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# VALIDATION REPORT

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## Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project in Thailand

REPORT No. 2007-1017

REVISION No. 02



# VALIDATION REPORT

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Client: Mitsubishi UFJ Securities Co., Ltd.	Client ref.: Junji Hatano

**Project Name:** Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project  
**Country:** Thailand  
**Methodology:** ACM0001  
**Version:** 05  
**GHG reducing Measure/Technology:** Capture of landfill gas for electricity generation and flaring.

**ER estimate:** Average of 47 185 tCO<sub>2</sub>e per year over ten years.

## Size

- ☒ Large Scale  
☐ Small Scale

## Validation Phases:

- ☒ Desk Review  
☒ Follow up interviews  
☒ Resolution of outstanding issues

## Validation Status

- ☒ Corrective Actions Requested  
☒ Clarifications Requested  
☒ Full Approval and submission for registration  
☐ Rejected

In summary, it is DNV's opinion that the "Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project", as described in the project design document of 27 June 2007, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0001 (version 05). Hence, DNV requests the registration of the project as a CDM project activity.

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Report title: Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project in Thailand		
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Work verified by: Michael Lehmann		

## Key words:

Climate Change  
 Kyoto Protocol  
 Validation  
 Clean Development Mechanism

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### *Abbreviations*

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EGAT	Electricity Generation Authority of Thailand
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IEE	Initial Environmental Examination
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill Gas
MEA	Metropolitan Electricity Authority
MP	Monitoring Plan
MSW	Municipal Solid Waste
MVP	Monitoring and Verification Plan
N <sub>2</sub> O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
ONEP	Office of Natural Resources and Environmental Policy and Planning
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change



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### 1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project” in Thailand. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

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

The project correctly applies ACM0001 “*Consolidated methodology for landfill gas project activities*”, version 5.

By utilising or flaring landfill gas instead of passively venting it the project results in reductions of CH<sub>4</sub>/CO<sub>2</sub> emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 47 185 tCO<sub>2</sub>e per year over the selected 10 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Adequate training and monitoring procedures have been implemented.

In summary, it is DNV’s opinion that the “Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project” in Thailand, as described in the PDD of 27 June 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0001. DNV thus requests the registration of the project as a CDM project activity.



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### 2 INTRODUCTION

Mitsubishi UFJ Securities Co., Ltd. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project” in Thailand (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0001.

#### 2.1 Objective

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

#### 2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Manual employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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



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### 3 METHODOLOGY

The validation consisted of the following three phases:

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

The following sections outline each step in more detail.

#### 3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation assessed during the validation:

- /1/ Mitsubishi UFJ Securities Co., Ltd.: “*Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project Project*” draft version of 20 May 2004, version 01 of December 2004, version 02 dated 12 January 2007 and version 03 dated 27 June 2007.
- /2/ Office of Natural Resources and Environment Policy and Planning (DNA of Thailand): *Letter of Approval*, 30 August 2007
- /3/ The Liaison Committee for the Utilization of the Kyoto Mechanisms (DNA of Japan): *Letter of Approval*. 28 March 2007
- /4/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /5/ CDM Executive Board: “*Consolidated methodology for landfill gas project activities*” ACM0001, Version 5 adopted at EB28.
- /6/ CDM Executive Board: “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*” ACM0002, Version 06 of 19 May 2006.
- /7/ CDM Executive Board: “*The tool for the demonstration and assessment of additionality*”, version 03.
- /8/ CDM Executive Board: “*Tool to determine project emissions from flaring gases containing methane*” adopted at EB28
- /9/ IPCC: “*Guidelines for National Green House Gas Inventories*” 2006
- /10/ Spreadsheet for ER calculations



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### 3.2 Follow-up Interviews with Project Stakeholders

The following persons were interviewed and/or provided additional information to the presented documentation:

Date	Name	Organization	Topic
1. 2004-05-31	Mr. Arch Inkatanuwat (Asst. director, Development and Planning Division)	EGAT (Electricity Generating Authority of Thailand),	<ul style="list-style-type: none"> <li>➤ Thailand's current electric power composition and future plan</li> <li>➤ Current and future capacity expansion for electricity</li> </ul>
2. 2004-05-31	1. Mr. Amnuay Thongsathitya (Executive Director). 2. Mr. Rangsan Sarochawikasit (Senior Engineer). 3. Somkiat Suriratana (Senior Engineer).	DEDE (Department of Alternative Energy Development and Efficiency)	<ul style="list-style-type: none"> <li>➤ Written approval of voluntary participation</li> <li>➤ Current and future policy about renewable energy</li> </ul>
3. 2004-06-01	Mr. Rangsan Pinthong (Director of Waste and Hazardous Substance Management Bureau)	Pollution Control Department, Ministry of Natural Resources and Environment	<ul style="list-style-type: none"> <li>➤ Current MSW management and policy in Thailand</li> <li>➤ Compliance with EIA requirement</li> </ul>
4. 2004-06-01	1. Mr. Chavalit Pichalai (Director, Energy System Analysis Bureau). 2. Mr. Wathanyu Amatayakul(Plan and Policy Analyst).	Energy Policy and Planning Office, Ministry of Energy	<ul style="list-style-type: none"> <li>➤ Current energy situation and policy in Thailand</li> <li>➤ Future energy plan of Thailand</li> </ul>
5. 2004-06-01	Dr. Asdaporn Krairapanond	DNA of Thailand	<ul style="list-style-type: none"> <li>➤ Thailand's DNA mechanism and criteria for sustainable development</li> </ul>
6. 2004-06-02	1. Ms. Kay Jaroenpoj. 2. Ms Kai Jaroenpoj.	Jaroensompong Corporation	<ul style="list-style-type: none"> <li>➤ Project's additionality as mandated in Article 12 of the Kyoto Protocol</li> <li>➤ Technological, institutional, legal/policy, investment, market, environmental and/or other barriers to investment in the projects</li> <li>➤ Project technology and provisions for technology and capacity transfer to the host country</li> <li>➤ Estimation of emission reductions and potential leakage</li> <li>➤ Environmental and social effect by implementation of the project</li> <li>➤ Monitoring plan</li> </ul>





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### 3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design.

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

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

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

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

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

The validation protocol consists of two tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Jaroensompong Corporation Rachathewa Landfill Gas to Energy Project" is enclosed in Appendix A to this report.



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

  

<b>Validation Protocol Table 2: Requirement checklist</b>				
<b>Checklist Question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Comment</b>	<b>Draft and/or Final Conclusion</b>
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (OK), or a <b>corrective action request (CAR)</b> due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.</i>

  

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

**Figure 1 Validation protocol tables**



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### 3.4 Internal Quality Control

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

### 3.5 Validation Team

<i>Role/Qualification</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>
Team leader, CDM validator	Lai	Chee Keong	Malaysia
GHG auditor	Cheong	Tse Wei	Malaysia
Sector expert	Nakao	Tsuyoshi	Japan
CDM validator	Narayanan	Thivakaran	Malaysia
Technical reviewer	Michael	Lehmann	Norway

Certificates of Competence for each validation team member are included in Appendix B to this report.

## 4 VALIDATION FINDINGS

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

The final validation findings relate to the project design document version 3 dated 27 June 2007.

### 4.1 Participation Requirements

Jaroensompong Corporation of Thailand and Mitsubishi UFJ Securities Co., Ltd. of Japan are the project participants. Thailand as the host Party and Japan as the Annex I Party meet the requirements to participate in the CDM. Written approvals of voluntary participation from the DNA of Thailand and Japan have been obtained /2/ /3/.

