and Gas engine. The work instruction will be developed for the operator's level. Also, the CDM monitoring manual will be developed by the CDM consultant in order to ensure the parameters to be monitored in the Section B.7.1. are fulfilled. The data log and monitored data will be kept for at least 2 years after the full crediting period. An adequate action has been taken in the revise monitoring plan; therefore, the CL is closed.



Finding	B17
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

Finding	C1
<b>Classification</b>	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The starting of crediting period is requested to revise to a realistic date.
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The starting date in PDD section C.2.2.1 has been changed 01/03/2011.
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The starting date of the crediting period in the revised PDD was revised, as the starting date of the crediting period shall be minimum 1 month in future for small scale project activity during the uploading. The DOE agreed that the revised starting date of the crediting period is realistic and reasonable 2011.03.01, therefore, the CL is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements

## 5 VALIDATION ASSESSMENT SUMMARY

### 5.1 General Description of the Project Activity

#### 5.1.1 Participation

##### LOA

Letter of Approval for the proposed project from the host country Thailand <sup>/HCA/</sup> has been issued by Thailand Greenhouse Gas Management Organization (Public Organization) which serves as the DNA of Thailand. The content of the LOA is fully matching with the CDM requirements.

The Letter of Approval from German DNA has been issued upon the release of a final validation opinion in the final validation report. The Annex I country approval<sup>/LOA/</sup> dated 2011-01-13 issued by Federal Environment Agency, German Emissions Trading Authority DNA for Federal Republic of Germany has been submitted and following is mentioned:

1. EnBW Energie Baden-Württemberg AG has been authorized to participate in the project activity.
2. Grants its approval of the project within the framework of CDM.
3. The project title is the same as in section A.1 of PDD

The LoA confirms the following:

1. The Federal Republic of Germany is a party to the Kyoto Protocol;
2. Voluntarily participation to CDM and the notified project;
3. The project does not cause severe adverse environmental impacts;
4. The host country Kingdom of Thailand confirms with the LOA that the project will not be adverse to sustainable development taking into account social, economic and environmental aspects.

The validation team concludes the LoAs issued by the host country DNA and Annex I country DNA are authentic and complies with the UNFCCC requirements.

##### Project Participants

The project participants are *NP Biopower Co.,Ltd. and EnBW Energie Baden-Württemberg AG*. The entities from Thailand have been approved by their respective DNA. The project participants are listed in tabular form in section A.3 and Annex 1 of the PDD/PDD/. The documents like PDD, MOC and LOA are internally consistent. However, whether the **EnBW Energie Baden-Württemberg AG** is confirmed as project participant by the DNA of Germany shall be confirmed after the LoA from the Annex I country will be issued.

#### 5.1.2 Contribution to Sustainable Development

The contribution of the project activity to sustainable development of the host country has been confirmed within the host government approval /HCA/.

For an in depth evaluation of these topics, please refer to section A2 of the annex1.

### **5.1.3 PDD editorial Aspects**

The PDD is in line with the structure and guidance given in the latest version of the relevant "CLEAN DEVELOPMENT MECHANISM PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)" version 3 and the latest version of the "GUIDELINES FOR COMPLETING THE SIMPLIFIED PROJECT DESIGN DOCUMENT (CDM-SSC-PDD) AND THE FORM FOR PROPOSED NEW SMALL SCALE METHODOLOGIES (CDM-SSC-NM)" version 5.

### **5.1.4 Technology to be employed.**

A physical site visit was conducted to confirm that the description in the PDD reflects the real situation of the proposed CDM project activity. The description of the project as contained in the PDD is complete and accurate and provides the reader with a clear understanding of the nature of the project activity. The residue biogas after utilized as fuel for the starch drying process will be used for the electricity generation. Therefore, the proposed project activity will uses state of the art technology as the equipment (the biogas generators and the radiant tube burner) bought from experienced technology supplier. The technology and know-how used in the project activity is assessed to be environmentally safe and sound.

For an in depth evaluation of these topics, please refer to section A4 of the annex 1. This section also contains the CARs related to this topic.

### **5.1.5 Small Scale Projects**

The installed capacity of the proposed project is 1 MW genset and one radiant tube burner. Total emission is less than 60,000 tCO<sub>2</sub>e/ year; therefore, the proposed project activity is qualifies as a small-scale project activity and is within the thresholds of the three possible types of small-scale CDM project activities. The proposed project activity applies one of the approved small-scale categories and any tool or methodology referenced therein.

The small-scale methodologies is applied in conjunction with the general guidance to the methodologies that provides guidance on equipment capacity, equipment performance, sampling and other monitoring related issues. The project is not a de-bundled component of a large scale project in accordance with the rules defined in appendix C of Annex II to decision 4/CMP.1. For an in depth evaluation of these topics, please refer to section A5 of the annex 1.



## 5.2 Project Baseline, Additionality and Monitoring Plan

### 5.2.1 Application of the Methodology

The proposed project applies to a valid version of a CDM Methodology approved by the board. All applied methodological tools are valid and approved. By means of cross check it can be confirmed that the applied methodology and the methodological tools are directly derived from the methodologies section on the CDM website<sup>/unfccc/</sup>.

The proposed project activity is newly installation of Modified Anaerobic Baffled Reactor (MABR) technology, which is an anaerobic wastewater treatment step with a methane capture, to the existing anaerobic series of open lagoons. The original designed of the baseline open lagoons and the MABR technology design were validated and confirmed by the validation team during the onsite validation.

The recovered methane is utilized for thermal and electricity generation, therefore, the approved baseline and monitoring methodologies under corresponding category under type I, AMS-I.C and AMS-I.D, are applicable. The applicability conditions threshold for three components were validated and summarized below:

- Ex-ante emission reductions due to the wastewater treatment were estimated at 18 kt CO<sub>2e</sub> annually. The result is lower than the 60 kt CO<sub>2e</sub> threshold.
- The thermal component is 3.0 MW<sub>thermal</sub> and is thus under the 45 MW<sub>thermal</sub>.
- The electricity component, 1 MW<sub>e</sub> will be installed by the project activity. The project is within the 15 MW<sub>e</sub> thresholds.

During the onsite validation, the status of the MABR construction, the quotation of the radiant tube burner, quotation of open flare were validated by the validation team.

The 1 MWe gas engine is indicated in the feasibility study report prepared by the technology provider, Premier Energy Co., Ltd. The FSR was provided and validated by the validation team.

Also, the depth of all lagoons is 5.0 meters which is deeper than 2.0 meters without aeration system. The local ambient temperature is average 27.12 °C which is higher than the applicability condition, 15 °C and the sludge removal period is more than 3 years with the COD volumetric loading is 0.14 kg COD.m<sup>-3</sup>.day<sup>-1</sup>. The original designed, historical of local meteorological and the starch plant record were validated by the validation team during the onsite validation. The location of the wastewater treatment plant and the source generating the wastewater is unequally defined.

The project activity, meets all applicability conditions of the applied methodology AMS-III.H AMS-I.C and AMS-I.D, the applied methodological tools and all methodology components referred to in the applied methodology and tools.

Beyond this, the proposed project activity does meet all other possible requirements or stipulations mentioned in all sections of the selected methodology. Furthermore the project activity is not expected to result in significant emissions, related both to project and leakage, other than those listed in the methodology. Therefore, it is assessed that the project applies a valid version of an approved CDM methodology and the methodology is applicable to the project. For an in depth evaluation of these topics, please refer to section B1 of the annex 1.

### **5.2.2 Project Boundary**

The PDD correctly describes the project boundary including the physical delineation of the project activity for the purpose of calculating baseline emission for this project activity. The choices which sources and GHGs can be included in or excluded of the project boundary comprise fossil fuel consumption for the project activity and malfunction was taken into account. It is confirmed that the justification provided by the PP is reasonable, based on assessment of supporting documented evidence provided by the PPs or by onsite validations. No emission sources which are impacted by the project activity and are not addressed by the approved methodology are detected during validation. For an in depth evaluation of these topics, please refer to section B.2 of the annex 1.

### **5.2.3 Baseline Identification**

The procedure to identify the most plausible baseline scenario derived from the methodology tools. They have been applied correctly and are transparently and sufficiently documented in the PDD. In summary, it can be assessed that the identified baseline scenario is reasonable and represents what would occur in the absence of the proposed project activity.

For an in-depth evaluation please refer to Annex 2 of this report.

### **5.2.4 Calculation of GHG Emission Reductions**

The PDD applies steps and equations to calculate project emissions, baseline emissions, leakage emission and emission reductions as per the requirements of the methodology. For the calculation of the GHG emission reductions the correct equations have been used reflecting the methodological choices. Furthermore, all equations are correctly applied.

To determine the removal efficiency of the baseline water system a 14 days measurement campaign was conducted in February 2010. The samples taken were analyzed by a third party (ENVIRPRO Co. Ltd.). The analysis reports were checked and compared with the values used to calculate the removal efficiency. By means of knowledge of the validation team and document review<sup>TD/</sup> the data used can be assessed as appropriate. Furthermore the period of the samples taken can be assessed as representative.

Other data and parameter to determine the baseline emission like volume of wastewater in the baseline wastewater treatment system and fuel oil consumption are based on three year historical records (2007-2009). The historical records of fuel oil consumption were crosschecked with fuel invoices. The values used to calculate the baseline emission can be assessed as appropriate.

The flare efficiency of the boiler was checked with the affirmation letters from HFO boiler suppliers<sup>TD/</sup>.



The data applied for the ex-ante electricity baseline emission calculation were checked by means of document review<sup>/FSR/</sup> and own calculations. The biogas required to replace HFO and the electricity generated by the project activity can be assessed as correct. For an in-depth evaluation of these topics, please refer to section B4-B6 of the annex 1.

The exclusion of baseline emission from sludge treatment and discharge of the treated wastewater is assessed as correct by means of site visit.

Furthermore following data and parameter applied to the ex-ante emission reduction calculation were validated:

The removal efficiency of the digester is defined as 85% in the FSR. The value was checked and by means of the knowledge of the validation team the value can be assessed as appropriate. The electricity consumption of the project activity was reviewed and recalculated. The assumption can be assessed as reliable.

In case of emergency the biogas is flared in an open flare. The quotation of the open flare was checked<sup>/ADD/</sup>. According to the tool<sup>/FT/</sup> the PP choose to calculate project emission the flare efficiency in the hour  $h$  ( $\eta_{\text{flare},h}$ ) as follows:

- 0% if the flame is not detected for more than 20 minutes during the hour  $h$ .
- 50%, if the flare is detected for more than 20 minutes during the hour  $h$ .

For ex-ante calculation the PP choose a flare efficiency of 0%. Project emission from flaring are not considered as the whole biogas generated can be utilized. These assumptions are assessed as appropriate as it can be assumed that the project activity works under good condition. Therefore no biogas must be flared. In the case that biogas must be flared it can be assumed that the flame is not detected for more than 20 minutes during the hour  $h$ . Therefore the choice of the flare efficiency ex-ante as 0% can be assessed as applicable.

For the data and parameters not to be monitored throughout the crediting period (i.e. they are determined only once and thus remain fixed throughout the crediting period or MCF), it is assessed that all data sources, assumptions and calculations are correct, applicable to the project and contribute to a conservative estimate of the emission reductions.

The documentation (PDD, excel calculations and supporting documents) were reviewed. The estimates of the baseline emissions can be replicated using the data and parameter values provided. The assumptions and data are listed, including their references and sources.

For the data and parameters subject to monitoring it is confirmed that the emission reduction estimates provided in the PDD are reasonable and conservative. For an in-depth evaluation of these topics, please refer to section B4-B6 of the annex 1.

## 5.2.5 Additionality Determination

### Consideration of CDM in decision making (if project start before validation)

The starting date given in the PDD is defined as 2010-02-22 which is the earliest date on which the project owner committed to expenditures – namely the signing of the contract agreement between N.P. Biopower Co.,Ltd and Premier Energy Co.,Ltd. /<sup>CDM</sup> to develop the biogas system. This is in line with the CDM Glossary of Terms. In prior to starting the proposed project activity, the CDM has been involved as the chronological event prescribed below:

- The Allied Carbon Credit GmbH has interested to invest on the CDM project. Then, agreement regarding the implementation of a “biogas to energy” project as CDM-project was established and agreed among three parties; Charoensuk Starch (2005) Co.,Ltd., NP Bio Power Co.,Ltd. and the Allied Carbon Credit GmbH on 2008-08-26.
- After that the Allied Carbon Credit GmbH had sought the local CDM consultants to develop the CDM. Then, the agreement on 2008-09-24 was signed with the Allied Carbon Credit GmbH and Advance Energy Plus Co.,Ltd. to develop the CDM documents and process the approval with Thai DNA.
- 2008-10-09, the 1<sup>st</sup> stakeholder meeting was conducted.
- 2008-10-16, the Allied Carbon Credit GmbH submitted the letter of intend to the DNA of Thailand. The letter from Thai DNA dated 2008-10-20 was submitted to the Allied Carbon Credit GmbH for confirmation of receiving and informed to proceed for the CDM process.
- In January 2009, the project design document was 1<sup>st</sup> web-hosted by TÜV NORD CERT GmbH during 2009-01-07 to 2009-02-05.
- Then, the Allied Carbon Credit GmbH has not been interested to invest further to the project. Therefore, the N.P. Biopower Co.,Ltd has contacted to the EnBW Energie Baden-Württemberg AG to be the investor for the proposed project activity.
- 2009-07-31, the letter of intend was drafted and submitted to the UNFCCC and the DNA of Germany. Then, the UNFCCC secretariat and the German DNA confirmed of notice received on 2009-08-17 and 2009-08-20 respectively.
- 2009-11-12, the mutual cancellation to terminate the CDM project from Allied Carbon Credit GmbH which submitted on 2009-09-14 was agreed and signed by Charoensuk Starch (2005) Co.,Ltd. and NP Biopower Co.,Ltd.
- 2010-02-03, the board of the NP Biopower Co.,Ltd had seriously taken into account revenue of CDM shall make the feasible on the financial. Then, the

decision has been made by the management to go on the proposed project activity with the CDM and agreed the contract to be signed with the EnBW Energie Baden-Württemberg AG after the contract was terminated with Allied Carbon Credit GmbH.

- 2010-02-20, the Emission Reduction Purchase Agreement between EnBW Energie Baden-Württemberg AG and NP Biopower Co.,Ltd. was engaged.

After the Allied Carbon Credit GmbH has not been involved in the proposed project, the EnBW Energie Baden-Württemberg AG has engaged as the project participant besides NP Biopower Co.,Ltd. Then, newly letter of intend from NP Biopower Co.,Ltd. was submitted to TGO on 2010-03-02. After that, 2010-04-02 the notification letter from TGO was replied to the NP Biopower Co.,Ltd. As well as, the EnBW Energie Baden-Württemberg AG has submitted the prior consideration CDM to the UNFCCC.

2010-03-26, the 2<sup>nd</sup> stakeholder meeting was carried out.

2010-07-17, the project design document was 2<sup>nd</sup> web-hosted by TÜV NORD CERT GmbH during 2010-07-17 to 2010-08-15.

All documents were provided and verified (please refer to chapter 7 “References” of the Final Validation Report. According to the “Guidance on the demonstration and assessment of prior consideration of the CDM (version 03)” from EB49, Annex 22, paragraph 6 (a) and (b) the verified documents prove that the project participants were aware of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project and (b) that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Beyond this the consideration is assessed as serious (i.e. the project activity would not be undertaken without the incentive of the CDM). These evidences were made available to the validation team and are assessed to be adequate for the purpose. Further, it is confirmed that the decision was made by an authorized person. During validation it could be assessed that this person has the authority to take corresponding decisions on behalf of the company.

### **Application of methodology / methodological tools**

The additionality of the project activity is consistent with Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities. The investment barriers was demonstrated an explanation.

In addition, the proposed project activity was demonstrated the investment comparison and the benchmark analysis which conformed to guidance 16 of Annex 58, EB 51, as the viable alternative to the proposed project activity is the supply of electricity from Thai electricity grid and utilized fuel oil to generate heat to dry product in the starch factory.

### **Alternatives**

Not applicable.

## **Investment analysis**

Due to small scale project activity, the proposed project activity has been demonstrated the barrier analysis.

### **Barrier analysis**

According to the Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the PP uses the barrier analysis to demonstrate of additionality.

#### **1) Investment Barrier**

According to Thailand regulation is specified only the characteristics of water discharged, the baseline anaerobic series lagoon is sufficient to treat the wastewater. The DOE has assessed the regulation of "Quality of water discharge" announced by the Department of Industrial Work under The Royal Gazette BE 2535 issued on 1996-06-14 and 1997-02-18 to confirm the condition.

An investment comparison and the benchmark analysis have been used to demonstrate the investment barriers faced by the proposed project activity. The project participants selected the post-tax equity IRR as the financial indicator and compared it against weight average cost of capital (WACC) benchmark.

The benchmark is estimated with a WACC (10.82 %) and compared to the project IRR (4.31%)

This is fully in compliance with the stipulations as set out in the additionality tool and guidance on the assessment of investment analysis. A detailed assessment of each parameter is provided in Annex 3 of this report.

Five parameters are selected for the sensitivity analysis:

- a) investment costs
- b) biogas selling price
- c) electricity price
- d) operation and maintenance costs
- e) biogas generation

The information and justification provided in the PDD were assessed and verified by the validation team. It can be confirmed that the argument provided, namely that the benchmark will most likely not be reached, is reasonable and substantiated with supportive evidence. The assessment of the values as outcome of the sensitivity analysis is provided in Annex 3.

The return on equity of the energy industry sector was taken which is comparable to the project activity. The data was published the stock exchange of Thailand<sub>/set/</sub> has been assessed by DOE. The benchmark applicable for the biogas utilization project at starch factory "Biopower project at Charoensuk Starch Co. Ltd, Thailand" project

examined the CDM project in lately year 2008 under similar circumstances. However, the project participants further discussed that the application of benchmark as 10.82% for energy industry would be more appropriate. It was published in consistence to the decision making 2010-02-03, the rate was considered to appropriate.

The DOE validated the IRR calculation, sensitivity analysis and validated all input values used in the analysis. The assessment of the values included for the IRR calculation has been demonstrated in the annex 3 of the report. The period of assessment is the expected operational lifetime of the project activity which is set as 15 years. The project IRR is calculated for the same period of the lifetime.

#### The Sensitivity Analysis

The post-tax equity IRR was calculated at 4.31% in the absence of the CER revenues. The sensitivity analysis was conducted to check the IRR with variation of  $\pm 15\%$ . In the sensitivity analysis, critical parameters such as investment cost of the project, Biogas selling price, electricity price, biogas generation and O&M cost of biogas are examined with variations covering  $\pm 15\%$  range. The DOE assessed that in any cases the values are lower than the 10.82% benchmark identified in the PDD. By checking the appropriateness of the input values and ranges for sensitivity analysis, The DOE agreed that the post-tax equity IRR 4.31% of calculated without the CER revenue, 15.5% with the CER revenue with assumption of sales price as 10 EURO/CER and that sensitivity analysis is appropriately conducted. Hence the DOE came to conclusion that the project activity is financially unattractive without the CDM scheme at the time of decision making.

#### Common practice analysis

Not applicable due to small scale project activity.

#### Summary

The procedure to justify the additionality of the project activity derived from the methodology or required methodological tools has been applied correctly and is transparently and sufficiently documented in the PDD. Considering all statements above, it is confirmed that the project activity is additional because anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the project activity.

For an in depth evaluation of these topics, please refer to section B4 of the annex. This section also contains the CARs and CLs related to this topic.

#### 5.2.6 Monitoring Methodology

The monitoring plan of the proposed CDM project activity is based on and in compliance with the applied monitoring methodologies. For an in-depth evaluation please refer to section B6 in Annex 1.

### **5.2.7 Monitoring Plan**

The DOE applied a two-step process to assessing compliance with the requirements of monitoring plan, as follows:

- a) Compliance of the monitoring plan with the approved methodology:
  - (i) Identified the list of parameters required by the selected approved methodology by means of document review;
  - (ii) Confirmed that the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the applied methodology AMS-III.H, AMS-I.D and subscribed tools;
- b) Implementation of the plan:
  - (i) The monitoring arrangements described in the monitoring plan are feasible within the project design;
  - (ii) The means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified.

The assessment has been conducted by the DOE by means of reviewing of the documented procedures, interviewing with relevant personnel, project plans and physical inspections of the proposed CDM project activity site.

### **5.2.8 Project Management Planning**

The operational and management structure that the project operator will implement in order to monitor emission reductions is described in the PDD. It clearly indicates the responsibilities and institutional arrangements for data collection and archiving.

### **5.2.9 Crediting Period**

The starting date of the fixed crediting period is 1st of March 2011 or date of registered whichever is the later. The starting date as mentioned in the PDD has been confirmed during site visit. The starting date is deemed to be appropriate. .

### **5.2.10 Environmental Impacts**

According to the project activity an EIA by the host country is not required. An Initial Environmental Evaluation (IEE) is required for all projects that apply for the letter of approval. The IEE was assessed. No significant impacts are defined. For an in-depth evaluation of these topics please refer to section D of Annex 1.

### **5.2.11 Comments by Local Stakeholders**

An official stakeholder consultation has been held at the Ban Koh Rak Siad School, Kamphaeng Phet Province which close to the project site on 2010-03-26. Relevant stakeholders like local people, people from local bureaus, national institutes, TGO and universities, also local NGOs were invited. The invitation letter no. 02/2553 on



2010-03-10 has been tendered to invite comments by local stakeholders. The relevant documents for the stakeholder consultation were reviewed. The local stakeholder<sup>/IM05/</sup> confirmed that the participants raised no concerns regarding the project activity and questions regarding the project activity were answered sufficiently.



## 6 VALIDATION OPINION

EnBW Energie Baden-Württemberg AG has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: "Biopower project at Charoensuk Starch Co. Ltd, Thailand" with regard to the relevant requirements of the UNFCCC for CDM project activities, as well as criteria for consistent project operations, monitoring and reporting. UNFCCC criteria include article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakech Accords) and the relevant decisions by COP/MOP and CDM Executive Board

In the course of the pre-validation 12 Corrective Action Requests (CARs) and 08 Clarification Requests (CLs) were raised and successfully closed. However, 01 Further Action Request (FAR) shall be closed during the first verification.

The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

In detail the conclusions can be summarised as follows:

- The project is in line with all relevant host country criteria (Thailand) and all relevant UNFCCC requirements for CDM. Project activity approval have been obtained from DNA of Thailand vide the Letter of Approval (HCA) dated 2010-09-30.

- The Federal Environment Agency, DNA for the Germany issued the Letter of Approval (LoA) dated 2011-01-13 on the basis of this positive validation opinion.

- .-The project additionality is sufficiently justified in the PDD.

- The monitoring plan is transparent and adequate.

- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 211,560 tCO<sub>2</sub>e are most likely to be achieved within the fixed crediting period (10 y) crediting period.

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.

Essen, 2011-04-11

Essen, 2011-04-11



Martin Saalmann  
TÜV NORD JI/CDM CP  
Validation Team Leader



Eric Krupp  
TÜV NORD JI/CDM CP  
Final Approval



## 7 REFERENCES

**Table 7-1:** Documents provided by the project participant

Reference	Document															
/ADD/	<p>Proof related to all input techno-commercial data and assumptions used for additionality-Investment analysis.</p> <ul style="list-style-type: none"><li>• Exchange rate on the management decision date, 46.52 Baht/EUR</li><li>• Tax exemption approval by Board of Investment (BOI)</li><li>• The regulation of tax payment from the revenue department of Thailand</li><li>• Biogas selling agreement between NP Biopower and Charoensuk Starch</li><li>• Feasibility analysis by Premier Energy Co., Ltd</li><li>• Quotation for radiant tube burner from BKE Combustion Controls Co., Ltd.</li><li>• Quotation for gas engine</li><li>• Operation and Maintenance cost for gas engine</li><li>• Quotation for flare system</li><li>• Comparison quotation between three technologies suppliers: Premier energy, Papop, and Global water</li><li>• Electricity generation rate calculation sheet based on GUASCOR SFGLD560 technical specification</li></ul>															
/BLS/	<p>Methodology and project specific baseline study related evidences:</p> <ul style="list-style-type: none"><li>• Document supporting the average depth of more than 2 m of the existing anaerobic lagoon system</li><li>• Series of open 8 lagoons layout</li><li>• Ambient temperature above 15°C, at least during part of the year, on a monthly average basis</li></ul>															
/CA/	Contractual agreement between TÜV NORD CERT GmbH and EnBW															
/CM/	<p>CDM milestones</p> <table><tr><th>Items</th><th>Events</th><th>Timing</th></tr><tr><td>/CM1/</td><td>CS and NP signed agreement with ALLIED CARBON (ACC)</td><td>26 Aug 2008</td></tr><tr><td>/CM2/</td><td>ACC signed agreement with local CDM consultants to develop documents for applying Thai DNA.</td><td>24 Sep 2008</td></tr><tr><td>/CM3/</td><td>ACC submitted Lol to Thai DNA</td><td>16 Oct 2008</td></tr><tr><td>/CM4/</td><td>Thai DNA reply to ACC</td><td>20 Oct</td></tr></table>	Items	Events	Timing	/CM1/	CS and NP signed agreement with ALLIED CARBON (ACC)	26 Aug 2008	/CM2/	ACC signed agreement with local CDM consultants to develop documents for applying Thai DNA.	24 Sep 2008	/CM3/	ACC submitted Lol to Thai DNA	16 Oct 2008	/CM4/	Thai DNA reply to ACC	20 Oct
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/CM3/	ACC submitted Lol to Thai DNA	16 Oct 2008														
/CM4/	Thai DNA reply to ACC	20 Oct														

Reference	Document		
			2008
	/CM5/	1 <sup>st</sup> upload for Global stakeholder'comment	Jan 2009
	/CM6/	LoI signed by former project participants including the intention to develop the project as a CDM project	31 July 2009
	/CM7/	PIN and form for prior consideration of CDM sent to UNFCCC	17 Aug 2009
	/CM8/	PIN and request for Letter of Endorsement from German DNA (dehst)	17 Aug 2009
	/CM9/	Contract for services for CDM consultancy and for required measurements, stakeholder consultation and IEE	21 Aug 2009
	/CM10/	Withdrawal of the CDM project by ACC	12 Nov 2009
	/CM11/	NP got proposal from Biogas Supplier	4 Jan 2010
	/CM12/	NP Board decided to implement the project	3 Feb 2010
	/CM13/	NP signed ERPA with EnBW	20 Feb 2010
	/CM14/	NP signed agreement with supplier to design MABR system	22 Feb 2010
	/CM15/	EnBW submitted form for prior consideration of CDM to UNFCCC	24 Feb 2010
	/CM16/	NP submitted newly LoI and the cancellation of 16 Oct 2008 to TGO	9 Mar 2010
	/CM17/	NP organized Public Hearing Seminar	26 Mar 2010
<b>/COD/</b>	COD measurements third party (ENVIROPRO CO. LTD.), Measurement campaign on 12 -25 February 2010 (14 days) (COD measurement campaign (plant effluent)) (COD measurement campaign (pond 8))		
<b>/ERPA/</b>	Emission Reduction Purchase Agreement (ERPA CS & EnBW 200210)		
<b>/FI/</b>	HFO invoices and fuel characteristic from supplier: Starch production (summary of fuel oil consumption & sample invoice for y 07)		

Reference	Document
	(summary of fuel oil consumption & sample invoice for y 08) (summary of fuel oil consumption & sample invoice for y 09)
<b>/FSR/</b>	Feasibility Analysis from Premier Energy Co Ltd date 2010-01-04
<b>/HCA/</b>	Host Country Approval, Thailand Date: 2010-09-30 (LoA Approval 180810)
<b>/LOA/</b>	Annex I country Letter of Approval issued by Federal Environment Agency, German Emissions Trading Authority dated 2011-01-13
<b>/LR/</b>	Law and regulations <ul style="list-style-type: none"> <li>• Enchantment and Conservation of National Environmental Quality Act of 1992</li> <li>• (enhancement and conservation of national environment BE 1992)</li> <li>• Type and capacity of the project or business to be required for the Environmental Impact Assessment (EIA) and reporting format announced by The Ministry of Natural Resources and Environment Department B.E. 2552</li> <li>• (Type and cap of EIA project MONRE)</li> <li>• Quality of water discharge announced by The Department of Industrial Work under The Royal Gazette BE 2535, issued dated 14 June BE 2539 and 18 Feb. BE 2540</li> </ul> (Quality of water discharge DIW)
<b>/LOG/</b>	CS starch production record year 2007-2009 (CS Starch Production record y07-09)
<b>/IEE/</b>	Initial Environmental Evaluation report (IEE CS)
<b>/IRR/</b>	Internal Rate of Return Calculation Sheet
<b>/MET/</b>	Local met data on annual average ambient temperature Temperature CS 2008 as shown in BLS
<b>/MOC/</b>	Modalities of Communication
<b>/ORG/</b>	Organisation chart describing the proposed project activity (Organization Chart NP)
<b>/PDD 1/</b>	Project Design Document named "Biopower project at Charoensuk Starch Co. Ltd, Thailand" Version 01 date 30/05/2010 (PDD 1 EnBW 150610)

Reference	Document
<b>/PDD 2/</b>	Project Design Document Version 02 "Biopower project at Charoensuk Starch Co. Ltd, Thailand" Version 02 date 30/09/2010
<b>/PPA/</b>	VSPP-PEA Power Purchase Agreement between NP and PEA <ul style="list-style-type: none"> <li>Capacity 1 MW</li> </ul>
<b>/ISC/</b>	Statutory Compliance <ul style="list-style-type: none"> <li>Operational permit license from Department of Industrial Work <ul style="list-style-type: none"> <li>CS: License No: 3-9(2)-1/48 Date: 280605</li> <li>(Plant operation license CS 280605)</li> <li>NP: License No.: Date:</li> </ul> </li> <li>Bureau of Business Registration <ul style="list-style-type: none"> <li>CS: License No.:0625548000122 Date: 080405</li> <li>(Affidavit CS 080405)</li> <li>NP: License No:0625550000185 Date: 121207</li> </ul> </li> </ul> (Affidavit NP 121207)
<b>/SD/</b>	<ul style="list-style-type: none"> <li>Starting date of the project: NP signed agreement with supplier to design MABR system: 2010-02-22</li> </ul>
<b>/SHCP/</b>	Local Stakeholder consultation process, report 26 <sup>th</sup> March 2010. <ul style="list-style-type: none"> <li>Invitation letter for stakeholder meeting. (Invitation letter)</li> <li>Attendance sheet date 26<sup>th</sup> March 2010. (Attendance sheet)</li> <li>Minute of meeting date 26<sup>th</sup> March 2010 (PBC report NP 260310)</li> <li>Photographs of stakeholder meeting on 26<sup>th</sup> March 2010.</li> </ul>
<b>/SLP/</b>	<ul style="list-style-type: none"> <li>Site layout plan (Layout of open lagoon system) (Site Layout Plan)</li> <li>Single line diagram for metering system and electricity flow for the project activity</li> <li>Measuring campaign: COD measuring points diagram</li> </ul>
<b>/TD/</b>	Technical data/document related to the project plant: <ul style="list-style-type: none"> <li>Technical details of key equipment used in the wastewater treatment plant MABR provided by the technology supplier <ul style="list-style-type: none"> <li>Volumetric capacity of the MABR</li> <li>COD removal efficiency (MABR Guarantee PE 040110)</li> </ul> </li> </ul>

Reference	Document
	<ul style="list-style-type: none"> <li>▪ Electricity consumption</li> <li>▪ Technical Life time of the MABR and gas engines (MABR Guarantee PE 040110)</li> <li>▪ Technical details of biogas generators, 1 MW, and life time</li> <li>▪ Technical details of radiant tube burner and life time (Radiant tube Burner spec BKE)</li> <li>(Radiant tube lifetime) <ul style="list-style-type: none"> <li>• Technical details/type of flare system and life time (Flare spec Golden)</li> </ul> </li> </ul>
<b>/TI/</b>	<ul style="list-style-type: none"> <li>• Thai Biogas Plants- High Rate Anaerobic Fixed Film Technology for Agro Industry Wastewater; Chaiprasert P, et.al., KMUTT, 2003 (Article about Potential Biogas in Agro by KMUTT)</li> <li>• Implementation of biogas system in starch industry from Thai Tapioca Starch Association, 2009 (TTSA letter 290909)</li> </ul>
<b>/TR/</b>	<p>Test report</p> <ul style="list-style-type: none"> <li>• Test report of wastewater baseline lagoon system: final effluent (COD measurement campaign (pond 8))</li> </ul> <p>Test report of boiler emission: HFO combustion (Report of boiler emission CS 260310)</p>
<b>/XLS 1/</b>	Emission reduction calculation spread sheet along with initial PDD version 1
<b>/XLS 2/</b>	Emission reduction calculation spread sheet along with revise PDD version 2 At the moment this project's ER calculation spread sheet has only first version.

**Table 7-2:** Background investigation and assessment documents

Reference	Document
<b>/AMS.I.C/</b>	Thermal energy for the user with or without electricity, Version 17, Scope 1 with reference to EB 54, 2010
<b>/AMS.I.D/</b>	Grid connected renewable electricity generation, Version 16, Scope 1 with reference to EB 54, 2010
<b>/AMS.III.H/</b>	Methane Recovery in Wastewater Treatment, Version 14, Scope 13 with reference to EB 53, 2010
<b>/ARB/</b>	Brazilian Journal of Microbiology (2009), ISSN 1517-8382, the study of "PERFORMANCE OF AN ANAEROBIC BAFFLED REACTOR (ABR) IN

Reference	Document
	TREATMENT OF CASSAVA WASTEWATER
<b>/CPM/</b>	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
<b>/EB22-3/</b>	Clarification on the Consideration of National and/or Sectoral Policies and Circumstances in Baseline Scenario.
<b>/EB41-20/</b>	EB 41 Meeting Annex 20 – Indicative Simplified Baseline and Monitoring Methodologies for Selected SSC Project Activity Categories.
<b>/EB41-46//G_CDM/</b>	EB41 Meeting Annex 46 - Guidance on the demonstration and assessment of prior consideration of the CDM Glossary of CDM terms (Version 05)
<b>/G_CDM//G AIA/</b>	Glossary of CDM terms (Version 05)Guidance on the Assessment of Investment Analysis Version 02.1
<b>/GAIA//GCP/</b>	Guidance on the Assessment of Investment Analysis Version 02.1UNFCCC: Guidelines for completing CDM-PDD and CDM-NM
<b>/GCP//IPCC-GP/</b>	UNFCCC: Guidelines for completing CDM-PDD and CDM-NMIPCC Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories, 2000
<b>/IPCC-GP//IPPC-RM/</b>	IPCC Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories, 2000Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual
<b>/IPPC-RM//KORAT /</b>	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference ManualKorat Waste to Energy Project (Registered on 16 June 2007, Ref 1040) PDD
<b>/KORAT//KP /</b>	Korat Waste to Energy Project (Registered on 16 June 2007, Ref 1040) PDDKyoto Protocol (1997)
<b>/KP//MA/</b>	Kyoto Protocol (1997)Decision 3/CMP. 1 (Marrakesh – Accords & Annex to decision (17/CP.7))
<b>/MA//TA/</b>	Decision 3/CMP. 1 (Marrakesh – Accords & Annex to decision (17/CP.7))Tool for the demonstration and assessment of additionality (Ver. 4 – Ver.5.2).
<b>/FT/</b>	Tool to determine project emissions from flaring gases containing methane, EB 28 Annex 13
<b>/TA//TEF/</b>	Tool for the demonstration and assessment of additionality (Ver. 4 – Ver.5.2).Tool to calculate the emission factor for an electricity system

Reference	Document
	(Version 2, Annex 14; EB 50)
<b>/TEF//TLT/</b>	Tool to calculate the emission factor for an electricity system (Version 2, Annex 14; EB 50) Tool to determine the remaining lifetime of equipment
<b>/TLT//VVM/</b>	Tool to determine the remaining lifetime of equipment Validation and Verification Manual (Version 1.2, Annex 1; EB 55)
<b>/VVM/</b>	Validation and Verification Manual (Version 1.2, Annex 1; EB 55)

**Table 7-3:** Websites used

Reference	Link	Organisation
<b>/biotec/</b>	<a href="http://www.biotec.or.th">http://www.biotec.or.th</a>	National of Genetic Engineering and Biotechnology, Thailand
<b>/bot/</b>	<a href="http://www.bot.or.th">http://www.bot.or.th</a>	Bank of Thailand
<b>/dede/</b>	<a href="http://www.dede.go.th/dede/index.php?id=174">http://www.dede.go.th/dede/index.php?id=174</a>	Department of Alternative Energy Development and Efficiency, Thailand: Report
<b>/dede-1/</b>	<a href="http://www.eppo.go.th/vrs/VRS38-10-Biomass.html">http://www.eppo.go.th/vrs/VRS38-10-Biomass.html</a>	Department of Alternative Energy Development and Efficiency, Thailand: Biogas production cost
<b>/dna/</b>	<a href="http://www.tgo.or.th">http://www.tgo.or.th</a>	Thailand Greenhouse Gas Management Organization (DNA of Thailand)
<b>/efe/</b>	<a href="http://www.efe.or.th/home.php?ds=preview&amp;back=content&amp;mid=cMS7s93qtBdrFxPI&amp;doc=VyQw6kpDug7JdfxY">http://www.efe.or.th/home.php?ds=preview&amp;back=content&amp;mid=cMS7s93qtBdrFxPI&amp;doc=VyQw6kpDug7JdfxY</a>	The Energy for Environmental Foundation website
<b>/maps/</b>	<a href="http://maps.google.com/">http://maps.google.com/</a>	Google Maps
<b>/ipcc/</b>	<a href="http://www.ipcc-nggip.iges.or.jp">www.ipcc-nggip.iges.or.jp</a>	IPCC publications
<b>/set/</b>	<a href="http://www.set.or.th/en/market/market_statistics.html">http://www.set.or.th/en/market/market_statistics.html</a>	The Stock Exchange of Thailand
<b>/ttsa/</b>	<a href="http://www.thaitapiocastarch.org/">http://www.thaitapiocastarch.org/</a>	Thai Tapioca Starch Association (TTSA)

Reference	Link	Organisation
/unfccc/	<a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a>	UNFCCC

**Table 7-4:** List of interviewed persons

Reference	Mol <sup>1</sup>		Name	Organisation / Function
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Roland Vogel	EnBW Senior Project Manager
		<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Christine Clashausen	EnBW CDM Senior Expert
		<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Tharasri Wongsriwattanakul	EnBW Project Manager
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Somsak Tancharoensuukjit	NP Biopower Co., Ltd Director
/IM03/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Vivat Khositsakul	Advance Energy Plus Co.,Ltd. Assistance Managing Director
		<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Jetsada Falert	Advance Energy Plus Co.,Ltd. CDM Project Manager
		<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Ruethai Trungkavashirakun	Advance Energy Plus Co.,Ltd. Assistance CDM Project
/IM04/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Warungoo Songkram	Premier Energy Co., Ltd. Environmental Engineer
/IM05/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Yui Janrodganawong	Vice Local Administration
		<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Wanna Chokpraserdthawarn	Ban Koh Rak Siad School Teacher
		<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Youwapa Kaewpradit	Head of Villager Moo 2
		<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Cherd Kaewlerd	Villager Moo 7

<sup>1)</sup> Means of Interview: (Telephone, E-Mail, Visit)



# ANNEX

- A1:** Validation Protocol
- A2:** Assessment of Baseline Identification
- A3:** Assessment of Financial Parameters
- A4:** Assessment of Barrier analysis
- A5:** Outcome of the GSCP
- A6:** Appointment certificates of the team members

## ANNEX 1: VALIDATION PROTOCOL

**Table A-1: Requirements ChecklistN**

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<b>A. General Description of Project Activity</b>				
<b>A.1. Approval</b> <i>The written approval of the parties involved is a mandatory requirement</i>				
<p>A.1.1. Has the project provided written approvals of all parties involved? (EB 55 Annex 1, § 44)</p> <p><i>Indicate whether a letter of approval has been received, with a clear reference to the supporting documentation.</i></p> <p><i>Indicate whether this letter was provided to the DOE by the project participants or directly by the DNA</i></p>	<p><i>Description:</i> No, the letters of approval of all parties are pending.</p> <p><i>Justification of evidences:</i> No documents were provided to the DOE. During the site visit the status of the approvals were discussed.</p> <p><i>Conclusion:</i> The letters of approval of all parties are pending. The LoA from Germany will be issued on the basis of the Final Validation Report.</p>	<p>/HCA/ /LOA/</p>	<p>CAR A1</p>	<p>Not yet OK OK</p>
A.1.2. Are the approvals issued	<i>Description:</i> Please refer to section A.1.1.	/HCA/	CAR	Not

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>from organisations listed as DNAs on the UNFCCC CDM website?</p> <p>(EB 55 Annex 1, §§ 44, 47, 48, 49 (b), 49 (c), 53)</p> <p><i>Indicate the means of validation employed to assess the authenticity, i.e. in case of doubt whether LoA has been verified with the DNA. Further describe which entity submitted the LoA for validation.</i></p>	<p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	/LOA/	A1	<del>Not yet OK</del> OK
<p>A.1.3. Do the written approvals confirm that the corresponding party is a Party to the Kyoto Protocol?</p> <p>(EB 55 Annex 1, § 45(a))</p>	<p><i>Description:</i> Please refer to section A.1.1.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	/HCA/ /LOA/	CAR A1	<del>Not yet OK</del> OK
<p>A.1.4. Do the written approvals confirm that the participation is voluntary?</p> <p>(EB 55 Annex 1, § 45(b))</p>	<p><i>Description:</i> Please refer to section A.1.1.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	/HCA/ /LOA/	CAR A1	<del>Not yet OK</del> OK
<p>A.1.5. Does the written approval from the host country</p>	<p><i>Description:</i> Please refer to section A.1.1.</p>	/HCA/ /LOA/	CAR A1	<del>Not yet OK</del> OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.				
confirm that the project contributes to the sustainable development in the country?  (EB 55 Annex 1, § 45(c))	<i>Justification of evidences:</i>  <i>Conclusion:</i>			OK				
A.1.6. Do the written approvals refer to the precise project title in the PDD submitted for registration or an additional specification of the project activity, e.g. PDD version number?  (EB 55 Annex 1, §§ 45(d), 50)	<i>Description:</i> Please refer to section A.1.1.  <i>Justification of evidences:</i>  <i>Conclusion:</i>	/HCA/  /LOA/	CAR A1	Not yet OK  OK				
A.1.7. Are the written approvals unconditional with regard to A.1.3 to A.1.6?  (EB 55 Annex 1, § 46)	<i>Description:</i> Please refer to section A.1.1.  <i>Justification of evidences:</i>  <i>Conclusion:</i>	/HCA/  /LOA/	CAR A1	Not yet OK  OK				
A.1.8. Is the information regarding the project participants listed in section A3 and in Annex 1 of the PDD internally consistent to each other?	<i>Description:</i> No, the host country, Thailand, project participant listed in section A3 and Annex 1 are not consistent. <table><tr><td>Section A3</td><td>NP Biopower Co. Ltd,</td></tr><tr><td>Annex1</td><td>NP Biopower Co., Ltd</td></tr></table> The Annex I country's project participant, EnBW Energie Baden-Württemberg AG, is	Section A3	NP Biopower Co. Ltd,	Annex1	NP Biopower Co., Ltd	/HCA/  /LOA/  /PDD/	CAR A3	OK
Section A3	NP Biopower Co. Ltd,							
Annex1	NP Biopower Co., Ltd							

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 55 Annex 1, § 51)	<p>consistent in both section</p> <p><i>Justification of evidences:</i> PDD and by mean of interview</p> <p><i>Conclusion:</i> The name of the host country project participant listed in section A3 and Annex 1 of the PDD is not consistent to each other.</p>			
<p>A.1.9. Are all project participants listed in the PDD approved at least by one Party involved?</p> <p>(EB 55 Annex 1, § 51)</p> <p><i>Indicate whether the participation of the project participant(s) has been approved by a Party to the Kyoto Protocol.</i></p> <p><i>Describe the means of validation employed to draw this conclusion.</i></p>	<p><i>Description:</i> Please refer to section A.1.1.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	<p>/HCA/ /LOA/ /PDD/</p>	<p>CAR A1</p>	<p><del>Not yet OK</del> OK</p>
<p>A.1.10. Are any other project participants approved but not listed in the PDD?</p> <p>(EB 55 Annex 1, § 52)</p>	<p><i>Description:</i> Please refer to section A.1.1.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	<p>/HCA/ /LOA/ /PDD/</p>	<p>CAR A1</p>	<p><del>Not yet OK</del> OK</p>