### 4.2 Project Design

The proposed project activity is located at the Rachathewa landfill and involves the installation of a landfill gas (LFG) collection system, a 1 MW electricity power plant and an open flaring system. Recovered LFG will be utilized as a fuel source in the power plant, while excess LFG will be flared. The generated electricity will be sold to the Metropolitan Electricity Authority (MEA) under a power purchase agreement.

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

- (i) combustion of recovered LFG, and
- (ii) displacement of grid electricity produced by fossil fuel based plants.

The project will be the first in Thailand to utilize LFG for electricity generation on a commercial basis. It will mitigate uncontrolled GHG emissions from the landfill, prevent on-



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site fires, control the release of volatile organic compounds, reduce undesirable odours, provide greater control of leachate drainage, and physically stabilize the landfill site.

The start date of the project is 01 August 2004. Evidence that the project started at this date has been provided in the form of an agreement dated 1 August 2004 and signed between Jaroensompong and Pairojsompong, which indicates the commencement date of the construction. The project is expected to have an operational lifetime of 15 years.

The starting date of the fixed crediting period of 10 years is 1 January 2008.

By promoting renewable energy, the project is likely to contribute to sustainable development in Thailand. The DNA of Thailand has provided confirmation that the project assists in achieving sustainable development /2/.

The project does not involve any public funding from an Annex I country, and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Thailand.

### 4.3 Baseline Determination

The project correctly applies the approved baseline methodology ACM0001 “*Consolidated methodology for landfill gas project activities*”, version 5 adopted at EB28 /5/. The project fulfils the following conditions under which ACM0001 is applicable.

1. The baseline scenario is the total atmospheric release of LFG,
2. The project involves the capture of LFG,
3. The captured LFG is flared, and
4. The captured LFG is used to produce electricity.

The selected baseline scenario for the Project is the total atmospheric release of methane gas with an adjustment factor of 0. The baseline scenario was confirmed by performing Step 1 and Step 3 of the “The tool for the demonstration and assessment of additionality”.

Through the interviews with the Ministry of Natural Resources and Environment and Jaroensompong Corporation, DNV was able to confirm that there are no enforced regulatory or contractual requirements for LFG collection/utilization in Thailand. The selection of an adjustment factor of 0 is thus justified.

### 4.4 Additionality

The additionality of the project is demonstrated by applying the “Tool for the demonstration and assessment of additionality” (version 03) as stipulated by ACM0001.

The project started construction on 1 August 2004. Mitsubishi UFJ Securities Co., Ltd. commissioned DNV for the validation of the project already in May/June 2004 and thus before the starting date of the project.

**Step 1:** Five alternative baseline scenarios were identified during the determination of the project’s baseline scenario:

- **Scenario A:**



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Continuation of the current practices of not collecting or utilizing LFG from waste disposal sites.

- **Scenario B:**

Installation of facilities for LFG collection, electricity generation and flaring of any excess LFG. Electricity generated will be sold to the Thai grid.

- **Scenario C:**

Collection of LFG and its disposal by flaring, without any LFG utilization in an electricity generator.

- **Scenario D:**

Installation of a composting facility for MSW at the landfill site.

- **Scenario E:**

Construction and operation of a waste incineration facility at the landfill site.

All alternative scenarios comply with existing environmental regulations.

**Step 2:** This step was not selected.

**Step 3:** A barrier analysis was conducted to identify barriers that would prevent the implementation of the proposed project activity. The following barriers were identified:

- Barriers due to prevailing practice

The project activity is the first LFG collection and utilization project in Thailand according to the reports by the Policy and Planning Office (EPPO) and the World Bank which are referred to in the PDD. The project participants also provided a report on the prevailing practice for MSW disposal in Thailand which shows that LFG collection and utilization is not common practise.

Investment Barriers

It is claimed that Jaroensompong Corporation was not able to secure financing from local banks for the project activity due to its perceived high risks. The project participants have provided documented evidence for this in the form of a loan application dated 14 June 2004 and the bank's letter that explains that the application was rejected. These documents demonstrate that the project has had difficulties in securing a bank loan.