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>A.1.11. Does the DoE have a direct contractual relationship with the PP? (EB 55 Annex 1, § 51; EB 50 Annex 48, §§ 7–9)</p> <p>Check whether the PPs listed in the published PDD are still listed in the PDD going to be submitted to request for registration.</p>	<p><i>Description:</i> The contract was signed between TÜV NORD Cert GmbH and EnBW Energie Baden-Württemberg AG</p> <p><i>Justification of evidences:</i> the validation proposal between TÜV NORD Cert GmbH and EnBW Energie Baden-Württemberg AG, No.: 10CDM0692, 2010.06.09</p> <p><i>Conclusion:</i> The DOE have a direct contractual relationship with the project participant.</p>	<p>/CA/ /PDD/</p>	OK	
<p><b>A.2. Contribution to Sustainable Development</b></p> <p>The project's contribution to sustainable development is assessed.</p>				
<p>A.2.1. Has the host country confirmed that the project assists it in achieving sustainable development? (EB 55 Annex 1, §§ 125–127)</p> <p>Contains a statement confirming whether the letter of approval by the DNA of the host party confirmed the contribution of the project to the sustainable development of the Host</p>	<p><i>Description:</i> Please refer to section A.1.1.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>	<p>/HCA/ /PDD/</p>	CAR A1	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.						
Party.										
A.2.2. Will the project create other environmental or social benefits than GHG emission reductions?  (EB 55 Annex 1, §§ 125–127) <i>Describe the other positive aspects not related to GHG emission reduction on the environment.</i>	<p><i>Description:</i> According to the PDD the proposed project activity creates other environmental and social benefits as following, also with the beneficial in local and national economics:</p> <table><tr><td>Environmental benefits</td><td><ol style="list-style-type: none"><li>1. Improvement of water quality in these lagoons,</li><li>2. Reduction of the unpleasant odor caused by the treatment of organic wastewater in open lagoons,</li><li>3. Reduction of GHG emissions from the use of fossil fuels.</li></ol></td></tr><tr><td>Economic benefits</td><td><ol style="list-style-type: none"><li>1. Utilization of the biogas as a new indigenous fuel source in Thailand and hence a reduction in the import of fossil fuels from overseas,</li><li>2. Earnings of foreign exchange from sale of CERs to Annex I country,</li><li>3. New business field (energy generation and sales) within the agro-industry sector.</li><li>4. Reduction of the fuel costs within factory.</li></ol></td></tr><tr><td>Social benefits</td><td><ol style="list-style-type: none"><li>1. Creation of employment opportunities for local skilled workers during construction and operation,</li><li>2. Provision of staff training to improve their technical skills.</li></ol></td></tr></table> <p>The view of project participants on the contribution of the proposed project activity towards sustainable development is described in section A.2 of the PDD and the table above.</p> <p><i>Justification of evidences:</i> The PDD was reviewed and interviews were conducted with the project participants and local stakeholders.</p>	Environmental benefits	<ol style="list-style-type: none"><li>1. Improvement of water quality in these lagoons,</li><li>2. Reduction of the unpleasant odor caused by the treatment of organic wastewater in open lagoons,</li><li>3. Reduction of GHG emissions from the use of fossil fuels.</li></ol>	Economic benefits	<ol style="list-style-type: none"><li>1. Utilization of the biogas as a new indigenous fuel source in Thailand and hence a reduction in the import of fossil fuels from overseas,</li><li>2. Earnings of foreign exchange from sale of CERs to Annex I country,</li><li>3. New business field (energy generation and sales) within the agro-industry sector.</li><li>4. Reduction of the fuel costs within factory.</li></ol>	Social benefits	<ol style="list-style-type: none"><li>1. Creation of employment opportunities for local skilled workers during construction and operation,</li><li>2. Provision of staff training to improve their technical skills.</li></ol>	/PDD/ /IM01/ /IM02/ /IM05/	OK	
Environmental benefits	<ol style="list-style-type: none"><li>1. Improvement of water quality in these lagoons,</li><li>2. Reduction of the unpleasant odor caused by the treatment of organic wastewater in open lagoons,</li><li>3. Reduction of GHG emissions from the use of fossil fuels.</li></ol>									
Economic benefits	<ol style="list-style-type: none"><li>1. Utilization of the biogas as a new indigenous fuel source in Thailand and hence a reduction in the import of fossil fuels from overseas,</li><li>2. Earnings of foreign exchange from sale of CERs to Annex I country,</li><li>3. New business field (energy generation and sales) within the agro-industry sector.</li><li>4. Reduction of the fuel costs within factory.</li></ol>									
Social benefits	<ol style="list-style-type: none"><li>1. Creation of employment opportunities for local skilled workers during construction and operation,</li><li>2. Provision of staff training to improve their technical skills.</li></ol>									

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.				
	<i>Conclusion:</i> By means of document review, interviews and knowledge of the validation team it can be confirmed that the proposed project creates other environmental or social benefits than GHG emission reductions like creation of eemployment opportunities for local skilled workers during construction and operation .							
<b>A.3. PDD editorial aspects</b> <i>The PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website.</i>								
A.3.1. Has the latest version of the PDD form been applied?  (EB 55 Annex 1, § 55)	<i>Description:</i> The proposed project activity is applied PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD) - Version 03  <i>Justification of evidences:</i> UNFCCC website <a href="http://cdm.unfccc.int/Reference/Documents">http://cdm.unfccc.int/Reference/Documents</a> and the PDD are reviewed.  <i>Conclusion:</i> The latest version of the PDD form has been applied.	/GCP/  /PDD/  /unfccc/	OK					
A.3.2. Has the PDD been duly filled in accordance with the latest guidance(s)?  (EB 55 Annex 1, §§ 56–57)	<i>Description:</i> The PDD has not been filled in accordance with the latest guidance. <table border="1"><tr><td></td><td>Section</td></tr><tr><td>The table formatting has been modified.</td><td>A.4.3 B.7.1</td></tr></table> <i>Justification of evidences:</i> The Guidelines for completing the simplified project design		Section	The table formatting has been modified.	A.4.3 B.7.1	/GCP/  /PDD/  /unfccc/	CAR A3	OK
	Section							
The table formatting has been modified.	A.4.3 B.7.1							



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	document (CDM-SSC-PDD) and the form for proposed new small scale methodologies (CDM-SSC-NM) Version 05 and the PDD were reviewed.  <i>Conclusion:</i> The PDD has not been duly filled in accordance with the latest guidance.			
<b>A.4. Technology to be employed</b>  <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The DOE should ensure that environmentally safe and sound technology and know-how is used.</i>				
A.4.1. Does the PDD contain a clear, accurate and complete project description?  (EB 55 Annex 1, §§ 58–59) <i>The PDD shall contain a clear description of the project activity which provides the reader with a clear understanding of the precise nature of</i>	<i>Description:</i> The project description is given in various parts of the PDD (esp. In sections A.2 and A.4.2 and A.4.3).  <i>Justification of evidences:</i> The validation team has verified the relevant sections of the PDD. Furthermore the description was compared with the proposed project activity during an on-site validation, technical evidences and by mean of interview.  <i>Conclusion:</i> In general the project description can be assessed as clear, accurate,	/PDD/ /SLP/ /TD/ /IM02/ /IM03/ /IM04/	CAR B2  CAR B3	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p><i>the project activity and the technical aspects of its implementation.</i></p> <p><i>Pl. consider esp. chapters A.2, A.4.2 and A.4.3 (in case of LSC PDD) for assessment.</i></p> <p><i>Describe the process undertaken to validate the accuracy and completeness of the project description.</i></p> <p><i>Contain the DOE's opinion on the accuracy and completeness of the project description.</i></p>	<p>complete and sufficient to provide the reader with a profound understanding of the project activity.</p> <p>However, during site visit some issue which not relevant to the prescription addressed in the PDD. The CAR B2 and CAR B3 were raised.</p>			
<p>A.4.2. Is this description in accordance with the real situation or (in case of greenfield projects) is it most likely that the project will be implemented acc to the project description?</p>	<p><i>Description:</i> The description of the proposed project activity in the PDD was checked during the onsite validation. The wastewater treatment plant, MABR, laboratory and foundation are under the construction phase. The heat transfer for new biogas boiler was presented during the onsite validation.</p> <p><i>Justification of evidences:</i> the PDD, technical description of the technology, by mean of interview with the technology supplier</p> <p><i>Conclusion:</i> It most likely that the project will be implemented according to the project description.</p>	<p>/PDD/ /SLP/ /TD/ /IM02/ /IM03/ /IM04/</p>	OK	
<p>A.4.3. In case the project involves alteration of the existing installation or process, is a clear description available</p>	<p><i>Description:</i> The proposed project activity does not involve alteration of the existing installation or process. The pre-project situation is the series of cascade anaerobic condition of 8 opened lagoons without the methane capture facility. The proposed project activity is MABR, wastewater treatment system with methane capture facility.</p> <p><i>Justification of evidences:</i> The PDD was reviewed and an onsite visit of the existing</p>	<p>/PDD/ /SLP/ /TD/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>regarding the differences between the project and the pre-project situation?</p> <p>(EB 55 Annex 1, §§ 63–64)</p> <p><i>Describe the steps taken to validate this issue.</i></p>	<p>lagoons series and MABR construction site was conducted. Also, by mean of interview with the project developer and technology provider</p> <p><i>Conclusion:</i> The proposed project activity does not involve alteration of the existing installation or process.</p>	<p>/IM02/ /IM03/ /IM04/</p>		
<p>A.4.4. Does the project design engineering reflect current good practices?</p> <p><i>Consider the equipment specifications, literature (e.g. EU BREF papers) and professional experiences. Describe the process undertaken to assess the engineering.</i></p>	<p><i>Description:</i> The proposed project activity uses the Modified Anaerobic Baffled Reactor (MABR) technology to treat the wastewater generated from the starch plant. The MABR digester is a combination of two keys techniques: the up flow system and the cover lagoon methane capture. The wastewater is pumped to the bottom of the earth pond type digester to create the up flow wastewater stream. The advantage of this type of digester is, the pond can be adjusted and excavated to suite the project geography, comparing to fixed type concrete digester.</p> <p>The captured biogas will be used as fuel to replace heavy fuel oil (HFO) consumption for the starch drying purposes. In case of surplus biogas, project owner will install an electricity gas engine system to produce electricity. In case of emergency an open flare will also be installed.</p> <p>The radiant tube burner is a combination of two key processes; the biogas combustion process and the heat transfer process. The treated biogas is delivered from the wastewater system and injected to the combustion chamber to combust. The LPG will be used for the start up ignition. The radiant tube, placed in the air tunnel, is heated. The ambient air temperature is blown through the heat transfer system by the electric blower. The hot air after the heat transfer system is delivered to the starch drying process. The hot air is directly contact with muddy type starch in a cyclone chamber. The cold air is pumped to the last chamber to cool down the dry starch.</p> <p><i>Justification of evidences:</i> The technical specification of MABR and radiant tube burner system are reviewed. Also, by mean of interview with the MABR technology suppliers and the professional experience of validation teams.</p>	<p>/PDD/ /SLP/ /TD/ /IM02/ /IM03/ /IM04/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<i>Conclusion:</i> the project design engineering reflect current good practices			
<p>A.4.5. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?</p> <p><i>Describe the process undertaken to assess the state of the art technology.</i></p>	<p><i>Description:</i> Please refer to A.4.4. Also, the commonly used technologies in the host country, is the series of the open lagoons.</p> <p><i>Justification of evidences:</i> The technical specification of MABR and radiant tube burner system are reviewed. Furthermore an interview with the MABR technology suppliers was conducted. The literatures and design wastewater treatment system, opened lagoons, from the licensed engineer, Department of Industrial Work was provided by the project participant.</p> <p><i>Conclusion:</i> The project use state of the art technology result in a significantly better performance than any commonly used technologies in the host country</p>	<p>/BLS/ /PDD/ /SLP/ /TD/ /IM02/ /IM03/ /IM04/</p>	OK	
<p>A.4.6. Does the project make provisions for meeting training and maintenance needs?</p> <p><i>Describe the process undertaken to assess the maintenance and training needs.</i></p>	<p><i>Description:</i> The project participant has signed a contract with the technology provide to provide the maintenance service to the proposed project activity. The contract defines that engineers from technology provider will be stationed at the project activity location to operate and provide support until the project is hand over to the project participant. The operators will be trained on general knowledge on equipment installed, knowledge in reading, recording and processing the data, inspection and maintenance, calibration and emergency responds.</p> <p><i>Justification of evidences:</i> The signed contract between project participant and technology provider was reviewed. Furthermore an interview with the technology supplier was conducted.</p>	<p>/CM14/ /IM02/ /IM03/ /IM04/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<i>Conclusion:</i> The project makes provisions to provide necessary training and maintenance needs to operate the proposed project activity.			
<b>A.5. Small scale project activity</b>  <i>It is assessed whether the project qualifies as small-scale CDM project activity</i>				
A.5.1. Does the project qualify as a small scale CDM project activity as defined in decision 4 / CMP.1 annex II?  (EB 55 Annex 1, §§ 135–136 (a))	<div><div><div><div>Type III of SSC</div><div>The ex-ante emission reduction due to the wastewater treatment is approximated 18 kt CO<sub>2</sub>e less than 60 kt CO<sub>2</sub>e annually from all type III components of the project activity.</div></div><div><div>Type I of SSC</div><div>The electricity output production capacity is 1.0 MW which is less than 15 MW  The thermal generation capacity is 3.0 MW<sub>thermal</sub> which is less than 45 MW<sub>thermal</sub></div></div></div><div><i>Description:</i> The proposed project activity is qualified the requirements of the simplified modalities and procedures for small-scale CDM project activities as below:  <i>Justification of evidences:</i> Relevant ddocuments related to the project specification (biogas boiler and generator) were reviewed. Also, an interview with the technology supplier was conducted.  <i>Conclusion:</i> The project qualify as a small scale CDM project activity as defined in decision 4 / CMP.1 annex II</div></div>	/PDD/  /IM03/  /IM04/  /unfccc/	OK	
A.5.2. Does the project apply one	<i>Description:</i> The proposed project activity is applied three approved small scale	/PDD/	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.																											
of the approved small scale categories and any methodology and tool referred therein?  (EB 55 Annex 1, § 136 (b)) <i>Check, if applicable the expiry dates of the applied methodology. Further, take into consideration the general guidance to the methodologies<sup>1</sup>, which provide guidance on equipment capacity, equipment performance, sampling and other monitoring related issues.</i>	methodologies: <table><tr><th>Methodology</th><th>Version</th><th>Validity</th></tr><tr><td>AMS-III.H. Methane recovery in wastewater treatment</td><td>14</td><td>Requests for registration can be submitted until 2011.04.12 23:59 GMT</td></tr><tr><td>AMS-I.C. Thermal energy production with or without electricity</td><td>17</td><td>Valid from 2010.06.11 onwards</td></tr><tr><td>AMS-I.D. Grid connected renewable electricity generation</td><td>16</td><td>Valid from 2010.06.11 onwards</td></tr></table> <table><tr><th>Tool</th><th>Version</th><th>EB</th></tr><tr><td>Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion</td><td>02</td><td>EB41 Annex 11</td></tr><tr><td>Tool to calculate the emission factor for an electricity system</td><td>02</td><td>EB50 Annex 14</td></tr><tr><td>Tool to calculate baseline, project and/or leakage emissions from electricity consumption</td><td>01</td><td>EB39 Annex 7</td></tr><tr><td>Tool to determine project emissions from flaring gases containing methane</td><td>0</td><td>EB28 Annex 13</td></tr></table> <i>Justification of evidences:</i> The methodologies and tools applied in the PDD were reviewed and cross checked the methodologies on the UNFCCC website.	Methodology	Version	Validity	AMS-III.H. Methane recovery in wastewater treatment	14	Requests for registration can be submitted until 2011.04.12 23:59 GMT	AMS-I.C. Thermal energy production with or without electricity	17	Valid from 2010.06.11 onwards	AMS-I.D. Grid connected renewable electricity generation	16	Valid from 2010.06.11 onwards	Tool	Version	EB	Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion	02	EB41 Annex 11	Tool to calculate the emission factor for an electricity system	02	EB50 Annex 14	Tool to calculate baseline, project and/or leakage emissions from electricity consumption	01	EB39 Annex 7	Tool to determine project emissions from flaring gases containing methane	0	EB28 Annex 13	/AMS.I.C/  /AMS.I.D/  /AMS.III.H/  /unfccc/		
Methodology	Version	Validity																													
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Tool to calculate baseline, project and/or leakage emissions from electricity consumption	01	EB39 Annex 7																													
Tool to determine project emissions from flaring gases containing methane	0	EB28 Annex 13																													

<sup>1</sup> <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<i>Conclusion:</i> By means of document review the proposed project applies the approved small scale categories and methodologies and tools referred therein.			
<p>A.5.3. Is the small scale project activity not a debundled component of a larger project activity?</p> <p>(EB 55 Annex 1, § 136 (c))</p> <p><i>Describe the steps taken to validate this issue. PI refer to the Compendium of guidance on debundling (EB 36, Annex 27-54, Annex 13).</i></p>	<p><i>Description:</i> Yes, the proposed project activity is the small scale project activity. It is not the debundled component of a large scale project activity. There is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity:</p> <ul style="list-style-type: none"> <li>• With the same project participants;</li> <li>• In the same project category and technology/measure; and</li> <li>• Registered within the previous 2 years; and</li> <li>• Whose project boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point.</li> </ul> <p><i>Justification of evidences:</i> The affidavit of project participant, NP, is reviewed. Also, confirmation during onsite visit and by mean of interview with the project participant.</p> <p><i>Conclusion:</i> The proposed project activity is not a debundled component of a lager project activity.</p>	<p>/SC/ /IM02/</p>	OK	
<p>A.5.4. Is an assessment of the environmental impacts of the proposed SSC CDM project activity required by the host Party?</p> <p>(EB 55 Annex 1, § 136 (d))</p>	<p><i>Description:</i> No assessment of the environmental impacts of the proposed project activity is required by the host country, Thailand.</p> <p><i>Justification of evidences:</i> By the knowledge of the host country validation team and the regulation from Office of Natural Resources and Environmental Policy and Planning, Thailand.</p> <p><i>Conclusion:</i> An assessment of the environmental impacts is not required by the host party.</p>	/LR/	OK	
<b>B. Project Baseline,</b>				



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.												
<b>Additionality and Monitoring Plan</b>																
<b>B.1. Application of the Methodology</b>																
<div>B.1.1. Does the project apply an approved and applicable CDM methodology and a valid version thereof?  (EB 55 Annex 1, § 65) <i>Describe the steps taken to validate this issue.</i></div>	<div><i>Description:</i> The proposed project activity applies the following applicable CDM methodologies:<table><tr><th>Methodology</th><th>Version</th><th>Validity</th></tr><tr><td>AMS-III.H. Methane recovery in wastewater treatment</td><td>14</td><td>Requests for registration can be submitted until 2011.04.12 23:59 GMT</td></tr><tr><td>AMS-I.C. Thermal energy production with or without electricity</td><td>17</td><td>Valid from 2010.06.11 onwards</td></tr><tr><td>AMS-I.D. Grid connected renewable electricity generation</td><td>16</td><td>Valid from 2010.06.11 onwards</td></tr></table></div> <div><i>Justification of evidences:</i> The PDD and emission reduction calculation was reviewed and cross checked the methodology on the UNFCCC website.</div> <div><i>Conclusion:</i> By means of document check it can be confirmed that he project applies an approved and applicable CDM methodology and a valid version thereof.</div>	Methodology	Version	Validity	AMS-III.H. Methane recovery in wastewater treatment	14	Requests for registration can be submitted until 2011.04.12 23:59 GMT	AMS-I.C. Thermal energy production with or without electricity	17	Valid from 2010.06.11 onwards	AMS-I.D. Grid connected renewable electricity generation	16	Valid from 2010.06.11 onwards	<div>/PDD/  /AMS.I.C/  /AMS.I.D/  /AMS.III.H/  /unfccc/</div>	OK	
Methodology	Version	Validity														
AMS-III.H. Methane recovery in wastewater treatment	14	Requests for registration can be submitted until 2011.04.12 23:59 GMT														
AMS-I.C. Thermal energy production with or without electricity	17	Valid from 2010.06.11 onwards														
AMS-I.D. Grid connected renewable electricity generation	16	Valid from 2010.06.11 onwards														
<div>B.1.2. Is the applied CDM methodology identical with the version available on the UNFCCC website?  (EB 55 Annex 1, §§ 65, 70) <i>Describe the steps taken to validate</i></div>	<div><i>Description:</i> Please refer to B.1.1.</div> <div><i>Justification of evidences:</i> The methodologies applied in the PDD are reviewed with the latest version of methodologies on the UNFCCC website</div> <div><i>Conclusion:</i> The applied CDM methodologies are identical with the latest version available on the UNFCCC website.</div>	<div>/PDD/  /AMS.I.C/  /AMS.I.D/  /AMS.III.H/</div>	OK													

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>this issue.</i>		/unfccc/		
<p>B.1.3. Are all applicability criteria in the methodology, the applied tools or any other methodology component referred to therein fulfilled?</p> <p>(EB 55 Annex 1, §§ 66(a)–(b), 68, 71, 76)</p> <p><i>Describe for <u>each</u> applicability criterion listed in the selected approved methodology the steps taken to assess the information contained in the PDD.</i></p>	<p><i>Description:</i> According to the PDD section B2. the proposed project activity fulfil all the applicability criteria in the methodologies.</p> <p><i>Justification of evidences:</i> The PDD was reviewed and checked with the applicability criterias of the applied methodologies and tools.</p> <p><i>Conclusion:</i> By means of document review it can be confirmed that all applicability criteria in the methodology, the applied tools or any other methodology component are fulfilled.</p>	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/ /unfccc/</p>	OK	
<p>B.1.4. In case one or more applicability criteria have not been met, has the validation team requested clarification to, revision of or deviation from the methodology in accordance with the latest guidelines?</p>	<p><i>Description:</i> All the applicability criteria have been met. Please refer to B.1.3.</p> <p><i>Justification of evidences:</i> The PDD is reviewed and cross check with the applied methodologies and tool.</p> <p><i>Conclusion:</i> All the applicability criteria have been met</p>	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/ /unfccc/</p>	OK	

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
(EB 55 Annex 1, §§ 72–75)				
<p>B.1.5. Is the project in accordance with every other stipulation or requirement mentioned in all sections of the methodology and in guidances for approved methodologies provided by the CDM EB?</p> <p>(EB 55 Annex 1, § 69, 71)</p> <p><i>Describe the steps taken to check whether the proposed project activity meets <u>all the other possible stipulations and /or limitations</u> mentioned in all sections of the approved methodology selected.</i></p>	<p><i>Description:</i> Please refer to B.1.3.</p> <p><i>Justification of evidences:</i> The PDD is reviewed and cross check with the applied methodologies and tool.</p> <p><i>Conclusion:</i> The project is in accordance with every other stipulation or requirement mentioned in all sections of the applied methodologies and tools.</p>	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/ /unfccc/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<b>B.2. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project</i>				
<b>B.2.1. Are the project's spatial boundaries (geographical) clearly defined?</b>  (EB 55 Annex 1, §§ 67(a), 78–80) <i>Provide information on how the validation of the geographical boundary has been performed either based on reviewed documented evidence or by describing what was observed/viewed during a site visit.</i>	<p><i>Description:</i> The project boundary encompasses the physical, geographical site of the starch wastewater treatment plant with the biogas boiler and biogas engine including open-flare system for an emergency situation. However, the boundary line diagram described in section B.3. of the PDD appears to be incomplete illustration:</p> <ol style="list-style-type: none"> <li>1. The existing HFO boiler is not included in the project boundary.</li> <li>2. The LPG is using for the biogas start up process.</li> <li>3. The biogas treatment process, sulphur and humidity, are not included in the project boundary.</li> </ol> <p><i>Justification of evidences:</i> PDD is reviewed. The onsite visit and by mean of interview with the technology supplier and the project participants.</p> <p><i>Conclusion:</i> The project boundary of the proposed project activity is not justified; therefore, CAR B2 and CAR B3 were raised.</p>	/PDD/ /IM02/ /IM03/ /IM04/	CAR B3  CAR B46	OK
<b>B.2.2. Are all sources and GHGs included in the project boundary as required in the applied methodology?</b>  (EB 55 Annex 1, §§ 67(a), 78–80) <i>Provide information on how the validation of the GHGs and sources has been performed either based on reviewed documented evidence or by</i>	<p><i>Description:</i> For the baseline scenario, the following emission sources are included/excluded in the project boundary:</p> <p><u>Wastewater treatment process</u></p> <p>CH<sub>4</sub>: Included because it is the major source of emissions in the baseline scenario.</p> <p>N<sub>2</sub>O: Excluded for simplification. This is conservative.</p> <p>CO<sub>2</sub>: Excluded because CO<sub>2</sub> emissions from the decomposition of organic waste are not accounted for.</p> <p><u>Electricity consumption/generation</u></p>	/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/ /IM02/	CAR B3	OK