- Technological Barriers

There are no other LFG collection and utilization projects in Thailand. This results in high technological risks due to the lack of available technology and experience in Thailand.

The identified barriers do not prevent Scenario A, which is the continuation of the current practices of not collecting or utilizing LFG from waste disposal sites. Documented evidences to support the elimination of Scenarios C, D and E have been provided and thus the elimination was found to be reasonable.

The inclusion of CDM revenue improves the viability of the project and reduces its risks. The project participants have included the revenue from the sales of CERs and it was estimated to generate USD 2.9 million, which would exceed the initial capital investment of USD 1.69 million.



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**Step 4:** It has been confirmed through interviews that there are no other similar activities as the proposed project. LFG collection and combustion is not practiced in Thailand as there are currently no legal requirements for landfills to collect and destroy LFG.

In summary, relevant documented evidences has been provided to demonstrate the project faces the barriers identified in the barrier analysis. The project is thus considered to be additional.

### 4.5 Monitoring

The monitoring plan is in accordance to the approved monitoring methodology ACM0001 “*Consolidated methodology for landfill gas project activities*”, version 5 adopted at EB28 /5/.

#### 4.5.1 Parameters determined ex-ante

The following values were determined ex-ante and verified at validation:

1. Global warming potential of methane ( $GWP_{CH_4}$ )
2. Adjustment factor for LFG flared in the baseline scenario (AF),
3. Emission factor for grid electricity ( $EF_{grid}$ ), consisting of the
  - a. Operating Margin emission factor for grid electricity ( $EF_{OM}$ ), and
  - b. Build Margin emission factor for grid electricity ( $EF_{BM}$ ).

An AF value of 0% was selected for the project activity to reflect the absence of any regulatory or contractual requirements for LFG collection/utilisation in Thailand.

The combined margin emission coefficient for the Thai national electricity grid has been determined ex-ante in accordance with AMS-I.D (version 11) as required by ACM00001. The calculations were based on electricity generation data and fuel consumption data for the years 2002-2004 provided by EGAT, the Department of Alternative Energy Development and Efficiency and the Energy Policy and Planning Office. Data for the years 2002-2004 were the most recent statistics available at the time of PDD submission. The values used for the calculation of  $COEF_i$  are those established by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

The calculations for the operating margin and build margin emission coefficient have been revised in the PDD of 27 June 2007 and the calculations are presented in a transparent manner. The simple operating margin (OM) emission coefficient is calculated to be 0.60 tCO<sub>2e</sub>/MWh. The BM emission factor of 0.42 tCO<sub>2e</sub>/MWh was calculated based on the power plants capacity additions that comprise 20% of the system generation (in MWh) that have been built most recently. The resulting combined margin emission coefficient is 0.51 tCO<sub>2e</sub>/MWh.

#### 4.5.2 Parameters monitored ex-post

The monitoring of the following indicators will allow for an ex-post assessment of project emissions:

1.  $PE_{flare,y}$  – Project emissions from flaring of residual gas stream,
2.  $fv_{i,h}$  – Volumetric fraction of individual gasses in the residual gas,
3.  $FV_{RG,h}$  – Volumetric flow rate of the residual gas,
4. Flare operating parameter (min/hour),



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5.  $EL_{IMP}$  – Total amount of electricity imported,
6.  $ET_y$  – Thermal energy used by the project activity generated from fossil fuel combustion, and
7.  $CEF_{thermal,y}$  –  $CO_2$  emission intensity of the thermal energy

Baseline emissions are determined from the ex-post monitoring of the following GHG indicators:

1.  $LFG_{total,y}$  – Total amount of landfill gas captured,
2.  $LFG_{flare,y}$  – Amount of landfill gas flared,
3.  $LFG_{electricity,y}$  – Amount of landfill gas combusted in power plant,
4.  $w_{CH_4,y}$  – Methane fraction in the landfill gas,
5.  $T$  – Temperature of the landfill gas,
6.  $P$  – Pressure of the landfill gas,
7.  $EL_{EX,LFG}$  – Total amount of electricity exported, and
8. Duration of plant operation (hours).