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<i>describing what was observed/viewed during a site visit.</i>	<p>CO<sub>2</sub>: Included because electricity is generated with biogas from anaerobic digesters under the project activity, and electricity generation in the grid is displaced by the proposed project activity.</p> <p>CH<sub>4</sub>: Excluded for simplification. This is conservative.</p> <p>N<sub>2</sub>O: Excluded for simplification. This is conservative.</p> <p><u>Thermal energy generation</u></p> <p>CO<sub>2</sub>: Included because thermal energy is generated with biogas from an anaerobic digester under the project activity, and on-site thermal energy generation is displaced by the proposed project activity.</p> <p>CH<sub>4</sub>: Excluded for simplification. This is conservative.</p> <p>N<sub>2</sub>O: Excluded for simplification. This is conservative.</p> <p>For the project activity, the following emission sources are included/excluded in the project boundary:</p> <p><u>Wastewater treatment process</u></p> <p>CH<sub>4</sub>: Included because the treatment of wastewater causes following emissions under the project activity:</p> <ol style="list-style-type: none"> <li>1. Methane emissions from the lagoons (effluent from the treatment under the project activity is directed to lagoons);</li> <li>2. Methane emissions from flaring (excess biogas from the digester is flared);</li> <li>3. Methane emissions from land application of sludge.</li> </ol> <p>CO<sub>2</sub>: Included because CO<sub>2</sub> emissions from the grid electricity imported for MABR electricity consumption.</p> <p>N<sub>2</sub>O: Excluded because the project does not involve land application of sludge.</p>	/IM03/  /IM04/		

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<p><u>On-site electricity use</u></p> <p>CO<sub>2</sub>: Excluded because the auxiliary load of biogas engine will be supplied from biogas generation.</p> <p>CH<sub>4</sub>: Excluded for simplification. This emission source is assumed to be very small.</p> <p>N<sub>2</sub>O: Excluded for simplification. This emission source is assumed to be very small.</p> <p><u>On-site fossil fuel consumption</u></p> <p>The LPG for biogas engine start up process, one of the GHG source during the project activity, is not mention in the PDD.</p> <p>The existing HFO boiler will be presented for the back up thermal generation in cause an emergency.</p> <p>CO<sub>2</sub>: Not identified in the PDD</p> <p>CH<sub>4</sub>: Not identified in the PDD</p> <p>N<sub>2</sub>O: Not identified in the PDD</p> <p><i>Justification of evidences:</i> The data set entry in the PDD has been cross-checked with the methodology. Furthermore, the sources were checked during the site visit.</p> <p><i>Conclusion:</i> All required sources are not justified in the project boundary. Therefore, CAR B2 and CAR B3 were raised.</p>			
B.2.3. In case the methodology allows to choose whether a source and/or gas is to be included, is the choice sufficiently explained and justified?	<p><i>Description:</i> The applied methodology does not allow choosing. Please refer to B.2.2.</p> <p><i>Justification of evidences:</i></p>		OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 55 Annex 1, §§ 67(a), 78–80) <i>Confirm if the justification provided by the PPs is reasonable, based on assessment of supporting documented evidence provided by the PPs or by onsite observations.</i>	<i>Conclusion:</i>			
<b>B.3. Baseline Identification</b> <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>				
B.3.1. What possible baseline scenarios have been considered? (EB 55 Annex 1, §§ 67(b), 83) <i>Fill in all alternatives in table A-2.</i>	<i>Description:</i> Please refer to Annex 2 “Assessment of baseline identification”. <i>Justification of evidences:</i> <i>Conclusion:</i>		OK	
B.3.2. Is the list of alternatives complete? (EB 55 Annex 1, §§ 67(b), 83) <i>Describe how it was validated that all</i>	<input checked="" type="checkbox"/> All plausible alternative scenarios listed in the approved methodology have been considered. In the course of document review and site visit, it has been validated that no other alternatives which supply comparable outputs and / or services are to be taken into consideration. Thus no plausible scenario has been omitted. <input type="checkbox"/> The following alternative scenarios/options have been omitted.		OK	



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>alternatives are plausible and no plausible alternative is excluded from the consideration</i>	Corresponding CAR(s)/CL(s) has /have been issued			
<p>B.3.3. What has been identified as the baseline scenario?</p> <p>(EB 55 Annex 1, §§ 81–82, 86)</p> <p><i>Describe the chosen BL scenario, taking into consideration the technology that would be employed and / or the activities that would take place in the absence of the proposed CDM project activity.</i></p>	<p><i>Description:</i> Since the proposed project activity includes wastewater treatment, electricity and heat generation by means of biogas generation, the baseline scenario refers to all three combinations. The most plausible baseline scenario identified that would occur in the absence of the project activity is as follows:</p> <ol style="list-style-type: none"> <li>1. The baseline scenario of the wastewater treatment is “The use of open lagoons for the treatment of the wastewater”.</li> <li>2. The baseline scenario of electricity generation is “Electricity generation from the grid”.</li> <li>3. The baseline scenario of heat generation is “Heat generation using fossil fuels in a boiler”.</li> </ol> <p>For all three combinations, no specific technology is required.</p> <p><i>Justification of evidences:</i> By means of document review such as HFO invoices and site visit, the baseline scenario has been identified by the local validation team.</p> <p><i>Conclusion:</i> Since all other alternatives can be eliminated and no other credible alternatives can be considered for the baseline scenarios, the above identified alternatives are the most realistic and plausible ones.</p>	<p>/BLS/ /COD/ /FI/ /PDD/ /SLP/</p>	OK	
<p>B.3.4. Has the baseline scenario been determined according to the methodology?</p> <p>(EB 55 Annex 1, §§ 82, 87(e))</p> <p><i>Describe how it is validated that the identification of the most plausible</i></p>	<p>For details of the assessment regarding the evaluation of the baseline scenario pl. refer to table A-2.</p> <p><input checked="" type="checkbox"/> The determination has been carried out as per the procedure contained in the applied methodology.</p> <p><input type="checkbox"/> The following CARs / CLs have been identified with respect to the selection of the baseline scenario:</p>		OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>baseline scenario is carried out in accordance with the applied methodology and applied methodological tools. Please refer to table A-2.</i>				
<p>B.3.5. Has any plausible alternative scenario been excluded?</p> <p>(EB 55 Annex 1, § 83) <i>Describe how it is validated that no plausible alternative scenario has been excluded.</i></p>	<p>For details of the assessment regarding the evaluation of the baseline scenario pl. refer to table A-2.</p> <p><input checked="" type="checkbox"/> No plausible baseline scenario has been excluded.</p> <p><input type="checkbox"/> The following plausible baseline scenarios have been excluded though no adequate justification has been provided for elimination. The following CARs / CLs have been issued:</p>		OK	
<p>B.3.6. Is the identified baseline scenario reasonable and has the baseline scenario been determined using conservative assumptions where possible, including relevant references and sources?</p> <p>(EB 55 Annex 1, §§ 84–86(a)–(c)) <i>Describe whether the choice of the identified baseline scenario is reasonable by validating the <u>key assumptions</u>, <u>calculations</u> and <u>rationales</u> used in the PDD. Describe whether these are listed, relevant and</i></p>	<p><input checked="" type="checkbox"/> The baseline scenario is reasonable and has been determined using conservative assumptions where possible. Please refer to comments in table A-2 and sections B.3.2 to B.3.5 above.</p> <p><input type="checkbox"/> The following CARs / CLs have been issued because assumptions used in the baseline determination have been assessed to be not conservative</p>		OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>conservatively interpreted in the PDD.</i>				
<p>B.3.7. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?</p> <p>(EB 55 Annex 1, §§ 85, 87(d))  <i>Describe whether the PP has shown that all relevant policies and circumstances have been identified and correctly considered in the PDD in accordance with the guidance by the Board. Pl. consider the guidance EB 22 annex 3 (regarding E+ and E-policies).</i></p>	<p><i>Description:</i></p> <ol style="list-style-type: none"> <li>1. The baseline scenario of the wastewater is “The use of open lagoons for the treatment of the wastewater”.</li> <li>2. The baseline scenario of electricity generation is “Electricity generation in the grid”.</li> <li>3. The baseline scenario of heat generation is “Heat generation using fossil fuels in a boiler”.</li> </ol> <p>For all three combinations of the baseline scenario, there are no relevant national and/or sectoral policies, macro-economic trends and political aspirations.</p> <p><i>Justification of evidences:</i> The provided article about anaerobic ponds treatment of starch wastewater in Thailand has been provided and checked by the local validation team. By means of interview during site visit, it can be confirmed that there are no relevant national and/or sectoral policies, macro-economic trends and political aspirations for the chosen baseline scenarios.</p> <p><i>Conclusion:</i> The baseline scenario takes into account relevant national and/or sectoral policies, macro-economic trends and political aspirations even they are no relevant for this project activity.</p>	/TI/	OK	
<p>B.3.8. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?</p>	<p><i>Description:</i></p> <ol style="list-style-type: none"> <li>1. The baseline scenario of the wastewater is “The use of open lagoons for the treatment of the wastewater”.</li> <li>2. The baseline scenario of electricity generation is “Electricity generation in the grid”.</li> <li>3. The baseline scenario of heat generation is “Heat generation using fossil fuels</li> </ol>	<p>/FI/ /PDD/ /TI/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 55 Annex 1, § 87(a)–(c)) <i>Describe whether the documents and sources referred to in the PDD are correctly quoted and clearly referenced.</i>	in a boiler”.  <i>Justification of evidences:</i> The data, footnote, and the indicated reference have been checked during site visit. Referring to the heat generation, invoices from fuel consumption for the boiler before the project activity have been checked during site visit.  <i>Conclusion:</i> The baseline scenario of all three combinations is in line with the available data and the sources are clearly referenced.			
B.3.9. Does the PDD contain a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity. (EB 55 Annex 1, § 86)	<i>Description:</i> Please refer to B.3.8.  <i>Justification of evidences:</i> The PDD was checked with regard to the description of the identified baseline scenario.  <i>Conclusion:</i> By means of document review it can be confirmed that the PDD contains a verifiable description of the identified baseline scenario and the employed technology.	/FI/ /PDD/ /TI/	OK	
<b>B.4. Additionality Determination</b>  <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>				
<b>B.4.1. Methodology</b>				

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>B.4.1.1. Does the PDD describe how the project is additional and does the additionality justification follow the requirements of the applied methodology and/or methodological tools?</p> <p>(EB 55 Annex 1, §§ 67(d), 94–95) Describe how it is validated that additionality justification is carried out in accordance with the applied methodology and/or applied methodological tools. Further focus your assessment on the reliability and credibility of data, rationales and assumptions, justifications and documentations provided by the PP.</p>	<p><i>Description:</i> The project participant has chosen the investment and the barrier analysis to demonstrate the additionality. Both the financial and the technological barrier have been applied to demonstrate that the proposed project activity is not financially feasible without CERs.</p> <p><i>Justification of evidences:</i> The latest version of the “Tool for the demonstration and assessment of additionality”, version 05.2, has been compared with the procedure in the PDD. Furthermore, the IRR calculation has been evaluated. For the credibility of the input values used in the IRR calculations, please refer to Annex 3 “Assessment of financial parameters” and to B.4.4.</p> <p><i>Conclusion:</i> The evidences prove that the PDD describes how the project is additional and that the additionality justification follows the requirements of the applied methodology and tool.</p>		OK	
<p><b>B.4.2. Consideration of CDM before project start</b></p>				
<p>B.4.2.1. Is the project starting date reported in accordance with the CDM glossary of terms?</p>	<p><i>Description:</i> The starting date of a CDM project activity is the earliest date at which the project participant has committed to expenditures related to the implementation or to the construction of the project activity. This can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity. The starting date for this project activity as indicated in the PDD is 2010-02-22, date on which the date of signing agreement with MABR technology supplier.</p>	<p>/PDD/ /CM14/ /IM01/ /IM02/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.												
<p>(EB 55 Annex 1, § 104(a))</p> <p><i>Assess why the chosen starting date can be considered as the earliest date at which either the implementation or construction or real action of a project has begun or will begin.</i></p> <p><i>Check that no other activities related to the project that happened before the identified start date can be considered as start date. In this context please also take into consideration infrastructural expenses if they are relevant (in terms of costs and importance for the project implementation) in the specific context of the project activity.</i></p>	<p><i>Justification of evidences:</i> The starting date as mentioned in the PDD has been cross-checked with the date when the project owner signed the work order agreement with the equipment supplier. The starting date has also been compared with the definition given in the CDM glossary of terms.</p> <p><i>Conclusion:</i> The starting date is deemed correct and is in line with the glossary of CDM terms, version 5.</p>															
<p>B.4.2.2. In case the project start date is on or after 2<sup>nd</sup> August 2008 has the PP informed the DNA and UNFCCC about the intension to seek CDM status?</p> <p>(EB 55 Annex 1, §§ 99–101)</p> <p><i>Describe whether such a notification has been provided by the project participants within six months of the project activity start date; if NOT it</i></p>	<p><i>Description:</i> The starting of the proposed project activity is after 2<sup>nd</sup> August 2008. The project participant has submitted Letter of Intension/ Letter of Endorsement to the DNA of host country, Thailand, and Annex I country, Germany, respectively. Also, the letter to informed prior consideration of CDM was sent to the UNFCCC secretariat. The date of letter are summarized below:</p> <table><tr><td></td><td>Parties</td><td>Inform Date</td><td>Acknowledgement Date</td></tr><tr><td>Letter of Intension</td><td>DNA: Thailand (TGO)</td><td>2008-10-16</td><td>2008-10-20</td></tr><tr><td>Letter of Endorsement</td><td>DNA: Germany</td><td>2009-08-17</td><td></td></tr></table>		Parties	Inform Date	Acknowledgement Date	Letter of Intension	DNA: Thailand (TGO)	2008-10-16	2008-10-20	Letter of Endorsement	DNA: Germany	2009-08-17		<p>/CM01/ /CM02/ /CM09/ /EB41-46/</p>	OK	
	Parties	Inform Date	Acknowledgement Date													
Letter of Intension	DNA: Thailand (TGO)	2008-10-16	2008-10-20													
Letter of Endorsement	DNA: Germany	2009-08-17														

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)				Ref.	Draft Concl.	Final Concl.				
shall be determined that the CDM was not seriously considered.	<table><tr><td>Letter to UNFCCC</td><td>UNFCCC secretariat</td><td>2009-08-17</td><td>2009-08-17</td></tr></table>				Letter to UNFCCC	UNFCCC secretariat	2009-08-17	2009-08-17			
	Letter to UNFCCC	UNFCCC secretariat	2009-08-17	2009-08-17							
<p>However, the proposed project activity was transferred from previous Annex I project participant, ALLIED CARBON CREDITED GmbH. The host country project participant, NP Biopower Co., Ltd was signed the agreement with ALLIED CARBON CREDITED GmbH on 2008-08-26 in order to develop the biogas project with the CDM scheme. The agreement was terminated on 2009-09-14. During that time, ALLIED CARBON CREDITED GmbH was informed and sent the letter of intention to the host country DNA: Dated 2008-10-20 which is applicable under the EB41 Annex46 GUIDANCE ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM para 2 "...the project participant must inform a Host Party DNA and/or the UNFCCC secretariat in writing1 of the commencement of the project activity and of their intention to seek CDM status..." Date 2008-08-02</p> <p><i>Justification of evidences:</i> The letters submitted to DNAs of both parties, Thailand and Germany were review. Also the email to inform UNFCCC secretariat. Please also refer to B.4.2.4 as the project was planned earlier with another project participant.</p> <p><i>Conclusion:</i> The project participants have informed the DNA and UNFCCC about the intension to seek CDM status.</p>											
B.4.2.3. In case the project start date is before commencing of validation and 2 <sup>nd</sup> August 2008, was the incentive from the CDM seriously considered and are details given in the PDD?	<p><i>Description:</i> The starting of the proposed project activity is after 2<sup>nd</sup> August 2008.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>					OK					



<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
(EB 55 Annex 1, §§ 100, 102) <i>Describe whether the evidence to support such consideration is adequately and transparently described in the PDD.</i>				
B.4.2.4. How and when was the decision to proceed with the project taken? <i>Describe the steps taken to validate the starting date.</i>	<p><i>Description:</i> The proposed project activity was started in 2008. The proposed project activity was initiated by ALLIED CARBON, NP Biopower and Charoensuk Starch (2005) Company Limited. The ALLIED CARBON started the CDM development by commencing the local CDM consultant, PDD development and DOE contract. Nevertheless, NP Biopower and Charoensuk Starch (2005) were not able to seek the financial support for the proposed project activity. The agreement between ALLIED CARBON and other two project participants was terminated, date 2009-11-12. The formal, Annex I country, project participant, EnBW approached the project participants. The NP Biopower board reviewed the proposal from the MABR technology provider and decided to implement the proposed project activity, date 2010-01-04. The ERPA between NP Biopower and EnBW was signed on 2010-02-20. Subsequently, the project participant, NP Biopower, signed agreement with the MABR technology supplier, date 2010-02-22, which indicated as the starting date of project activity in the PDD.</p> <p>Further steps in the CDM involved are presented in section B.5, table 11, of the PDD. Respective information were validated and found correct taking into account stakeholder interviews and relevant supporting documents.</p> <p><i>Justification of evidences:</i> The agreement between ALLIED CARBON, NP Biopower and Charoensuk Starch (2005) was reviewed. The mutual cancellation agreement between ALLIED CARBON, NP Biopower and Charoensuk Starch (2005) was reviewed. The proposal from the MABR technology provider and the signed contract were reviewed. The ERPA between EnBW and NP Biopower was reviewed. The minute of NP Biopower meeting was reviewed. By mean of interview with the project participants, NP Biopower</p>	/CM01/ /CM02/ /CM09/ /CM13/ /CM14/	OK	



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	and EnBW.  <i>Conclusion:</i> It can be confirmed that the necessary steps to validate the starting date have been undertaken.			
B.4.2.5. Is the project start date consistent with the available evidences? (EB 55 Annex 1, § 102)  <i>Describe the evidence assessed regarding the prior consideration of the CDM (if necessary). Describe whether the evidence to support such consideration is adequately and transparently described in the PDD.</i>	<i>Description:</i> The starting date for this project activity as quoted in the PDD is 2010-02-22 as indicated in the contract between the project participant, NP Biopower Co Ltd, and MABR technology supplier, Premier Energy Co Ltd.  <i>Justification of evidences:</i> The validation team has checked the starting date of the contract by means of document review and interview with the project participant and technology supplier during site visit.  <i>Conclusion:</i> It can be concluded that the evidence to support prior CDM consideration is adequately and transparently described in the PDD.	CM14 /IM01/ /IM02/	OK	
B.4.2.6. Was the decision to proceed with the project taken by a person which has the authority to do so? (EB 55 Annex 1, § 102(a))  <i>Describe the steps taken to validate this issue.</i>	<i>Description:</i> The decision has been taken by NP Biopower Board and signed by Mr Somsak Tancharoensuukjit, the director of NP Biopower Co Ltd.  <i>Justification of evidences:</i>  A copy of the NP Biopower Board resolution, date 2010-02-03, has been checked during on-site visit. Furthermore, an interview has been undertaken with Mr Somsak Tancharoensuukjit, the director of NP Biopower who signed the NP Biopower Board resolution to approve the minute.  <i>Conclusion:</i> By means of interview, it can be confirmed that the decision to proceed with the project has been taken by an authority.	/CM12/	OK	
B.4.2.7. How was the CDM	<i>Description:</i> According to the PDD, the NP Biopower Board agreed to develop the	/IM02/	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
involved in the decision making process?  (EB 55 Annex 1, § 102) <i>Describe why CDM was a decisive factor in the decision making process.</i>	project as a CDM project activity only if additional income from CERs could be generated to make the project financially feasible.  <i>Justification of evidences:</i> By means of document review during the on-site investigation and by interviewing the deputy managing director, the CDM involvement in the decision making process has been assessed.  <i>Conclusion:</i> It can be confirmed that CDM was a decisive factor to proceed with CDM as the project would not have been undertaken without CER revenue.			
B.4.2.8. Do the evidences provided doubtlessly prove that continuous and real actions were taken in order to secure the CDM status?  (EB 55 Annex 1, § 102; EB 49 Annex 22 § 7)	<i>Description:</i> Please refer to B.4.2.4.  <i>Justification of evidences:</i>  <i>Conclusion:</i> By means of document review, interviews and the fact that TÜV NORD was also involved in the previous validation process of the project it can be confirmed that real action were taken in order to secure the CDM status.	/CM01/ /CM02/ /CM09/ /CM13/ /CM14/	OK	
B.4.2.9. Is the gap of documented evidences to secure the CDM status less than 3 years and are the evidences relevant for substantiating the action taken, credible, reliable and complete?  (EB 49 Annex 22 § 8)	<i>Description:</i> All necessary key events regarding CDM consideration are described in the PDD with indication of the respective date.  <i>Justification of evidences:</i> The timeline of the demonstration of prior consideration has been checked by means of documented evidences and by interviews. Please refer to B.4.2.4.  <i>Conclusion:</i> It can be confirmed that there is no gap more than three years and that the evidences relevant for substantiating the action taken are credible, reliable and complete.	/CM/ /IM01/ /IM02/	OK	

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>B.4.2.10. Did implementation of the project ceased after its commencement and did implementation recommence after consideration of the CDM?</p> <p>(EB 51 Annex 58, § 7)</p> <p><i>Describe the reasons for ceasing the project and explain why the incentive from CDM was necessary to recommence the implementation.</i></p>	<p><i>Description:</i> According to the PDD the projects doesn't cease after a commencement.</p> <p><i>Justification of evidences:</i> Relevant contracts and documents were reviewed.</p> <p><i>Conclusion:</i> By means of document review, site visit and interviews it can be confirmed that the implementation of the project doesn't cease after the commencement.</p>	<p>/ADD/ /IM01/ /IM02/</p>	<p>OK</p>	
<p>B.4.2.11. Can the CDM involvement in the decision assessed as serious?</p> <p><i>Describe whether or not the project would have been undertaken without the incentive of the CDM.</i></p> <p>(EB 55 Annex 1, § 104(b)–(c))</p>	<p><i>Description:</i> Please refer to B.4.2.4. and B.4.2.7.</p> <p><i>Justification of evidences:</i> Please refer to B.4.2.4. and B.4.2.7.</p> <p><i>Conclusion:</i> By means of document review, site visit and interviews it can be confirmed that the CDM involvement in the decision is assessed as serious.</p>	<p>/CM01/ /CM02/ /CM09/ /CM13/ /CM14/ /IM02/</p>	<p>OK</p>	
<p><b>B.4.3. Identification of alternatives Step 1</b></p>				

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
(in case of SSC projects pl. skip steps 1 and 2 if appropriate)				
<p>B.4.3.1. Does the list of alternatives contain the status-quo situation, the project not undertaken as a CDM project as well as all other viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity?</p> <p>(EB 55 Annex 1, §§ 105–107)</p> <p><i>Describe the steps taken to validate this issue on the basis of your local and sectoral knowledge.</i></p>	<p><i>Description:</i> The proposed project activity is SSC.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	
<p>B.4.3.2. Have all realistic alternatives been identified to the project?</p> <p>(EB 55 Annex 1, §§ 105–107)</p> <p><i>Describe whether the list of alternatives is credible and complete. Describe how it is validated that the</i></p>	<p><i>Description:</i> The proposed project activity is SSC.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>alternatives are realistic.</i>				
<b>B.4.3.3.</b> Do all identified alternatives comply with enforced legislations?  (EB 55 Annex 1, §§ 106(c)) <i>Describe the steps taken to validate this issue. Refer to the legislations.</i>	<i>Description:</i> The proposed project activity is SSC.  <i>Justification of evidences:</i>  <i>Conclusion:</i>		N/A	
<b>B.4.4. Investment analysis Step 2</b>  <i>In case the investment analysis as per step 2 is chosen to justify the additionality Annex 2 "Assessment of Financial Parameters" has to be used to provide additional details of the calculation parameters..</i>				
<b>B.4.4.1.</b> Does the PDD provide evidence that the project would not be the most economically or financially attractive alternative or economically / financially feasible without the revenues from the sale of	<i>Description:</i> The proposed project activity is a small scale project. The PP decides to evidence the additionality also with an investment analysis. The result in the PDD indicates that the proposed project activity is only financial viable when CDM benefits are taking into account compared to the most likely alternative.  <i>Justification of evidences:</i> The PDD has been checked and supporting documents like IRR calculation spreadsheet and proposal from technology provider have been cross-checked to verify the figures in the PDD.  <i>Conclusion:</i> In the draft validation stage it could not be doubtlessly verified whether the	/ADD/ /PDD/ /XLS/	GAR B9 CL B11 CL B12	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
CERs? (EB 55 Annex 1, § 108)	financial figures provided are correct or not. Especially findings CAR B9, CL B11 and CL B12 have been open to address this.			
B.4.4.2. Is an appropriate analysis method chosen for the project (simple cost analysis, investment comparison analysis or benchmark analysis)? (EB 55 Annex 1, § 108; EB 39 Annex 10) <i>Describe why the selected analysis method is appropriate under consideration of potential revenues and costs, potential project alternatives and potential available benchmark values.</i>	<i>Description:</i> The PP decided to analysis the financial viability against a benchmark. This is in accordance to the Attachment A of Appendix B of the SSC modalities and procedures. Since the proposed project provides electricity and heat as final output products it cannot be compared to an alternative and besides gets revenues.  <i>Justification of evidences:</i> It has been verified that this approach is fully in line with the latest additionality tool, which provides guidance for financial assessment.  <i>Conclusion:</i> The benchmark analysis is assessed as appropriate method.	/PDD/ /TA/ /GAIA/	OK	
B.4.4.3. Is a clear, viewable and unprotected Excel spreadsheet available for the investment calculation? (EB 55 Annex 1, § 110; EB 51, Annex 58, §8) <i>Describe the steps taken to validate this issue.</i>	<i>Description:</i> In general the Excel sheet provided is viewable and unprotected.  <i>Justification of evidences:</i> The Excel sheet has been carefully checked to confirm this.  <i>Conclusion:</i> However, several issues are observed and need to be clarified. Hence, the following non conformity has been raised: With regard to the input parameter the following needs to be clarified: 1. In the IRR calculation spreadsheet cell B15 three values are summarized to	/XLS/	CL B14	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<p>form the input value for “Biogas System”. It is requested to specify the values applied.</p> <ol style="list-style-type: none"> <li>Further cell A16 defines a “Boiler System”. Clarification is requested whether this system only refers to the electricity part or also to the heat part.</li> <li>It should be justified and evidenced how the gas selling price is determined.</li> <li>Since heat will be supplied to the starch company it is not clear why a price is not determined to create another revenue stream. In this context it is not clear why NP Biopower is selling the CH<sub>4</sub> to the starch company.</li> <li>The PP is requested to back-up the total investment costs, the annual average O&amp;M costs, biogas selling price and expected project lifetime should be backed-up with further documented evidences.</li> <li>Explanation is requested why no increase rate for the electricity tariff is assumed.</li> <li>To calculate the O&amp;M costs from Euro to Thai Baht the exchange rate from 26<sup>th</sup> January has been applied. Clarification is requested why the exchange rate of this date was applied even though the management decision was taken earlier. In this context it shall be clarified why the O&amp;M costs are expressed originally in EURO.</li> <li>The use of the Excel sheets “Overhaul GE (GUASCOR)”, “FOREX 290110” and “MLR 290110” need to be explained.</li> </ol> <p>It is requested to provide the exact sources of the different parameters for investment analysis in table 9, i.e. document, author and page number.</p>			
B.4.4.4. Does the period chosen for the investment analysis reflect the technical lifetime of the project activity or in case a shorter period is	<p><i>Description:</i> The PDD indicates a technical lifetime of 15 years. The cash figures in the IRR calculation as provided in the Excel sheet also refer to this 15 years.</p> <p><i>Justification of evidences:</i> The 15 years figure is derived from the technology provider contract. To confirm the value It has been cross checked with the guidance for technical lifetime of project activities. Further TÜV NORD confirmed based on sectoral expertise of the validation team that a technical lifetime of 15 years for this kind of equipment is</p>	/TD/ /TLT/ /XLS/	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>chosen, is the fair value of the project activity's assets at the end of the investment analysis period (as a cash inflow) included?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58 § 3 – 4)</p> <p><i>Describe how the technical lifetime / period chosen for calculating financial parameter(s) is reviewed and which documents were utilised in the course of review. Describe furthermore the approach used to check the inclusion of a potential fair value.</i></p>	<p>reasonable.</p> <p><i>Conclusion:</i> A technical lifetime of 15 years is assessed as appropriate and applicable.</p>			
<p>B.4.4.5. Is the (remaining) technical lifetime of existing or project equipment defined in accordance with the guidance of the <i>Tool to determine the remaining lifetime of equipment?</i></p> <p>(EB 50 Annex 15)</p>	<p><i>Description:</i> Not applicable as the technical lifetime is based on new equipment.</p> <p><i>Justification of evidences:</i> By means of document review and site visit.</p> <p><i>Conclusion:</i> The remaining technical lifetime is not applicable for this project activity.</p>		OK	
<p>B.4.4.6. Is the fair value calculated in</p>	<p><i>Description:</i> A fair value, book value or residual value is not considered in the IRR calculation and hence, not addressed in the PDD.</p>	/TD/	OK	



<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>accordance with local accounting regulations (where available) or international best practice?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 4)</p> <p><i>State the accounting regulations applied for calculating the fair value and describe why these are applicable under the project specific circumstances. Describe potential mismatches between regulations and the approach applied for calculating the fair value.</i></p>	<p><i>Justification of evidences:</i> This has been assessed as appropriate by the validation team, since the technical lifetime of the equipment utilized is 15 years and cash flow analysis refers to 15 years. It is not expected that the proposed project has a certain value after this time period.</p> <p><i>Conclusion:</i> Hence, considering no fair value, book value or residual value is acceptable.</p>	/XLS/		
<p>B.4.4.7. Is the book value as well as the expectation of the potential profit or loss included in the fair value calculation?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 4)</p>	<p><i>Description:</i> A fair value, book value or residual value is not considered in the IRR calculation and hence, not addressed in the PDD.</p> <p><i>Justification of evidences:</i> This has been assessed as appropriate by the validation team, since the technical lifetime of the equipment utilized is 15 years and cash flow analysis refers to 15 years. It is not expected that the proposed project has a certain value after this time period.</p> <p><i>Conclusion:</i> Hence, considering no fair value, book value or residual value is acceptable.</p>	/XLS/	OK	
<p>B.4.4.8. Are depreciation and other non-cash related</p>	<p><i>Description:</i> Yes, the IRR calculation does not consider depreciation and other non-cash items neither as cash-out nor as cash-in. It is considered as a neutral position. It should</p>	/XLS/	OK	

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
items added back to net profits for the purpose to calculate the financial indicator?  (EB 55 Annex 1, § 109; EB 51 Annex 58, § 5)	<p>be noted that depreciation has been considered for income tax calculation. This assessed as appropriate since it reduces the basic value for income tax, which finally reduces the costs, which lead to a higher IRR.</p> <p><i>Justification of evidences:</i> The IRR calculation sheet provided by PP has been checked.</p> <p><i>Conclusion:</i> Non-cash items are not taken directly into account for cash-flow analysis.</p>			
B.4.4.9. Is taxation excluded in the investment analysis or is the benchmark intended for post tax comparisons?  (EB 55 Annex 1, § 109; EB 51 Annex 58, § 5)	<p><i>Description:</i> The benchmark chosen according to the draft PDD is the weighted average cost of capital (WACC). This is a post tax benchmark. The IRR is calculated in this matter.</p> <p><i>Justification of evidences:</i> The IRR calculation has been checked and compared to the guidance as per EB51 Annex 58.</p> <p><i>Conclusion:</i> The WACC is an appropriate benchmark for after tax analysis. However the following has been observed and should be clarified:  Clarification is requested according to the following statement on page 17 of the PDD:  “(…) project developers have considered a conservative benchmark in terms of CDM. (….) used the WACC formula (…).”</p> <ol style="list-style-type: none"> <li>1. It should be substantiated and further justified why this benchmark applied is appropriate, e.g. with regard to VVM 1.1, paragraph 111 c).</li> <li>2. It should be clarified why the benchmark is considered as “conservative”.</li> </ol>	/XLS/	CL-B6	OK

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>B.4.4.10. Were the input values used in the investment analysis valid and applicable at the time of the investment decision?</p> <p>(EB 55 Annex 1, § 109,112; EB 51 Annex 58, § 6)</p> <p><i>In case the basis for input values is a Feasibility Study Report (FSR) describe how it has been ensured that the period in time between the finalisation of the FSR and the investment decision is sufficiently short so that it is unlikely that input values would have materially changed. Further confirm the consistency of values in FSR and PDD.</i></p>	<p><i>Description:</i> The input values are mainly based on the proposal from the technology provider which is a turn-key contract. The decision to implement the project was done in 2010-02-03. The proposal from gas supplier is from 2010-01-04.</p> <p><i>Justification of evidences:</i> The proposal has been checked and values have been cross-checked with the data provided in PDD and Excel sheet.</p> <p><i>Conclusion:</i> In general the input values are assessed as valid and applicable considering the short time span of 1 month. However, issues addressed in CAR B10 should be clarified first before forming an opinion.</p>	<p>/PDD/ /XLS/</p>	<p>CAR B10</p>	<p>OK</p>
<p>B.4.4.11. Is the plant load factor (PLF) chosen in a conservative manner, taking into account that the PLF may be different in the framework of demonstrating additionality and calculating the ex-ante ER?</p>	<p><i>Description:</i> In the context of the project activity the plant load factor of the electricity genset or heat boiler is not of interest, since the financial figures are based on the COD removal and the CH<sub>4</sub> availability for energy production.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		<p>N/A</p>	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 48, Annex 11)				
<p>B.4.4.12. In case of project IRR: Are the costs of financing expenditures (loan repayments and interests) excluded from the calculation of project IRR?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 9)</p>	<p><i>Description:</i> Yes, from the PDD and IRR Excel sheet it is clearly shown that costs of financing expenditures are not taken into account.</p> <p><i>Justification of evidences:</i> The PDD and IRR Excel sheet have been checked.</p> <p><i>Conclusion:</i> Exclusion of non related expenditures has been conducted. No cost of financing is included.</p>	/PDD/ /XLS/	OK	
<p>B.4.4.13. In cases where a post-tax benchmark is applied please ensure that actual interest payable is taken into account in the calculation of income tax.</p> <p>(EB 51 Annex 58, § 11)</p> <p><i>As per the guidance it is recommended to select a pre tax benchmark in order to Describe the steps taken in assessing this requirement.</i></p>	<p><i>Description:</i> Yes, the interest payable and depreciation have been taken into account to calculate the basis for income tax calculation.</p> <p><i>Justification of evidences:</i> IRR calculation has been checked.</p> <p><i>Conclusion:</i> Conservativeness has been ensured, since interest payable has been considered for income tax calculation.</p>	/XLS/	OK	
<p>B.4.4.14. In case of equity IRR: Is the part of the investment costs,</p>	<p><i>Description:</i> The financial analysis is based on the project IRR approach.</p>		N/A	

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>which is financed by equity considered as net cash outflow and is the part financed by debt excluded in net cash outflow?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 10)</p>	<p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>			
<p>B.4.4.15. Is the type of benchmark chosen appropriate for the type of IRR calculated (e.g. local commercial lending rates or weighted average costs of capital for project IRR; required/expected returns on equity for equity IRR)?</p> <p>(EB 55 Annex 1, § 111; EB 51 Annex 58, §§12 – 15)</p> <p><i>In case risk premiums are applied precisely describe its suitability to reflect the risks associated with the project activity, considering the project type and market situation.</i></p>	<p><i>Description:</i> The benchmark chosen is the weighted average cost of capital (WACC) approach. This is compared to the project IRR.</p> <p><i>Justification of evidences:</i> The IRR Excel sheet has been checked and compared to the information provided in the PDD.</p> <p><i>Conclusion:</i>  The WACC is an appropriate benchmark compared to the project IRR. However, the following has been observed and should be clarified to come to a final conclusion. Clarification is requested according to the following statement on page 17 of the PDD:  “(…) project developers have considered a conservative benchmark in terms of CDM. (...) used the WACC formula (...)”.</p> <ol style="list-style-type: none"> <li>1. It should be substantiated and further justified why this benchmark applied is appropriate, e.g. with regard to VVM 1.1, paragraph 111 c).</li> <li>2. It should be clarified why the benchmark is considered as “conservative”.</li> </ol> <p>It should be clearly stated whether a project or equity IRR is calculated.</p>	<p>/PDD/ /XLS/</p>	<p>CL-B6 CAR B7</p>	<p>OK</p>

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>B.4.4.16. Is the benchmark value suitable for the project activity and is it reasonable to assume that no investment would be made at a rate of a lower return than the benchmark?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, §§13 – 15)</p> <p><i>Describe whether it is reasonable to assume that a lower rate of return would consequently result in the baseline scenario.</i></p>	<p><i>Description:</i> The benchmark value is 10.82 %.</p> <p><i>Justification of evidences:</i> The Excel file providing the calculation has been checked.</p> <p><i>Conclusion:</i> The question could not be finally assessed. Following issues are open: Clarification is requested why the input values for WACC calculation are considered as parameters that are "(...) standard in the market, considering the specific characteristics of the project type (...)" as per Additionality Tool substep 2 b) paragraph 5, bearing in mind that the proposed project mainly produces heat and companies listed produce electricity.</p> <p>It is requested to provide the exact sources of the different parameters for WACC calculation in table 8, i.e. document, author and page number.</p>	/XLS/	CL-B8 CAR B9	OK
<p>B.4.4.17. Is it ensured that the project cannot be developed by other developers than the PP?</p> <p>(EB 55 Annex 1 § 109; EB 51 Annex 58, §§ 13 – 14)</p> <p><i>Describe why the benchmark does not include the subjective profitability expectations or risk profile of the project developer. If applicable assess the past financial behavior of the entity during at least the last 3 years in relation to similar</i></p>	<p><i>Description:</i> N/A</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>projects.</i>				
B.4.4.18. Was the benchmark consistently used in the past for similar projects with similar risks?  (EB 55 Annex 1, § 112(c))	<p><i>Description:</i> N/A, as WACC benchmark.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	
<p>B.4.4.19. Does the PDD and related spreadsheets contain a sensitivity analysis and does the same contain variation of parameters which may vary throughout the project lifetime,  (EB 55 Annex 1, §§ 109–110(e); EB 51 Annex 58, § 17–18)</p> <p><i>Describe relevance of parameters used in the sensitivity analysis as well as their likeliness to vary during the project's lifetime. Parameters which are fixed on the basis of contracts, PPAs etc. may not be subject to variation and not adequate.</i></p>	<p><i>Description:</i> The PDD and the relevant Excel spreadsheet do contain a sensitivity analysis with the following parameters:</p> <ol style="list-style-type: none"> <li>1. Biogas selling price</li> <li>2. Investment costs</li> <li>3. Electricity price</li> <li>4. Biogas generated</li> <li>5. Operation cost</li> </ol> <p>The variation chosen for these parameters is <math>\pm 10\%</math>. The parameters chosen cover all relevant costs and revenues. It is assumed that these have the most impact on the result of IRR calculation.</p> <p>The justification of the biogas price depends on the contractual conditions of the starch factory and the biogas facility operator. However, a conclusive assessment depends on the outcome of CL B11 raised in section B above.</p> <p>A significant variation of the total investment is also not likely since the contract for construction and the equipment is already signed and the value is fixed. However, it is included to cover the risk of overestimation of the price.</p>	/PDD/ /XLS/	CL B13	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<p>The electricity tariff consists of a fixed part and a part which is depending on the development of the oil price. So, it may vary within the operation period. Therefore it is concluded that it is appropriate to include it in sensitivity analysis.</p> <p>The biogas generated mainly depends on the degradation of COD in the wastewater. This depends on the production of starch which may vary during the seasons. Even though it is not expected that the average value will vary significantly, TÜV NORD assessed the inclusion of biogas generation as necessary.</p> <p>The O&amp;M costs may also vary within the operational lifetime due to decreased maintenance costs or increased operational costs. Hence, inclusion of O&amp;M costs is reasonable.</p> <p><i>Justification of evidences:</i> The PDD and the Excel calculation sheet have been checked. The calculation has been verified and is confirmed that it is correct.</p> <p><i>Conclusion:</i> Even though a sensitivity analysis is provided the following has been identified and should be clarified:</p> <p>Clarification is requested why a range of <math>\pm 10</math> % is assumed to be reasonable. Therefore it is recommended to discuss the likeliness of increasing/ decreasing of certain parameters.</p>			
B.4.4.20. Were only variables that constitute more than 20% of either total project costs or total project revenues subjected to reasonable variation?	<p><i>Description:</i> All parameters have been considered even if they constitute more or less than 20 %.</p> <p><i>Justification of evidences:</i> The Excel file has been checked and compared to the available evidences during pre-validation, i.e. the proposal from technology provider.</p>	/XLS/	OK	



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 55 Annex 1, § 109; EB 51 Annex 58, § 17)	<i>Conclusion:</i> No value is missing, all reasonable values are included which is assessed to be appropriate.			
<p>B.4.4.21. Have parameters, constituting less than 20% of total project costs or revenues, been identified with potential material impact on the financial parameter?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 17)</p> <p><i>Describe whether those parameters are considered in the sensitivity analysis?</i></p>	<p><i>Description:</i> Please refer to assessment B.4.4.20.</p> <p><i>Justification of evidences:</i> -</p> <p><i>Conclusion:</i> -</p>		OK	
<p>B.4.4.22. Is the range of variation reasonable in the specific context of the project activity, taking into consideration historic trends in the business sector?</p> <p>(EB 55 Annex 1, § 109; EB 51 Annex 58, § 18)</p> <p><i>Describe whether the range of variation is appropriate with focus on historic</i></p>	<p><i>Description:</i> Please refer to assessment in B.4.4.19. and relevant CL raised.</p> <p><i>Justification of evidences:</i> -</p> <p><i>Conclusion:</i></p> <p>Clarification is requested why a range of <math>\pm 10</math> % is assumed to be reasonable. Therefore it is recommended to discuss the likeliness of increasing/ decreasing of certain parameters.</p>		CL B43	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>developments, e.g. price of oil / labour etc., energy potential in the region in question.</i>				
<b>B.4.5. Barrier analysis Step 3 or SSC additionality assessment</b>				
<p>B.4.5.1. Are there any barriers given which have a clear and direct impact on the financial returns of the project?</p> <p>(EB 55 Annex 1, §§ 115, 134, 137)</p> <p><i>In case of LSC projects those issues cannot be considered as barriers and shall be assessed in the investment analysis. In case of SSC projects the same fundamentals as for LSC projects shall apply, i.e. the assessment of the investment barrier according to EB 51 Annex 58.</i></p>	<p><i>Description:</i> The draft PDD does not include such barrier.</p> <p><i>Justification of evidences:</i> -</p> <p><i>Conclusion:</i> -</p>		N/A	
<p>B.4.5.2. Are the barriers described risk related (e.g technology failure, other performance related risks)?</p> <p>(EB 55 Annex 1, §§ 116, 134,</p>	<p><i>Description:</i> It has been addressed that the technology implemented is risky compared to the baseline scenario.</p> <p><i>Justification of evidences:</i> The PDD and sources addressed in the footnote have been checked.</p>	/PDD/	<del>CL</del> B14	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
137) <i>Are there other barriers or barriers due to prevailing practice existent which would have led to higher emissions?</i>	<p><i>Conclusion:</i> However, the argumentation is not conclusive. Hence the following clarification request has been raised:</p> <p>The technological barrier addressed in the PDD is not convincing. Compared to other biogas systems like UASB the maintenance is easier. According to the contract with the technology supplier the project will be supervised for one year by qualified person who is also training staff from NP power.</p> <p>PP is requested to further justify the barrier.</p>			
<p>B.4.5.3. Has the unavailability of means of finance for the project been described and adequately substantiated? Do evidences doubtlessly prove that the financing of the project was assured only due to the benefit of the CDM?</p> <p>(EB 55 Annex 1, §§ 116, 137, EB 50 Annex 13, § 9)</p>	<p><i>Description:</i> Barrier not provided.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	
<p>B.4.5.4. How is it justified and evidenced that the barriers given in the PDD are real?</p> <p>(EB 55 Annex 1, § 116(a))</p>	<p><i>Description:</i> A technology barrier is indicated, which has been assessed in paragraph above. Another barrier, due to prevailing practice, is referenced as well.</p> <p><i>Justification of evidences:</i> The PDD and additional footnotes have been checked.</p>	/PDD/	CL B15	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<p><i>Conclusion:</i> Also the prevailing practice barrier is not conclusively justified. Hence, the following CL has been issued:</p> <p>The barrier due to prevailing practice as presented in the PDD is not conclusive. Considering the following sentence: "Hence, from the view of compliance with the national requirements on wastewater treatment, there is no reason for the proponent to change its prevailing practice." it should be noted that a possible reason for changes is the savings of heavy fuel oil to reduce costs. It is requested to provide a clarification upon this.</p>			
<p>B.4.5.5. How is it justified that one or a set of real barriers prevent(s) the implementation of the project activity and do not prevent the implementation of at least one of the alternatives?</p> <p>(EB 55 Annex 1, § 116(b))</p>	<p><i>Description:</i> Please refer to the CLs listed above.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		<p>CL B14 CL B15</p>	OK
<p>B.4.5.6. Does the review of relevant background information on the nature of the company(ies) and entity(ies) involved in the financing and</p>	<p><i>Description:</i> Please refer to the CLs listed above.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		<p>CL B14 CL B15</p>	OK