The regulatory requirements relating to landfill gas projects will also be recorded annually.

The monitoring method, equipment and frequency are acceptable and in accordance with ACM0001.

### 4.5.3 Management system and quality assurance

As indicated in Annex 4 of the PDD, an operational and management team appointed by Jaroensompong Corporation will be responsible for all data monitoring, acquisition and recording.

A copy of the monitoring procedure has been provided and was assessed by DNV. The roles and responsibilities of relevant monitoring tasks have been clearly stated in these procedures. Other relevant procedures shall be established, employees will be trained and the procedures be implemented prior to the start of the crediting period.

### 4.6 Estimate of GHG Emissions

A review of the spreadsheet used for emissions calculations was conducted and it was verified that relevant formulas were used in the calculation of emissions reduction. Emissions reductions from the project activity are determined by calculating (i) the quantity of LFG that is combusted, and (ii) the quantity of grid electricity displaced.

Annual LFG generation by the landfill were calculated correctly and in accordance with the First Order Decay (FOD) model of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories /9/. It is assumed that 60% of the total LFG generated is collected and combusted. This corresponds to the low end of the range of collection efficiencies as reported by the US-EPA. The 60% collection efficiency has also been further confirmed by the feasibility study conducted. Fugitive methane emissions from the flaring of residual LFG were correctly calculated as per the “*Tool to determine project emissions from flaring gases containing methane*” /8/. Since an open flare is used, the flare efficiency is assumed to be 50%.





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Emissions reductions due to the displacement of grid electricity by the project activity are calculated by multiplying the net quantity of electricity exported ( $EL_{EX,LFG}$  minus  $EL_{IMP}$ ) by the ex-ante determined grid emission factor ( $EF_{grid}$ ).

As per ACM0001, no leakage is to be accounted for.

Based on the calculations shown in the PDD and spreadsheet, the project is expected to generate emissions reductions of 471 851 tCO<sub>2</sub>e over its 10 year crediting period from 2008 to 2017.

### 4.7 Environmental Impacts

As per the Office of Natural Resources and Environmental Policy and Planning (ONEP), an EIA is not required for LFG collection and utilization projects that have a capacity of less than 10 MW. Only an initial Environmental Examination (IEE) has been carried out, and the IEE has been completed in Thai language and admitted. The project is not expected to result in any significant environmental impacts.

### 4.8 Comments by Local Stakeholders

A public consultation meeting was held on 2 April 2004 which was attended by participants from almost all the interested parties, such as the local administration, factory, school, office of the Governor, hospital, nearby villages etc.

Questions raised by the stakeholders were with regards to the environmental and social impacts of the project. No adverse comments were received. The summary of comments has been included in the PDD in section E.2 and due account was taken of the comments received.

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

### 4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 12 January 2007 was made publicly available on DNV's climate change website ([www.dnv.com/certification/climatechange](http://www.dnv.com/certification/climatechange)) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 19 January to 17 February 2007. No comments were received.

Already the PDD of December 2004 was made publicly available and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 31 January 2005 to 3 March 2005. No comments were received in this period either.



## **APPENDIX A**

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### **CDM VALIDATION PROTOCOL**

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

Requirement	Reference	Conclusion
<b>About Parties</b>		
The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK Written approvals of voluntary participation from the DNA of Thailand and Japan have been obtained
The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	Written confirmation by the DNA of Thailand has been obtained
In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK There is no public funding from any Annex I Party involved in the project activity.
Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK DNA of Thailand is the Office of Natural Resources and Environment Policy and Planning (ONEP). DNA of Japan is the Liaison Committee for the Utilization of the Kyoto