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>implementation of the project sufficiently justify that the barriers related to the lack of access to capital, technologies and skilled labour are real?</p> <p>(EB 50 Annex 13, § 4)</p>				
<p>B.4.5.7. Has it been demonstrated in an objective way how the CDM alleviates each of the identified barriers to a level that the project is not prevented anymore from occurring by any of the barriers?</p> <p>(EB 50 Annex 13, § 5)</p>	<p><i>Description:</i> Please refer to the CLs listed above.</p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		<del>CL</del> B14 <del>CL</del> B15	OK
<p>B.4.5.8. Would provision of additional financial means lead to the mitigation of the barrier(s) demonstrated?</p> <p>(EB 50 Annex 13, § 7)</p>	<p>Please refer to the CLs listed above.</p>		<del>CL</del> B14 <del>CL</del> B15	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>Describe why provision of additional financial means would not lead to mitigation of the barrier(s) demonstrated and hence analysing the project's additionality within the framework of an investment analysis is inappropriate. .</i>				
<b>B.4.6. Common practice analysis Step 4</b> (in case of SSC projects skip this step)				
<p>B.4.6.1. Is the defined region for the common practice analysis appropriate for the technology/industry type?</p> <p>(EB 55 Annex 1, § 120(a))</p> <p><i>Describe why the project activity is not common practice in a transparent and unambiguous manner. If a region other than the entire host country is chosen, describe why this region is more appropriate.</i></p>	<p><i>Description: N/A</i></p> <p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>		N/A	
<p>B.4.6.2. To what extent similar projects have been undertaken in the relevant region?</p>	<p><i>Description: N/A</i></p> <p><i>Justification of evidences:</i></p>		N/A	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
(EB 55 Annex 1, § 120(b))	<i>Conclusion:</i>			
B.4.6.3. In case similar projects are identified, are there any key differences between the proposed project and existing or ongoing projects and what kind of differences are observed? (EB 55 Annex 1, § 120(c))	<i>Description:</i> N/A  <i>Justification of evidences:</i>  <i>Conclusion:</i>		N/A	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<b>B.5. Ex-Ante Calculation of GHG Emission Reductions</b>  <i>It is assessed whether the ex-ante calculations of project emissions, baseline emissions, leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified. Furthermore calculation of emission reductions shall be assessed.</i>				
<b>B.5.1. Are the equations applied correctly according to the applied approved methodology?</b>  (EB 55 Annex 1, §§ 67(c), 89–90, 92)  <i>Describe clearly the steps taken to assess whether the methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. Further take into consideration that all</i>	<input type="checkbox"/> The equations applied for calculation are correctly applied according to the approved methodology. <input checked="" type="checkbox"/> The following mistakes have been identified in this context:  <i>Description:</i> <b>Baseline emission:</b> For the baseline emission calculation the following equation was considered: <b>AMS III H Methane recovery in wastewater treatment Version 14</b> $BE_y = BE_{power,y} + BE_{ww,treatment,y} + BE_{s,treatment,y} + BE_{ww,discharge,y} + BE_{s,final,y}$ For $BE_{ww, treatment, y}$ the following equation was applied:	/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/	CAR B1  CAR B3  CAR B4  CAR B5	OK



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.	$BE_{ww,treatment,y} = \sum_i Q_{ww,i,y} * COD_{removed,i,y} * MCF_{ww,treatment,BL,i} * B_{o,ww} * UF_{BL} * GWP_{CH_4}$ <p><b>AMS I C Thermal energy production with or without electricity Version 17</b></p> $BE_{thermal,CO_2,y} = EG_{thermal,y} * EF_{FF,CO_2} / \eta_{BL,thermal}$ <p><b>AMS I D Grid connected renewable electricity generation Version 16</b></p> $BE_{power,y} = EG_{BL,y} * EF_{CO_2,grid,y}$ <p><b>Project emission:</b></p> <p>For the project emission calculation the following equation was considered:</p> <p><b>AMS III H Methane recovery in wastewater treatment Version 14</b></p> $PE_y = PE_{power,y} + PE_{ww,treatment,y} + PE_{streatment,y} + PE_{wwdischarge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{biomass,y} + PE_{flaring,y}$ <p>For <math>PE_{power,y}</math> the following equation was applied:</p> $PE_{power,y} = Auxiliary\ consumption\ by\ the\ biogas\ plant\ (MWh/yr) * EF_{CO_2,grid,y} (tCO_2/MWh)$ <p>For <math>PE_{ww,treatment,y}</math> the following equation was applied:</p> $PE_{ww,treatment,y} = Q_{ww,y} * COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k,y} * B_{o,ww} * UF_{PJ,k,y} * GWP_{CH_4}$ <p>For <math>PE_{fugitive,y}</math> the following equation was applied:</p> $PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$ <p>Since there will be no anaerobic sludge treatment, <math>PE_{fugitive,y} = PE_{fugitive,ww,y}</math></p> <p>Where; <math>PE_{fugitive,ww,y} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH_4}</math></p> <p>Where; <math>MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ,k,y} * \sum_k COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k,y}</math></p> <p>For <math>PE_{flare,y}</math> the following equation was applied:</p>			

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	$PE_{flaring,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH_4}}{1000}$ <p><b>AMS I C Thermal energy production with or without electricity Version 17</b> Not estimate</p> <p><b>AMS I D Grid connected renewable electricity generation Version 16</b> Not estimate</p> <p><b>Leakage:</b> Not estimate</p> <p><b>Emission reduction:</b></p> $ER_{y,exante} = BE_{y,exante} - (PE_{y,exante} + LE_{y,exante})$ <p><b>Grid Emission Factor:</b></p> <p>The emission factor which applied for emission reduction calculation is determined. Two sources of data which posted to public were referred. First is the electrical power in Thailand year 2008, posted by Department of Alternative Energy Development and Efficiency. Another source is the data from the Energy Policy and Planning Office.</p> <p><i>Justification of evidences:</i> The equations used for the emission reduction calculation in the spreadsheet and indicated in the PDD were checked and compared with the equations and approaches used in the methodologies. As well as, the source of data referred for the emission factor calculation was validated.</p> <p><i>Conclusion:</i> By means of document review it can be assessed that the equations are applied correctly to calculate project emissions, baseline emissions and emission reductions but some value input and parameters are not consistent with the evidences during the validation. According to the methodology no leakage emission are estimated.</p>			

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<p>The excel spreadsheet for grid emission factor is still pending. Nevertheless please refer to CAR B1, CAR B3, CAR B4 and CAR B5</p> <p>The emission reduction calculation for the project activity is clearly described in the PDD.</p>			
<p>B.5.2. In case the methodology allows for different methodological choices, are the equations applied properly justified and have they been used reflecting the other methodological choices (i.e. baseline identification)?</p> <p>(EB 55 Annex 1, §§ 90–91)</p> <p><i>Assess the correct selection and application of methodological choices. Describe whether proper justification has been provided (based on the choice of the baseline scenario, context of the project activity and other evidence provided) and whether the correct equations have been used reflecting the relevant methodological choices.</i></p>	<p><i>Description:</i> For the calculation of baseline emission from anaerobic wastewater treatment in open lagoons the Methane Conversion Factor (MCF) Method was applied.</p> <p>For the emission factor (<math>EF_{CO_2,grid,y}</math>) the subscribed tool “Tool to calculate the emission factor for an electricity system” was applied, this regard Thai DNA has not yet published the official value for Thailand. The source data was chosen from the report of electric power in Thailand year 2008 which is the latest data posted on the website. Three years of data since year 2006, 2007 and 2008 were applied for Operation Margin (OM) calculation.</p> <p>For the Build Margin (BM) calculation, 20% of power generation from the latest installed power plant in Thailand was demonstrated. The information regard the date of commercial and electrical power generation for each individual power plants within 20% power generation data are obtained from the Energy Policy and Planning Office (EPPO) under the Ministry of Energy.</p> <p>Then, Combined Margin (CM) was calculated by using 50% weight of the Operation Margin and the Build Margin.</p> <p>Regard to the local emission factor for each fuel type consumed for generation of electrical power in Thailand is not available, the emission factor for each fuel type was chosen from the IPCC. However, the value applied deems inconsistency with the subscribed tool referred.</p> <p><i>Justification of evidences:</i> As defined in the methodology the MCF method can be used for all project activities including Greenfield Projects. Also the subscribed tool “Tool to calculate the emission factor for an electricity system” is properly applied due to unavailability of the official value</p> <p><i>Conclusion:</i> The applied methodological choices can be assessed as appropriate. For</p>	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/</p>	<p>CAR B4</p>	<p>OK</p>

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	the properly justification and whether the correct equations have been used please refer to B.5.1.			
<p>B.5.3. Have conservative assumptions been used when calculating the project emissions?</p> <p>(EB 55 Annex 1, §§ 90–91)</p> <p><i>Describe clearly the steps taken to assess whether all the assumptions and data used by the PP are listed in the PDD including references and sources and are conservatively interpreted in the PDD.</i></p>	<p><i>Description:</i> All data and assumptions for the project emission calculation are listed in the PDD and include the references and sources.</p> <p><i>Justification of evidences:</i> To check whether conservative consumptions have been used when calculating the project emission the source of the data and assumption were checked. The data for the emission calculation is based on both default values and measurements. The default values used for calculation are in line with the default values mentioned in the methodology. This was checked with the methodology. The input values, mainly COD values, are based on measurements methods conducted by the project participant and measurements conducted by third parties. These documents were reviewed and the appropriateness of these values was checked with literature search.</p> <p><i>Conclusion:</i> By means of document review and literature research it can be confirmed that the emission calculation is based on conservative assumptions.</p>	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /tool/ /LOG/ /COD/</p>	OK	
<p>B.5.4. Does the implementation of the project activity lead to GHG emissions within the project boundary which are expected to contribute more than 1% of the overall expected average annual emission reductions, which are not addressed by the methodology?</p> <p>(EB 55 Annex 1, § 77)</p>	<p><i>Description:</i> According to the PDD the proposed project activity doesn't lead to GHG emissions, which are not addressed by the methodology within the project boundary. Therefore other GHG emissions sources as defined in the methodology are not considered.</p> <p><i>Justification of evidences:</i> By means of site visit it was verified if the implementation of the project activity leads to unexpected average annual emission more than 1 %. Here the process of the project activity was assessed and checked with the physical site visit. The assessment is also based on the experiences the validation team in the field of wastewater treatment project in Thailand.</p> <p>No additional activities or sources that are not mentioned in the methodology were observed. Possible sources like additional transportation of the wastewater not included in the boundary were not observed.</p>	<p>/PDD/ /IM03/</p>	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
	<i>Conclusion:</i> By means of site visit and experiences of the validation team in the field of wastewater projects in Thailand it can be confirmed that no additional GHG emissions arise due to the project activity, which are not addressed by the methodology.			
<p>B.5.4.1. Has a plant load factor (PLF) been defined ex-ante and considered for determination of baseline emissions?</p> <p>(EB 48 Annex 11, §§ 1, 3–4)</p> <p><i>Describe why the PLF is conservative in the framework of calculating emissions reductions and whether the PLF is the same in the framework of demonstrating additionality by applying the investment analysis. Note, in order to be conservative in both cases the PLF may be different.</i></p>	<p>A plant load factor was not defined ex-ante and considered for determination of baseline emissions.</p> <p>The conservativeness of calculating emission reduction as well the appropriateness of the demonstration additionality by applying the investment analysis is assessed in the other sections of this report.</p>	/PDD/	OK	
<p>B.5.5. Are all data sources and assumptions appropriate and parameters which remain fixed throughout the crediting period correct, applicable to the project and will lead to a conservative estimation of emission reductions?</p> <p>(EB 55 Annex 1, § 91)</p> <p><i>Describe clearly the steps taken to</i></p>	<p><i>Description:</i> The data sources and assumptions which are fixed throughout the crediting period are mentioned in different sections of the PDD and in the emission reduction sheet respectively.</p> <p><i>Justification of evidences:</i> The data and parameter indicated in the PDD and used for emission reduction calculation were assessed.</p> <p>By means of document review the appropriateness of the parameter received from own measurements were assessed.</p> <p>Here parameters like depth of the lagoon, temperature at the site, COD values were assessed by means of evidences and site visit. Other parameter and date like emission factor fuel are based on values defined in the methodology and tools. If these values were used from literature like IPCC the indicated literature was assessed. However,</p>	<p>/PDD/</p> <p>/AMS.I.C/</p> <p>/AMS.I.D/</p> <p>/AMS.III.H/</p> <p>/tool/</p>	<p>CAR B1</p> <p>CAR B5</p>	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>assess whether the values used for the fixed parameters are considered reasonable, correct and applicable in the context of the project activity. Check esp. chapter 6.2 of the PDD.</i>	some values were in-correctly applied.  <i>Conclusion:</i> By means of document review and site visit it can be confirmed that the fixed parameter and date used from the methodology, tools or literature are applied correct. The appropriateness and conservativeness of the data and parameter received from measurement were assessed with evidences and literature research. Some data deemed to be incorrect applied; therefore, CAR B1 and CAR B5 were issued.			
B.5.6. Are all ex-ante calculation values for monitoring parameters (as defined as per chapter B.7.1) reasonable?  (EB 55 Annex 1, § 91) <i>Describe clearly the steps taken to assess whether the values used for the monitoring parameters are considered reasonable, applicable and conservative in the context of the project activity</i>	<input type="checkbox"/> All "Values of data to be applied for the purpose of calculating expected emissions reductions" are considered to be reasonable, applicable and conservative. <input checked="" type="checkbox"/> The following mistakes have been identified in this context: The emission reduction calculation for the project activity is clearly described in the PDD and emission reduction calculation spreadsheet. The calculation in the PDD is based on monitoring parameter taken into account the heat and electricity generation from proposed project activity. However, during the onsite validation, one the HFO invoice and starch production for the recent past 3 years were not taken into account in the calculation sheet. The CAR B1, CAR B4 and CAR B5 were raised.	/FI/ /PDD/	CAR B1  CAR B4  CAR B5	OK
B.5.7. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.  <i>Describe the steps taken to validate this issue.</i>	<i>Description:</i> The PDD describes how the project activity gives long term benefits related to the mitigation of climate change.  <i>Justification of evidences:</i> By means of site visit the emission reduction can be assessed as real, measurable and gives long terms benefits related to the mitigation. The common practice in Thailand is to discharge the wastewater from starch factories to open lagoons. During this process CH <sub>4</sub> emission occurs as of the anaerobic condition within the open lagoons. The project activity uses the wastewater to generate CH <sub>4</sub> and use the CH <sub>4</sub> for energy purposes. Therefore the CH <sub>4</sub> is not emitted to the air, but used for energy purposed and destroyed to CO <sub>2</sub> .	/PDD/	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.																																				
	<i>Conclusion:</i> By means of document review and onsite visit it can be confirmed that the emission reduction is real, measurable and give long-term benefits related to the mitigation of climate change.																																							
<b>B.6. Monitoring of Emission Reductions</b>  <i>It is assessed whether the monitoring plan is appropriate for the project activity and in line with the applied methodology.</i>																																								
<p>B.6.1. Are all monitoring parameters required by the applied methodology contained in the monitoring plan?</p> <p>(EB 55 Annex 1, §§ 67(e), 121, 123(a), 124)</p> <p><i>Assess whether all applicable parameters listed in the methodology are included in the monitoring plan.</i></p> <p><i>Pl. check further whether the selection of parameters not to be monitored (section B.6.2) is appropriate and in line with the applied methodology.</i></p> <p><i>In case of different approaches can be chosen acc. to the methodology assess whether the selection of</i></p>	<p><i>Description:</i> Following data and parameters are included in section B.7.1 data and parameters to be monitored:</p> <table><tr><td><math>Q_{ww,i,y}</math></td><td><math>COD_{ww,untreated,y}</math></td><td><math>COD_{ww,treated,y}</math></td><td><math>COD_{ww,removed,PJ,k,y}</math></td></tr><tr><td><math>F_{CH4}</math></td><td><math>Q_{biogas, burner, y}</math></td><td><math>P_{biogas, burner}</math></td><td><math>T_{biogas, burner}</math></td></tr><tr><td><math>EG_{thermal,y}</math></td><td><math>Q_{biogas, gas engine, y}</math></td><td><math>P_{biogas, gas engine}</math></td><td><math>EG_{gross, y}</math></td></tr><tr><td><math>EG_{aux, biogas system, y}</math></td><td><math>EG_{aux, gas engine, y}</math></td><td><math>EG_{BL,y}</math></td><td><math>Q_{biogas, flare,y}</math></td></tr><tr><td><math>P_{biogas, flare}</math></td><td><math>\eta_{flare,h}</math></td><td>Duration of flare</td><td>Sludge application</td></tr></table> <p>Following data and parameters are included in section B.6.2 data and parameters that are available at validation:</p> <table><tr><td>Annual starch production</td><td>Wastewater generation rate</td><td>COD inflow</td><td>COD outflow</td></tr><tr><td><math>COD_{ww,treated,y}</math></td><td><math>COD_{removed,i,y}</math></td><td><math>COD_{removed,PJ,k,y}</math></td><td><math>COD_{removal efficiency}</math></td></tr><tr><td><math>MCF_{ww,treatment.BL,i}</math></td><td><math>MCF_{ww,treatment.PJ,k}</math></td><td><math>B_{o,ww}</math></td><td><math>CFE_{ww}</math></td></tr><tr><td><math>\rho_{CH4,n}</math></td><td>Quantity of HFO used</td><td><math>NCV_{HFO}</math></td><td><math>EF_{FF, CO2}</math></td></tr></table>	$Q_{ww,i,y}$	$COD_{ww,untreated,y}$	$COD_{ww,treated,y}$	$COD_{ww,removed,PJ,k,y}$	$F_{CH4}$	$Q_{biogas, burner, y}$	$P_{biogas, burner}$	$T_{biogas, burner}$	$EG_{thermal,y}$	$Q_{biogas, gas engine, y}$	$P_{biogas, gas engine}$	$EG_{gross, y}$	$EG_{aux, biogas system, y}$	$EG_{aux, gas engine, y}$	$EG_{BL,y}$	$Q_{biogas, flare,y}$	$P_{biogas, flare}$	$\eta_{flare,h}$	Duration of flare	Sludge application	Annual starch production	Wastewater generation rate	COD inflow	COD outflow	$COD_{ww,treated,y}$	$COD_{removed,i,y}$	$COD_{removed,PJ,k,y}$	$COD_{removal efficiency}$	$MCF_{ww,treatment.BL,i}$	$MCF_{ww,treatment.PJ,k}$	$B_{o,ww}$	$CFE_{ww}$	$\rho_{CH4,n}$	Quantity of HFO used	$NCV_{HFO}$	$EF_{FF, CO2}$	<p>/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /TD/ /tool/</p>	CAR B5	OK
$Q_{ww,i,y}$	$COD_{ww,untreated,y}$	$COD_{ww,treated,y}$	$COD_{ww,removed,PJ,k,y}$																																					
$F_{CH4}$	$Q_{biogas, burner, y}$	$P_{biogas, burner}$	$T_{biogas, burner}$																																					
$EG_{thermal,y}$	$Q_{biogas, gas engine, y}$	$P_{biogas, gas engine}$	$EG_{gross, y}$																																					
$EG_{aux, biogas system, y}$	$EG_{aux, gas engine, y}$	$EG_{BL,y}$	$Q_{biogas, flare,y}$																																					
$P_{biogas, flare}$	$\eta_{flare,h}$	Duration of flare	Sludge application																																					
Annual starch production	Wastewater generation rate	COD inflow	COD outflow																																					
$COD_{ww,treated,y}$	$COD_{removed,i,y}$	$COD_{removed,PJ,k,y}$	$COD_{removal efficiency}$																																					
$MCF_{ww,treatment.BL,i}$	$MCF_{ww,treatment.PJ,k}$	$B_{o,ww}$	$CFE_{ww}$																																					
$\rho_{CH4,n}$	Quantity of HFO used	$NCV_{HFO}$	$EF_{FF, CO2}$																																					



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>parameters is justified and correct.</i>	$NCV_{\text{biogas}}$ $GWP_{\text{CH}_4}$ $\eta_{\text{th}}$ $\eta_{\text{flare,h}}$ $EF_{\text{CO}_2,\text{grid,y}}$  <i>Justification of evidences:</i> To check whether all applicable parameter are listed in section B.6.2 and B.7.1 of the PDD, the methodology, monitoring schematic and related tools were checked.  <i>Conclusion:</i> By means of document review and site visit following could be observed and is addressed in CAR B5 :  Also, data and parameters related to the grid EF calculation.			
B.6.2. Are the means of monitoring of all parameters contained in the monitoring plan feasible and in accordance with the requirements of the applied methodology?  (EB 55 Annex 1, § 123(a)–(b), 124) <i>Assess whether the provided information for all parameters w.r.t.</i> a) <i>Label (name of the data / parameter)</i> b) <i>data unit</i> c) <i>description</i>	<i>Description:</i> The information of the monitoring parameters are described in the relevant sections of the PDD.  <i>Justification of evidences:</i> The monitoring parameters and the provided information were verified and compared with the methodology and the related tools. The description is in line with the related tools and methodology. Specific information are described appropriately.  <i>Conclusion:</i> By means of document review and site visit it can be confirmed that the parameter mentioned in the monitoring section are described appropriately. Nevertheless please refer to B.6.2. and B.7.1. as the monitoring section has to be improved.	/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /TD/ /tool/	CAR A3 CAR B5	OK



Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
d) <i>source of data</i> e) <i>measurement equipment / method / procedure</i> f) <i>monitoring frequency</i> g) <i>QA/QC procedures</i> <i>are appropriately described and in compliance with the requirements of the methodology..</i>				
B.6.3. Have all means of implementing the monitoring plan, e.g. equations necessary for ex-post emission reduction calculation, been described clearly and in line with the methodology?  (EB 55 Annex 1, §§ 123(b), 124) <i>Check whether all necessary equations have been provided in the PDD. Pl. consider that ex-post and ex-ante calculations might be different.</i>  <i>Please consider that additional equations might be necessary to calculate auxiliary parameters.</i>	<i>Description:</i> The equation necessary for ex-post emission reduction calculation are described in the PDD. The data monitored necessary for emission reduction calculation ex-post are described in the monitoring sections.  <i>Justification of evidences:</i> The means of implementing the monitoring plan has been checked by document review. All equations have been provided in the PDD.  <i>Conclusion:</i> By means of site visit and document check, following was observed and raised in a CAR B5  The emission reduction calculation for the project activity is clearly described in the PDD.	/PDD/ /AMS.I.C/ /AMS.I.D/ /AMS.III.H/ /TD/ /tool/	CAR B5	OK
B.6.4. Is it likely that the	<i>Description:</i> The monitoring arrangements are described in the PDD.	/PDD/	CL	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>monitoring arrangements described in the PDD can properly be implemented in the context of the project activity?</p> <p>(EB 55 Annex 1, § 124(c)) Assess whether the described monitoring arrangements are sufficient and realistic to enable a thorough monitoring. Pl. consider also special monitoring conditions, e.g. downtimes of monitoring equipment etc.</p>	<p><i>Justification of evidences:</i> The relevant sections in the PDD were reviewed and compared with the monitoring arrangements on-site and statements received during interviews. As the proposed project activity is still under construction all of the responsible people were not appointed.</p> <p><i>Conclusion:</i> As the proposed project activity is still under construction all of the QA/AC procedures are not implemented. By means of interview, document check and site visit, the CL B17 was raised.</p>	<p>/IM02/ /IM03/ /IM04/</p>	B17	
<p>B.6.5. Are the QA/QC procedures appropriate sufficient to ensure the emission reductions achieved from the project activit can be reported ex-post and verified?</p> <p>(EB 55 Annex 1, § 124(b)) Please consider the description given in section B.7.2. Describe which QA/QC provisions are considered. Address Quality Management System provisions, calibration and maintenance of equipment. Address further any review procedures.</p>	<p><i>Description:</i> The QA/QC procedures to ensure that the emission reductions can be reported ex-post and verified are described in section B.7.2 of the PDD. Here responsibilities of the review of documentations and the data management are defined. Training for the supervisors will be provided by the MABR technology provider.</p> <p><i>Justification of evidences:</i> The relevant sections in the PDD were reviewed and compared with the monitoring arrangements on-site and statements received during interviews. As the proposed project activity is still under construction all of the responsible people were not appointed.</p> <p><i>Conclusion:</i> As the proposed project activity is still under construction all of the QA/AC procedures are not implemented. By means of interview, document check and site visit, the CL B17 was raised.</p>	<p>/PDD/ /IM02/ /IM03/ /IM04/</p>	CL B17	OK

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>B.6.6. Are procedures identified for data management?</p> <p>(EB 55 Annex 1, § 124(b))</p> <p><i>Check whether appropriate provisions are considered for data management including responsibilities, what records to keep, storage area of records and how to process performance documentation</i></p> <p><i>Check further the data archiving provisions for the project activity and ensure that provisions are made to archive data for the whole crediting period + 2 years.</i></p>	<p><i>Description:</i> The procedure for data management is described in the relevant section of the PDD. The parameters monitored will be recorded in the daily operational and maintenance log books. Any distinguishing event will be reported and recorded as special log. The monitored data will be saved during the full crediting period.</p> <p><i>Justification of evidences:</i> The data management described in the PDD were reviewed.</p> <p><i>Conclusion:</i> By means of interview, site visit and document review. The CL B17 was raised.</p>	<p>/PDD/ /IM02/ /IM03/ /IM04/</p>	<p>CL B17</p>	<p>OK</p>
<p><b>C. Duration of the Project/ Crediting Period</b></p> <p><i>It is assessed whether the temporary boundaries of the project are clearly defined.</i></p>				

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<p>C.1. Is the project's starting date clearly defined and evidenced?</p> <p>(EB 55 Annex 1, § 99)</p> <p><i>Check whether the starting date is correct. Apply the definition of the project starting date as per the "Glossary of CDM terms".</i></p>	<p><i>Description:</i> The project starting date is defined in the PDD as the date 2010-02-22 on which the NP Biopower signed a contract with Premier Energy Co Ltd for the MABR technology of proposed project activity. The contract stated that NP Biopower assigned Premier Energy Co Ltd to be responsible for design and construction of wastewater treatment and biogas capture from starch wastewater.</p> <p><i>Justification of evidences:</i> The contract was provided to the DOE and reviewed during the site visit. Also, an interview was conducted with Mr Somsak Tancharoensuukjit, the NP Biopower board director.</p> <p><i>Conclusion:</i> The project's starting date defined in the PDD as the date where the first contract agreement was signed can be assessed as reliable. Furthermore the starting date is in line with the "Glossary of CDM terms".</p>	/CM14/ /G_CDM/ /IM02/	OK	
<p>C.2. Is the project's operational lifetime clearly defined and evidenced?</p> <p><i>Check whether the project lifetime is correctly defined. Consider the guidance on the assessment of investment analysis (annex to the additionality tool).</i></p> <p><i>Check in case of phased implementation this has been reflected throughout the whole PDD incl. the financial assessment, if applicable.</i></p>	<p><i>Description:</i> The project's operational life time was conducted through the assessment of MABR system proposal which prepared by Premier Energy Co Ltd date 2010-01-04. The life time statements for MABR system is fifteen years.</p> <p><i>Justification of evidences:</i> The proposal from MABR technology supplier was reviewed and by mean of interview with the representative from MABR technology provider.</p> <p><i>Conclusion:</i> the project's operational lifetime clearly defined and evidenced</p>	/CM11/ /CM14/ /IM04/	OK	
<p>C.3. Is the start of the crediting period clearly defined and</p>	<p><i>Description:</i> The starting date of the crediting period is 2011-01-01 which defined in the PDD. It was confirmed that the commissioning date of the proposed project activity will be on December 2010. However, the CL C1 was raised regarding to the timeline of the</p>	/PDD/ /IM01/	<del>CL C1</del>	OK

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
reasonable?  <i>Check whether the envisaged starting date of the crediting period is realistic, taking into consideration the times needed for validation and registration.</i>	validation process.  <i>Justification of evidences:</i> By means of interview with the project participants and the MABR technology supplier.  <i>Conclusion:</i> The start of the crediting period is not reasonable.	/IM02/ /IM04/		
<b>D. Environmental Impacts</b>  <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the DOE.</i>				
D.1.1. Are there any Host Party requirements for an Environmental Impact Assessment (EIA)?  (EB 55 Annex 1, §§ 131–133) <i>Check the host party regulations, regarding EIA.</i>	<i>Description:</i> No, the proposed project activity is not required for an Environmental Impact Assessment (EIA). Only combine heat power with a capacity more than 10 MW is required for an EIA by the host party.  <i>Justification of evidences:</i> The type and capacity of the project or business to be required for the Environmental Impact Assessment (EIA) and reporting format announced by The Ministry of Natural Resources and Environment Department B.E. 2552 was reviewed.  <i>Conclusion:</i> There are no requirement from host party, Thailand, for an Environmental Impact Assessment (EIA)	/LR/	OK	
D.1.2. In case an Environmental Impact Assessment (EIA)	<i>Description:</i> Please refer to D.1.1.	/LR/	OK	

<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>is requested by the host party, has it been carried out and if applicable duly approved?</p> <p>(EB 55 Annex 1, §§ 131–133)  Check the EIA and its approval, if applicable.</p>	<p><i>Justification of evidences:</i></p> <p><i>Conclusion:</i></p>			
<p>D.1.3. Has an analysis of the environmental impacts of the project activity been sufficiently described and in line with the host party environmental legislation?</p> <p>(EB 55 Annex 1, §§ 130–132)  Check the PDD (section D). Check whether the project will create any adverse environmental effects.  Check the relevant national environmental legislation.</p>	<p><i>Description:</i> According to national laws, this kind of project does not require an Environmental Impacts Assessment (EIA). However, an Initial Environmental Evaluation (IEE) is mandatory to get the Host country approval from the TGO.</p> <p>An analysis of the environmental impact of the project activity has been described in the PDD. Furthermore an IEE was provided to the DOE.</p> <p><i>Justification of evidences:</i> The IEE was reviewed. Furthermore, the monthly report of the irrigated water delivered from the project owner and the operating license issued by the Department of Industrial Work were assessed during site visit.</p> <p><i>Conclusion:</i> An analysis of the environmental impacts of the proposed project activity has been sufficiently described and in line with the host party environmental legislation.</p>	/IEE/ /PDD/	OK	
<p>D.1.4. Are transboundary environmental impacts considered in the analysis?</p> <p>(EB 55 Annex 1, §§ 131–133)  Check the documents and local official</p>	<p><i>Description:</i> There are no transboundary environmental impacts considered. The proposed project activity is located at the North of Thailand. The proposed project activity is expected to treat the wastewater generated from the starch production. Under the Thai regulation, the wastewater is not allowed to be discharge to water bodies.</p> <p>The project location is also located in the North of Thailand where there is not land border with another country.</p>	/IEE/ /PDD/	OK	

Checklist Item (incl. guidance for the validation team)	Validation Team Comments (justification and substantiation of information, data and evidences)	Ref.	Draft Concl.	Final Concl.
<i>sources / expertise regarding transboundary environmental impacts.</i>	<p><i>Justification of evidences:</i> The PDD is reviewed and by mean of interview with the project participant.</p> <p><i>Conclusion:</i> The validation team has concluded that there is no possible of transboundary environmental impacts.</p>			
<p><b>E. Stakeholder Comments</b></p> <p><i>The DOE should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i></p>				
<p>E.1. Have relevant local stakeholders been invited to consultation prior to the publication of the PDD?</p> <p>(EB 55 Annex 1, § 128)</p> <p><i>Check by means of document review and interviews with local stakeholders if and when a local stakeholder consultation process has been carried out.</i></p>	<p><i>Description:</i> The stakeholder meeting was conducted on the 2010-03-26 at the Ban koh Rak Siad School, nearest school, meeting room, Khamphaengphet province Thailand. The local stake holder from Local Governor, and Education Sectors joined in the meeting. All commented discussed during the stakeholder meeting were listed in the PDD.</p> <p><i>Justification of evidences:</i></p> <p>The assessment was conducted through review of local stakeholder meeting report on 2010-03-26, attendant list, and interviewing with the local stakeholder during site visit.</p> <p><i>Conclusion:</i></p> <p>The relevant local stakeholders have been invited to the consultation meeting before the publication of PDD in the UNFCCC website 2010-07-17 – 2010-08-15.</p>	<p>/PDD/ /SHCP/ /unfccc/ /IM05/</p>	OK	



<b>Checklist Item</b> (incl. guidance for the validation team)	<b>Validation Team Comments</b> (justification and substantiation of information, data and evidences)	<b>Ref.</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<p>E.2. Can the local stakeholder consultation process be assessed as adequate? (EB 55 Annex 1, § 129(a)–(c))</p> <p><i>Describe what assessment steps have been undertaken to assess the adequacy of the stakeholder consultation process. Give a final opinion on the adequacy.</i></p> <p><i>Please consider the following requirements in this context:</i></p> <p><i>(a) Comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity, have been invited;</i></p> <p><i>(b) The summary of the comments received as provided in the PDD is complete;</i></p> <p><i>(c) The project participants have taken due account of any comments received and have described this process in the PDD.</i></p>	<p><i>Description:</i> The stakeholder meeting was conducted on the 2010-03-26 at the Ban koh Rak Siad School, nearest school, meeting room, Khamphaengphet province Thailand.</p> <p>The invitation was conducted by the project developer. The invitation letter number 002/2553, issued on 2010-03-10, was submitted to local stakeholders for invitation. The relevant sectors from local governor, education, environmental, NGOs, Local Agricultural Department and communication sector were invited. As the result, there are of 42 people were joined in the meeting. The attendants are the representative from the Local Department of Industrial Work, Local Environmental, Local Public Health, School, Appropriate Technology Association, District Administration Office, Subdistrict Headman, and Villager Headman.</p> <p>The consultation meeting was arranged by the involvement parties from NP Biopower , Premier Energy, Charoensuk Starch (2005) and Advance Energy Plus Co.,Ltd., The presentation was included the overall situation of Clean Development Mechanism (CDM) and the CDM status of the proposed project activity. The final part of the presentation was discussed about the impact that could be found from the proposed project activity. The questions raised during the stakeholder meeting were responded. By mean of interviewing with on-site, the local stakeholder has positive attitude regard the environmental and employment which can be brought to the community. The representatives from the project participants were taken appropriate response regard the comments to the stakeholders. All the comments are clearly defined in the PDD.</p> <p><i>Justification of evidences:</i></p> <p>The assessment was conducted through review of local stakeholder meeting report on 2010-03-26 and interviewing with the local stakeholder during site visit.</p> <p><i>Conclusion:</i></p> <p>The relevant local stakeholders were invited and interviewed during site visit. Also the stakeholder consultation process is in line with the requirement also the comments raised by stakeholder were indicated in the PDD.</p>	<p>/PDD/ /SHCP/ /IM05/</p>	<p>OK</p>	



## ANNEX 2: ASSESSMENT OF BASELINE IDENTIFICATION

**Table A-2:** Assessment of Baseline Identification (EB 51 Annex 3, §§ 82 – 85)

<input type="checkbox"/>	Baseline is not identified
<input checked="" type="checkbox"/>	Assessment of baseline see below

Baseline Alternatives identified	Inline with the Methodology?	Eliminated	Reasons for elimination / non-elimination from list of alternatives	Evidence used	DOE Assessment	
					Appropriateness of elimination	Assessment of validation team (results and means of assessment)

Baseline Alternatives identified	Inline with the Methodology?	Eliminated	Reasons for elimination / non-elimination from list of alternatives	Evidence used	DOE Assessment		
					Appropriateness of elimination	Assessment of validation team (results and means of assessment)	
The baseline scenarios are the anaerobic condition open lagoons, wastewater treatment without methane recovery	☒	☐	This practice is most widely seen at starch factory in Thailand and does not face any technical or financial barriers.	/unfccc/ /LR/	☒	On the basis of the knowledge of the local validation team it could be identified that the current practice is	
						Registered ref.	Title
						2645	Wastewater Treatment with Biogas Technology in a Tapioca Processing Plant at Roi Et Flour Company Limited, Thailand
						2660	Wastewater Treatment with Biogas Technology in a Tapioca Processing Plant at P.V.D. International Company Limited, Thailand
						2556	Bangna Starch Wastewater Treatment and Biogas Utilization Project
						2672	Kitroongruang Biogas Energy Project
						2678	Eiamburapa Company Ltd. Tapioca starch wastewater biogas extraction and utilization project, Sakaeo Province, Kingdom of Thailand

Baseline Alternatives identified	Inline with the Methodology?	Eliminated	Reasons for elimination / non-elimination from list of alternatives	Evidence used	DOE Assessment	
					Appropriateness of elimination	Assessment of validation team (results and means of assessment)
						reliable. Furthermore, this practice fulfills all regulatory requirements for industrial wastewater discharge in Thailand. Also, the registered projects, host country: Thailand, the baseline scenario is the anaerobic condition open lagoons. The reference projects are all starch wastewater treatment project with methane recovery located in Thailand. In conclusion, the baseline scenario for the proposed project activity is transparently identify and compliancy with the regulation in the host country.
Heat generation from fossil fuel: Heavy Fuel Oil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This practice is most widely seen at starch factory in Thailand and does not face any technical or financial barriers.	/ttsa/ /AMS I C/	<input checked="" type="checkbox"/>	On the basis of the experience of the local validation team and the information from Thailand Tapioca Starch association. Heat is used in the drying unit. Hot air is produced and sent from the steam boiler or the hot oil unit. The hot air is blown with a high pressure and carries the starch through the stack. The starch is then fallen into the cyclone. Normally, the cassava starch factory utilizes fuel oil for energy generation at approximately 40 liter/day. it could be identified that the current practice is reliable.
Electricity generation in the grid (continuation of current practice).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This practice does not face any preventive barriers.	/AMS I D/	<input checked="" type="checkbox"/>	On the basis of the experience of the local validation team it could be identified that the current practice is reliable. The host country, Thailand, has only one owned government grid.

### ANNEX 3: ASSESSMENT OF FINANCIAL PARAMETERS

**Table A-3:** Assessment of Financial Parameters (EB 51 Annex 3, §§110, 111, 113/ in case financial parameters stem from FSR §112,)

<input type="checkbox"/>	No financial parameters are used for additionality justification
<input checked="" type="checkbox"/>	Assessment of all financial parameters see below

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT				
					Correctness of value applied	Comment			
Biogas System	47,000,000	THB	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/	<input checked="" type="checkbox"/>	The estimated cost of investment for the biogas system which is taken from the feasibility study by Premier Energy Co.,Ltd. dated 2010-01-04. At the time prior to the decision by the board of management; there are three proposals from three technology suppliers are compared especially the biogas system. The summary are listed below:			
						Supplier	Date	Biogas system price THB	Land excavation THB
						Premier Energy	2010-01	39,000,000	8,000,000
						PAPOP	2009-06	60,000,000	Not include
						Global Water	2007-07	74,800,000	Not include
						However, the project participant has chosen the Premier Energy technology for the proposed project activity. For the Biogas system price 39 MBaht, as indicated in the feasibility study, the cost is broken down as following:			

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT																					
					Correctness of value applied	Comment																				
						<table><tr><th>Breakdown Activity</th><th>Cost (THB)</th></tr><tr><td>1) Land excavation</td><td>8,000,000</td></tr><tr><td>2) MABR System :</td><td></td></tr><tr><td>Civil Work</td><td>15,000,000</td></tr><tr><td>Mechanical &amp; Municipal work</td><td>15,000,000</td></tr><tr><td>Electrical work &amp; Control System</td><td>4,500,000</td></tr><tr><td>Sludge clearance and Start Up &amp; preparation work</td><td>500,000</td></tr><tr><td>3) Biogas Cleaning System:</td><td></td></tr><tr><td>Bioscruber Unit work</td><td>3,500,000</td></tr><tr><td>De-humidifier unit</td><td>500,000</td></tr></table>	Breakdown Activity	Cost (THB)	1) Land excavation	8,000,000	2) MABR System :		Civil Work	15,000,000	Mechanical & Municipal work	15,000,000	Electrical work & Control System	4,500,000	Sludge clearance and Start Up & preparation work	500,000	3) Biogas Cleaning System:		Bioscruber Unit work	3,500,000	De-humidifier unit	500,000
Breakdown Activity	Cost (THB)																									
1) Land excavation	8,000,000																									
2) MABR System :																										
Civil Work	15,000,000																									
Mechanical & Municipal work	15,000,000																									
Electrical work & Control System	4,500,000																									
Sludge clearance and Start Up & preparation work	500,000																									
3) Biogas Cleaning System:																										
Bioscruber Unit work	3,500,000																									
De-humidifier unit	500,000																									
<p>Note: The technology, MABR, is the ground type reactor therefore, the total of the cost of the biogas system is including land excavation.</p> <p>The costs of all proposals were compared. The selected technology cost is the lowest of all three suppliers. The value indicated deemed to be appropriate.</p>																										
Thermal Generation System	6,000,000	THB	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/	<input checked="" type="checkbox"/>	<p>Three proposals from three technology suppliers are compared especially the thermal generation system. The summary are listed below:</p> <table><tr><th>Supplier</th><th>Date</th><th>Thermal unit THB</th></tr><tr><td>Premier Energy</td><td>2010-01</td><td>6,000,000</td></tr><tr><td>PAPOP</td><td>2009-06</td><td>Not included</td></tr></table>	Supplier	Date	Thermal unit THB	Premier Energy	2010-01	6,000,000	PAPOP	2009-06	Not included											
Supplier	Date	Thermal unit THB																								
Premier Energy	2010-01	6,000,000																								
PAPOP	2009-06	Not included																								

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT																
					Correctness of value applied	Comment															
									in the quotation, additional cost will be applied												
							Global Water	2007-07	in the quotation, additional cost will be applied.												
						The project participant chooses the Premier Energy technology as the technology provider. As only the quotation from Premier Energy includes thermal generation system and radiant tube burner, the DOE added the thermal generation cost from Energy to the total investment cost from other two suppliers. The results are PAPOP, 95,500,000 THB, and Global Water, 80,800,000 THB. However, the quotation from Global Water is excluded power generation system, gas engine, biogas cleaning system and land application which is 34,000,000 THB. Therefore, the quotation price from the Premier Energy is the lowest of all three suppliers. Hence, the value indicated is deemed to be appropriate.															
Gas Engine System	25,000,000	THB	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/	<input checked="" type="checkbox"/>	Three proposals from three technology suppliers are compared especially the gas engine system. The summary are listed below: <table><tr><th>Supplier</th><th>Date</th><th>Gas engine unit THB</th></tr><tr><td>Premier Energy</td><td>2010-01</td><td>25,000,000</td></tr><tr><td>PAPOP</td><td>2009-06</td><td>29,500,000</td></tr><tr><td>Global Water</td><td>2007-07</td><td>Not included</td></tr></table>				Supplier	Date	Gas engine unit THB	Premier Energy	2010-01	25,000,000	PAPOP	2009-06	29,500,000	Global Water	2007-07	Not included
Supplier	Date	Gas engine unit THB																			
Premier Energy	2010-01	25,000,000																			
PAPOP	2009-06	29,500,000																			
Global Water	2007-07	Not included																			

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT				
					Correctness of value applied	Comment			
						<div></div> <div></div> <div></div> <div>in the quotation, additional cost will be applied.</div>			
						The quotation price from the Premier Energy is the lowest of all three suppliers. Hence, the value indicated is deemed to be appropriate.			
Engineering Fee	7,000,000	THB	Feasibility study from Premier Energy Co.,Ltd. 2010	/ADD/	<div>☒</div>	Three proposals from three technology suppliers are compared especially the engineering fee. The summary are listed below:			
						Supplier	Date	Engineering fee THB	
						Premier Energy	2010-01	7,000,000	
						PAPOP	2009-06	Included in the total investment cost	
						Global Water	2007-07	Included in the total investment cost	
						The project participant chooses the Premier Energy technology as the technology provider. As only the quotation from Premier Energy includes thermal generation system and radiant tube burner, the DOE added the thermal generation cost from Energy to the total investment cost from other two suppliers. The results are PAPOP, 95,500,000 THB, and Global Water, 80,800,000 THB. However, the quotation from Global Water is excluded power			

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT					
					Correctness of value applied	Comment				
						generation system, gas engine, biogas cleaning system and land application which is 34,000,000 THB. Therefore, the quotation price from the Premier Energy is the lowest of all three suppliers. Hence, the value indicated is deemed to be appropriate.				
Total investment cost	85,000,000	THB	Feasibility study from Premier Energy Co.,Ltd. 2010	/ADD/	<input checked="" type="checkbox"/>	The total investment cost is the accumulation of the four items above: Biogas system, Thermal generation system, Gas engine system, and Engineering fee. The quotations of the other two technologies suppliers excluded several cost; PAPOP quotation is excluded thermal generation system and Global Water quotation is excluded thermal and electricity generation systems. The DOE assessed the costs mentioned above and agreed that all four parameters from the Premier Energy are included in the quotation. The quotation price from the Premier Energy is the lowest of all three suppliers. Hence, the value indicated is deemed to be appropriate.				
Starch Plant Production	44,000	ton/yr	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /SC/ /LOG/	<input checked="" type="checkbox"/>	The estimated capacity of starch production output at Charoensuk Starch (2005) Company Limited. This value is indicated in the feasibility study <sup>/ADD3/</sup> . The DOE has validated the value by cross-checked with the starch production records since 2007 to 2009 which is before the management made a decision for the project activity. As the result, the value taken is based on the starch plant operation license <sup>/SC/</sup> from the local authority of the host country, 200 ton/day. Due to the starch plant was established in 2005 and started the production process in year 2006. Therefore, the starch production log sheet <sup>/LOG/</sup> year 2007, 2008 and 2009 was assessed. The summation of the total starch production are listed below:				
						<table><tr><th>Year</th><th>Starch plant production (ton/yr)</th></tr><tr><td>2007</td><td>20,652</td></tr></table>	Year	Starch plant production (ton/yr)	2007	20,652
						Year	Starch plant production (ton/yr)			
2007	20,652									



Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT					
					Correctness of value applied	Comment				
						<table><tr><td>2008</td><td>31,467</td></tr><tr><td>2009</td><td>39,290</td></tr></table> <p>By means of assessment, the validation team came to the conclusion that the value is appropriate and applicable.</p>	2008	31,467	2009	39,290
2008	31,467									
2009	39,290									
Starch Plant operating days	220	day	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /ttsa/	<input checked="" type="checkbox"/>	<p>The operation day of the starch plant which is indicated in the feasibility study. The operating day of the starch factory is depended on the seasoning of the raw material, fresh cassava. The cassava harvesting seasoning is on the dry season (winter) of the host country, November – February. During the raining season, the starch per ton of the fresh cassava is low due to the nature of the cassava plant; the plant is growing not storing. The study from the Thai Tapioca Starch Association (TTSA)<sup>/ttsa/</sup> is also confirmed the seasoning of the fresh cassava in Thailand. However, the starch production log sheet has been assessed during site visit. The operating day is indicated in range 202-291 days a year. Hence, the DOE agree that the value applied is appropriate.</p>				
Wastewater generation rate	15.00	m <sup>3</sup> /ton starch	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /XLS/ /unfccc/	<input checked="" type="checkbox"/>	<p>The value is indicated in the feasibility study from Premier Energy Co.,Ltd.</p> <p>The DOE has validated the value by cross-checked wastewater discharge and starch production output from the starch production record as demonstrated in the measurement campaign sheet during 2010-02-12 to 2010-02-25<sup>/XLS/</sup>. Then, the DOE has re-calculated the value, which is indicated the average wastewater generation rate per ton starch production during that period of time at 14.76 m<sup>3</sup>/ton. In addition, the DOE has also cross-checked with the article published on the Thai Tapioca Starch Association (TTSA) website (<a href="http://www.thaitapiocastarch.org/article01.asp">http://www.thaitapiocastarch.org/article01.asp</a>) which indicates the water required for production of starch output at 10-30 m<sup>3</sup>/ton. Also, assessed to other register CDM projects,</p>				

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
						which is the wastewater from starch factory in Thailand, the value was indicated at 15 m <sup>3</sup> /ton starch production. Hence, the validation team came to conclusion that the applied value is within the range and considered as appropriate.
Amount of Generated wastewater	660,000	m <sup>3</sup> /year	Calculated	/IRR/	<input checked="" type="checkbox"/>	The value is calculated from the starch output per annual and the wastewater generation rate per ton starch output. The IRR excel sheet and the value applied for calculation was validated; hence, the DOE concluded that the calculated value is correct.
COD loss in Sand Trap	10.00	%	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /unfccc/	<input checked="" type="checkbox"/>	The value is indicated in the feasibility study report from the technology provider. The value consider the losses of COD at the sand trap in prior to enter the ABR system. The DOE has assessed the value by means of interview with the technology provider. As well cross-checks with other CDM projects were done For instance, the CDM project no 2678. By means of interview and crosschecks the 10% loss is considered as appropriate and conservative.
Maximum design of COD content in the wastewater	17,500	mg COD/litre	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /COD/ /XLS/	<input checked="" type="checkbox"/>	This value is indicated in the feasibility study from the technology provider for the maximum COD content in the wastewater discharged from starch factory. The DOE has assessed the report of COD measured during 2010-02-12 to 2010-02-25 <sup>/COD/</sup> by the external laboratory. The value is indicated at 17,639 mg/l <sup>/XLS/</sup> in average. In addition, the DOE has assessed to the literature "Resource Assessment Report for Livestock and Agro-Industrial Wastes – Thailand" which prepared for: U.S. EPA Methane to Markets Program date 2009-09-14. The COD value in the effluent from the starch factory in Thailand is range 13,000 – 20,000 mg/l. By means of assessment, the COD applied for the design is appropriate.

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
COD loading for Digester	52,500	kg COD/day	Calculated	/ADD/ /SC/	<input checked="" type="checkbox"/>	The COD load per day for the project activity. This value is indicated in the feasibility study <sup>/ADD/</sup> . This value was calculated based on the maximum COD discharged from starch factory and the amount of wastewater. In addition, 10% loss of COD before entering the biogas system was taken into account. The value has also been checked by means of interview during site visit and deemed to be appropriate.
Digester Efficiency	85.00%	%	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /ARB/ /TD/	<input checked="" type="checkbox"/>	The value is indicated in the feasibility study from Premier Energy Co.,Ltd. 2010-01-04. As well as, a literature published in the Brazilian Journal of Microbiology (2009), ISSN 1517-8382, the study of "PERFORMANCE OF AN ANAEROBIC BAFFLED REACTOR (ABR) IN TREATMENT OF CASSAVA WASTEWATER" <sup>/ARB/</sup> on the similar ABR biogas system has addressed the efficiency of the ABR biogas system at range 83-92% which based on the HRT (hydraulic retention time) of the system at 3.5 days. In addition, the assessment through other registered CDM project on UNFCCC website with similar technology, CDM ref. no. 2110 and 1040 have been applied the efficiency for the system within the range indicated in the literature which is reasonable. Therefore, the DOE came to conclusion that the value applied is considered as appropriate.
Biogas generation rate	0.40	m <sup>3</sup> /kg COD removal	The Department of Alternative Energy Development and Efficiency website	/dede/	<input checked="" type="checkbox"/>	The value indicated in the IRR calculation. The assessment was conducted through research study on UASB prototype projects from starch factory in Thailand <sup>/uasb/</sup> which has been published on the website of the Department of Industrial Work. As well as, the publishment of biogas on the DEDE website <sup>/dede/</sup> . By means of assessment both references, the value of biogas generation rate for the UASB system is in range 0.3-0.5 m <sup>3</sup> /kgCOD. Therefore, the value applied is acceptable.

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
Amount of Generated biogas	3,534,300	m <sup>3</sup> /yr	Calculated	/IRR/ /ADD/ /TD/	<input checked="" type="checkbox"/>	The biogas generation amount from the biogas system. This value is calculated from the guarantee efficiency at 85%, annual operating day, COD enter biogas system, and the rate of biogas generation. The value applied for the calculation and the formula to calculate has been assessed. Hence, the validation team came to conclusion that the calculated value is correct.
Amount of Fuel Oil Usage	1,076,497	litre/yr	Fuel invoices	/FI/	<input checked="" type="checkbox"/>	The average amount of the fuel oil consumed annually for the starch factory. The DOE has assessed and recalculated the invoices of fuel payment year 2007, 2008 and 2009 which is match. Therefore, the value is appropriated to be applied.
Boiler Efficiency	81.00	%	Technical specification of radiant tube burner	/TD/	<input checked="" type="checkbox"/>	The efficiency of radiant tube burner which installed for the project activity. The DOE has assessed the document and interviewed the project participant. By means of assessment the value applied as appropriate.
Amount of biogas for Thermal Application	2,525,307	m <sup>3</sup> /yr	Calculated	/IRR/	<input checked="" type="checkbox"/>	The value is calculated from the amount of fuel oil usage, boiler efficiency, NCV of biogas and the fuel oil. The value applied has been assessed and cross-checked with the relevant document as assessment in detail. For the NCV of biogas and the fuel oil is taken from the data published in the electrical report year 2008 in Thailand. The DOE also cross-checked from the report published in the DEDE website and the value is match. Therefore, the validation teams agree that the value applied is calculated as appropriate.
Amount of biogas for Power Generation	1,008,993	m <sup>3</sup> /yr	Calculated	/IRR/	<input checked="" type="checkbox"/>	The different between Amount of Generated biogas and Amount of biogas for Thermal Application. The formulas and values applied has been assessed in detail as describe in each parameters. Therefore, the value applied is calculated as appropriate.
Power generation rate	2.18	kWh/m <sup>3</sup> biogas	Technical specification of gas engine	/IRR/ /ADD/	<input checked="" type="checkbox"/>	The estimated value is applied in the IRR calculation sheet. The value is calculated from the technical data of GUASCOR

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
				/TD/		SFGLD560 <sup>/ADD/</sup> . The power generation rate as per the calculation sheet <sup>/ADD/</sup> has been assessed and the value is assessed as appropriate. As well the feasibility study which was proposed by the technology provider indicates 2 kWh/m <sup>3</sup> biogas. Even the value applied is not match with the value at the time of management decision; however, the value 2.18 is appropriate and conservative.
Amount of electricity produced per year	2,199,605	kWh/yr	Calculated	/IRR/	<input checked="" type="checkbox"/>	The value is calculated from the parameters mentioned above; Amount of biogas for power generation multiplied to power generation rate. The calculation is correctly applicable and appropriated. Both parameters were assessed in detail. The DOE agreed that the value applied is acceptable.
Auxiliary load for gas engine	4.00	%	Estimated	/IRR/ /XLS/	<input checked="" type="checkbox"/>	The estimated percentage of the auxiliary load for the gas engine at the value has been cross-checked by interviewed with the technology provider during site visit. The design diagram for the auxiliary has been check with the capacity applied as indicated in the contract agreement between the project owner and the technology provider. The value has been re-calculated for the amount power and divided by the total generation amount of the electricity of the power generation unit. The result of assessment is match to the value demonstrated in the emission calculation sheet. However, the 4% load is considered as appropriate by comparing to the calculated value 4.26%. By means of assessment, the DOE agree that the value applied is acceptable.
Biogas Selling Price	6.00	THB/m <sup>3</sup>	Estimated	/ADD/ /IRR/ /dede-1/	<input checked="" type="checkbox"/>	The estimated biogas selling price between the starch factory and NP Biopower is in between 6 – 7 THB/m <sup>3</sup> . The values for the upper range, 7 THB/m <sup>3</sup> is from the proposal from other technology provider, TBEC. The lower value, 6 THB/m <sup>3</sup> , is from SPC ltd. The selling price of biogas has been validated by comparing the NGV (natural gas for vehicle) price in the market. The literature from the Economic and Money Analysis for the Renewable Energy

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
						<p>in Thailand<sup>/BSP/</sup> which published on the DEDE website, page 29 has been demonstrated the price of NGV at 6.49 to 9.69 THB/Nm3. By consideration the heating value from the biogas and the NGV, the 6 THB/m3 is considered as appropriate. As well as, the assessment of the production biogas cost as published in the EPPO website <a href="http://www.eppo.go.th/vrs/VRS38-10-Biomass.html">http://www.eppo.go.th/vrs/VRS38-10-Biomass.html</a> has indicated at 3.14 THB/Nm3 which is the cost of biogas production from the manure wastewater.</p> <p>By consideration of the biogas price comparing to the production cost 3.14 THB/Nm3 even the project type is different but the production cost can be considered not much different. Also, comparing the selling price 6 THB/m3 to the NGV price range 6.49 to 9.69 THB/Nm3. The selling price at 6 THB/m3 is comparable by considered the same amount of energy. .</p>
Base Tariff Rate	2.60	Baht/kWh	Calculated average price based on prices from PEA. Invoices and other supporting documents have been provided.	/PPA/ /tariff/	<input checked="" type="checkbox"/>	<p>Calculated from the electricity tariff invoices and Power Purchase Agreement. Also, cross-check of the tariff which government paid to firm and non-firm SPP generators as published in the table-1 on Palang-Thai website<sup>/tariff/</sup>, the value indicated at 2.56 Baht/kWh year 2007. By comparing the base tariff with the tariff price in the region year 2007 which indicated in the report<sup>/tariff/</sup>, the value applied is conservative w.r.t the IRR. Therefore, value applied deemed to be appropriate and conservative w.r.t. IRR calculation.</p>
Adder	0.30	THB/kWh	The regulation for subsidy additional of renewable	/IRR/	<input checked="" type="checkbox"/>	<p>The subsidy additional for renewable of Thailand. The DOE has assessed the PEA announcement effective on 2007-02-01 which published on <a href="http://www.pea.co.th/annoucement/adder.pdf">http://www.pea.co.th/annoucement/adder.pdf</a>. The 0.3 THB/kwh was indicated and the subsidy additional amount can be applied for 7 years period counted from the commercial operation date (COD). By means of assessment the adder applied is correct.</p>

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
Operation Cost : Biogas system	7,000,000	THB/yr	Estimated	/ADD/	<input checked="" type="checkbox"/>	The estimated annual cost to operate the MARB system which is indicated in the feasibility study from technology provider 2010-01-04. This cost is comprised of : Labor cost 1,320,000 THB/yr Lab analysis 500,000 THB/yr
Operation Cost : Gas engine	0.30	THB/kWh	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /DEDE/	<input checked="" type="checkbox"/>	The O&M cost of the gas engine is determined by the net generation multiplied by the O&M cost per kWh, 0.3 THB/kWh, provided by the technology provider. As per the research document published by the DEDE, the O&M cost for the gas engine for the biogas project in Thailand is 0.5 THB/kWh. By means of assessment, the value applied deemed to be appropriate and conservative for the IRR calculation.
Operation Cost : Gas engine	659,881	THB/yr	Calculated from electricity generation per year multiplied by the operation cost factor from the Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/ADD/ /IRR/	<input checked="" type="checkbox"/>	Calculated from the electricity generation from the proposed project activity multiplied by the O&M cost of gas engine factor from the feasibility study by Premier Energy Co.,Ltd. 2010-01-04 The parameter was recalculated by the validation team Operation cost: Gas engine = $2,199,605 \times 0.3$ = 659,881 THB/year By means of assessment, the value applied deemed to be appropriate and conservative for the IRR calculation.
Maintenance & Overhaul : Biogas system	8,000,000	THB/Five years	Technical Description from the technology provider	/ADD/ /TD/	<input checked="" type="checkbox"/>	The overhaul of the biogas system will be performed every five years which will be $2 \times 8,000,000 = 16,000,000$ THB for the fixed 10 years crediting period. The main portion of the maintenance is changing the HDPE sheet for the wastewater system, 4,500,000 THB. The pumping system for wastewater and biogas, measuring equipment and biogas cleaner are cost 3,500,000 THB. The figures are cross checked with the standard price in the host country. By means of assessment, the value applied deemed to be appropriated and conservative for the IRR calculation.



Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
Maintenance & Overhaul : Gas Engine	Year 1: 2,237,503 Year 2: 2,237,503 Year 3: 4,032,027 Year 4: 2,237,503 Year 5: 2,237,503 Year 6: 7,531,149 Year 7: 2,237,503 Year 8: 2,237,503 Year 9: 4,032,027 Year 10: 2,237,503 Year 11: 2,237,503 Year 12: 7,531,149 Year 13: 2,237,503 Year 14: 2,237,503 Year 15: 4,032,027	THB/year	Technical Description from the gas engine provider	/ADD/ /TD/	<input checked="" type="checkbox"/>	<p>The overhaul of gas engine is depended on the operation hour of the engine. The 15 years, 131,400 hours, breakdown cost detail was provided by the gas engine provider.</p> <p>The figures are cross checked with the standard price in the host country.</p> <p>By means of assessment, the value applied deemed to be appropriated and transparency conservative since the detail of breakdown were applied for individual year for the IRR calculation.</p>



Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
Average Annual O&M cost	12.57	Million THB/year	Calculated from summation of Operation Cost : Biogas system, Operation Cost : Gas engine, Maintenance & Overhaul : Biogas system, and Maintenance & Overhaul : Gas Engine divided by life time of proposed project activity, 15 years	/IRR/ /ADD/	<input checked="" type="checkbox"/>	The average annual O&M costs indicated in the PDD is an accumulation of four components: Operation cost of biogas system, Operation cost of gas engine, Overhaul of biogas system and Overhaul of gas engine, divided by life time of proposed project activity, 15 years. The O&M cost for each year is not fixed due to the overhaul of biogas system and gas engine. For the overhaul of the biogas system is 8,000,000 every 5 years and for the gas engine is depended on the operation hours. The parameter was recalculated by the validation team. By means of assessment, the value applied deemed to be appropriated and conservative for the IRR calculation.
Life time	15.00	years	Feasibility study from Premier Energy Co.,Ltd. 2010-01-04	/TD/ /interview/ /unfccc/	<input checked="" type="checkbox"/>	The value is indicated in the feasibility study and crossed check with technology provider during site visit <sup>TD/</sup> . Cross-check with other registered CDM project no. 2110 and 2144 which is considered as similar technogy, the life time was indicated at 12 and 25 years. Therefore, the DOE agree that value applied is fallen within range and considered as appropriate.
Forex	46.52	THB/EURO	Bank of Thailand website on 2010-01-29	/WACC/ /bot/ /IM02/	<input checked="" type="checkbox"/>	Cross-check of the exchange rate from Bank of Thailand at the date of management decision to go for CDM (2010-02-03). The value indicated is 46.50 Baht/EU. By means of interview the exchange rate on 2010-01-29 is taken which is before the date of board decided for the project activity. As well as, the value applied is very close to the value assessed from the value published on Bank of Thailand website. By means of assessment, the exchange rate applied is considered as appropriate and conservatism.
Debt Share	51.7	%	The value applied for WACC benchmark	/WACC/ /set/	<input checked="" type="checkbox"/>	The value applied is in according to debt/equity(D/E) in the energy sector which is considered as the same business category. The

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
			calculation			assessment was conducted by cross-checked the data published in the stock exchange of Thailand website year from 2007 to 2009. The fraction of D/E is indicated in range 1.01 to 1.17 which is calculated to equity percentage at range 51 to 56. However, the 51.7% is taken and applied in for calculation of WACC benchmark. The DOE consider that the 51.7% debt share applied is fallen within to the debt share of the same business sector. Hence, it is reasonable to take this value as basis for debt share. Furthermore it is common practice internationally to assume this share of debt when doing an investment. The value is appropriate.
Equity Share	48.3	%	The value applied for WACC benchmark calculation	/WACC/ /set/	☒	The value applied is in according to debt/equity(D/E) in the energy sector which is considered as the same business category. The assessment was conducted by cross-checked the data published in the stock exchange of Thailand website year from 2007 to 2009. The fraction of D/E is indicated in range 1.01 to 1.17 which is calculated to equity percentage at range 44 to 49. However, the 48.3% is taken and applied in for calculation of WACC benchmark. The DOE consider that the 48.3% equity share applied is fallen within to the equity share of the same business sector. Hence, it is reasonable to take this value as basis for equity share. Furthermore it is common practice internationally to assume this share of equity when doing an investment. The value is appropriate.
Minimum Lending Rate (MLR)	6.95	%	WACC benchmark calculation	/WACC/ /bot_1/	☒	The value is sourced from the annual minimum lending rate (MLR) of the country from 2007 to 2009. The value of MLR year 2007 to 2009 were cross-checked by assessment the Bank of Thailand website /bot_1/. The applied value reflects the value from 2010 at the time of management decision for CDM. The validation team came to conclusion that value is appropriate and conservative.

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
Return of Equity (ROE)	17.20	%	WACC benchmark calculation	/WACC/ /set/	<input checked="" type="checkbox"/>	The value is applied for WACC benchmark calculation. The assessment was conducted by cross-checked with the data published on the stock exchange market of Thailand <sup>/set/</sup> . The return of equity for energy sector was taken due to considered as same business sector in the market. The value was assessed year 2007 to 2009. As well as, validation team has re-calculated by summation of net profit percentage and divided by the equity. Also, the research from other similar biogas project activity, CDM ref.no 2678 and 2658 has come to the result that the %ROE is applied is 12.38%. For the value applied from the proposed project is also taken at 17.20% which is reflect to the time of decision for the project activity. Therefore, validation team came to the conclusion that the value applied is appropriate.
Corporate Tax Rate (Tc)	30	%	WACC benchmark calculation	/IRR/ /WACC/ /IM03/	<input checked="" type="checkbox"/>	Corporate Tax 30% was not taken into account for benchmark calculation. The 30% tax rate is the standard corporate tax of Thailand under the Revenue Department of Thailand which is the government sector to responsible about the tax of the country. The assessment was conducted by interviewed the project developer by considered the dated 2010-02-03 at the decision date for CDM. In addition, the website of Revenue Department <a href="http://www.rd.go.th/publish/6044.0.html">http://www.rd.go.th/publish/6044.0.html</a> and the result was consistence. Therefore, the validation team came to the conclusion that corporate tax rate applied is appropriate.
WACC Benchmark	10.82	%	Post-tax benchmark by calculated	/WACC/ /unfccc/	<input checked="" type="checkbox"/>	$WACC = \frac{E}{E+D} \times R_e + \frac{D}{E+D} \times R_d \times (1-T)$ <p> E / (E+D): Equity fraction in the Project  D / (E+D): Debt fraction in the Project  Re: Rate of expected return by shareholders  Rd: Rate of expected return by loan providers </p>

Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT	
					Correctness of value applied	Comment
						<p>T: Corporate tax rate</p> <p>The formula is correctly applied. The approach to establish a comparable benchmark to the project IRR is in compliance with EB 51, Annex 58, para 12. The calculation was conducted with appropriate of data applied. The result has been recalculated by the validation team.</p> <p>The benchmark is calculated based on parameters that are standard in the market. All parameters applied are assessed as correct and appropriate and chosen to ensure a high degree of conservativeness. Furthermore, by comparison to other registered CDM which similar biogas project activity in Thailand ref. no. 2678, the post-tax benchmark range of WACC is indicated at 8.68%. Also, some projects such as ref. no. 1993 had been applied benchmark at 15% by referred to the research of biomass market in Thailand. However, for the project activity, the post-tax WACC benchmark at 10.82% has been chosen which is fallen within the range of benchmark applied to other registered CDM project. As well as, the assessment in CAR B6 and CL B8 has been demonstrated; therefore, the post-tax benchmark WACC is considered as appropriate. By mean of validation, the DOE has validated and agreed that the benchmark is appropriate.</p>

## ANNEX 4: ASSESSMENT OF BARRIER ANALYSIS

**Table A-4:** Assessment of Barrier Analysis (EB 51 Annex 3, § 117)

<input checked="" type="checkbox"/>		No barrier parameters are used for additionality justification		
<input type="checkbox"/>		Assessment of barriers see below		
Kind of Barrier (invest, tech, other)	Description of Barrier	Evidence used	Assessment of validation team	
			Appropriateness of information source	Explanation of final result
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	
			<input checked="" type="checkbox"/>	

## ANNEX 5: OUTCOME OF THE GSCP

**Table A-5:** Outcome of the Global Stakeholder Consultation Process

(§§ 40-42, VVM Version 1.2)

<input checked="" type="checkbox"/>	No comments were received during the global stakeholder consultation period					
<input type="checkbox"/>	Comments were received during the global stakeholder consultation period. The comments (in unedited form) and the consideration/response of the validation team are presented below:					
Comment No.:	Comment by:	Inserted on:	Subject	Comment <sup>*)</sup>	Action taken by the validation team to take due account on the comment <sup>*)</sup>	Conclusion (incl. CARs CLs or FARs)
					Further clarification has been / has not been requested from the entity providing the comment because the comment was / was not sufficiently substantiated due to ...	

<sup>\*)</sup> In case clarifications have been requested by the validation team corresponding rows shall be added

## ANNEX 6: APPOINTMENT CERTIFICATES OF TEAM MEMBERS



### CERTIFICATE OF APPOINTMENT

**Mr. Dipl.-Ing. Eric Krupp**

born on 1971-06-25

satisfies the requirements as specified in the TÜV NORD  
JI/CDM CP directives and is hereby appointed as

**TÜV NORD JI/CDM Senior Assessor**

The present appointment will terminate on 2010-07-05  
Certification registration No. 06 05 01 - 017

Essen, 2007-07-06

  
Head of TÜV NORD JI/CDM Certification Program  
of TÜV NORD CERT GmbH



### CERTIFICATE OF APPOINTMENT

**Ms. Saowalak Thongsong**

born on 1974-04-25

satisfies the requirements as specified in the TÜV NORD  
JI/CDM CP directives and is hereby appointed as

**TÜV NORD CDM Expert**

The present appointment will terminate on 2013-03-14  
Certification registration No. 10 03 11 - 143

Essen, 2010-03-15

  
Head of TÜV NORD JI/CDM Certification Program  
of TÜV NORD CERT GmbH



### CERTIFICATE OF APPOINTMENT

**Mr. Martin Saalmann**

born on 1976-02-23

satisfies the requirements as specified in the TÜV NORD  
JI/CDM CP directives and is hereby appointed as

**TÜV NORD JI/CDM Senior Assessor**

The present appointment will terminate on 2013-03-31  
Certification registration No. 10 04 01 - 22

Essen, 2010-04-01

  
Head of TÜV NORD JI/CDM Certification Program  
of TÜV NORD CERT GmbH



### CERTIFICATE OF APPOINTMENT

**Mr. Dr. Jochen Schubert**

born on 1970-12-24

satisfies the requirements as specified in the TÜV NORD  
JI/CDM CP directives and is hereby appointed as

**TÜV NORD JI/CDM Expert**

For the following scopes: 1, 2, 3, 6, 7, 13, 15

The present appointment will terminate on 2011-07-22  
Certification registration No. 08 07 02 - 56

Essen, 2008-07-23

  
Head of TÜV NORD JI/CDM Certification Program  
of TÜV NORD CERT GmbH



#### **CERTIFICATE OF APPOINTMENT**

**Mr. Ulrich Walter**

born on 1964-10-12

satisfies the requirements as specified in the TÜV NORD  
JI/CDM CP directives and is hereby appointed as

**TÜV NORD JI/CDM Expert**

The present appointment will terminate on 2013-05-24

Certification registration No. 10 05 08 – 149

Essen, 2010-05-25

A handwritten signature in black ink, appearing to be 'U. Walter'.

Head of TÜV NORD JI/CDM Certification Program  
of TÜV NORD CERT GmbH