Requirement	Reference	Conclusion
		Mechanisms.
The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK Thailand ratified the Kyoto Protocol on 28 August 2002 Japan has accepted the Kyoto Protocol on 4 June 2002.
The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK Japan's assigned amount is 94% of the base year emissions.
The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
<b>About additionality</b>		
Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
<b>About forecast emission reductions and environmental impacts</b>		
The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
<b>For large-scale projects only</b>		
Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall	CDM Modalities and Procedures §37c	OK

Requirement	Reference	Conclusion
be carried out.		
<b>About stakeholder involvement</b>		
Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	<p>OK</p> <p>The PDD of 12 January 2007 was made publicly available on DNV's climate change website (<a href="http://www.dnv.com/certification/climatechange">www.dnv.com/certification/climatechange</a>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 19 January to 17 February 2007. No comments were received.</p> <p>Already the PDD of December 2004 was made publicly available and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 31 January 2005 to 3 March 2005. No comments were</p>

Requirement	Reference	Conclusion
		received in this period either.
<b>Other</b>		
The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

**Table 2 Requirements Checklist**

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<b>A. General Description of Project Activity</b> <i>The project design is assessed.</i>					
<b>A.1. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR	Yes, the project is located at the Rachathewa landfill, in the city of Rachathewa Bangplee in Thailand.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The physical boundary includes the LFG collection system at sites 1 and 2, the flaring system and the electricity generation power plant.		OK
<b>A.2. Participation Requirements</b> <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i>					
A.2.1. Which Parties and project participants are participating in the project?	/1/	DR	Japan is the Annex I Party, while Thailand is the Non-Annex I Party. The project participants are Mitsubishi UFJ Securities Co., Ltd. of Japan and Jaroensompong Corporation of Thailand.		OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been	/1/	DR	The Letters of Approval from the DNA of Thailand and Japan are pending.	<del>CAR-1</del>	OK

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authorized by an involved Party?					
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR	Thailand (Non-Annex I Party): - Thailand ratified the Kyoto Protocol on 28 August 2002. - The Letter of Approval from the DNA of Thailand is pending. - DNA of Thailand is the Office of Natural Resources and Environment Policy and Planning (ONEP).  Japan (Annex I Party): - Japan has accepted the Kyoto Protocol on 4 June 2002. - The Letter of Approval from the DNA of Japan is pending. - DNA of Japan is The Liaison Committee for the Utilization of the Kyoto Mechanisms.	<del>CAR-1</del>	OK
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	There is no public funding from any Annex I Party involved in the project activity.		OK
<b>A.3. Technology to be employed</b> <i>Validation of project technology focuses on the project engineering, choice of technology and competence/maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is</i>					

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<i>used.</i>					
A.3.1. Does the project design engineering reflect current good practices?	/1/	DR I	The design of the LFG collection system reflects current good practice. The system is based on horizontal lines and wells which are more appropriate for the Thai MSW and climatic conditions, instead of the traditional vertical system.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	Yes, the project utilizes advanced foreign technology for electricity generation.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR I	The project will require training and maintenance efforts during the project period to enable local staff to acquire skills in the operation of LFG collection and utilization equipment. The technology supplier for the biogas-fuelled generator will be responsible for training staff in generator operation and maintenance.		OK
<b>A.4. Contribution to Sustainable Development</b> <i>The project's contribution to sustainable development is assessed.</i>					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/	DR	Confirmation from the DNA of Thailand is pending.	CAR-2	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is expected to lower methane and odour emissions from the landfill site.		OK



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<b>B. Project Baseline</b> <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
<b>B.1. Baseline Methodology</b> <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes, the project applies the approved consolidated methodology ACM0001 “Consolidated baseline methodology for landfill gas project activities” version 5 adopted at EB28.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR	Yes, the project complies with the following applicability criteria for ACM0001: <ol style="list-style-type: none"> <li>1. The project involves the capture of LFG,</li> <li>2. The baseline scenario is the total atmospheric release of LFG,</li> <li>3. The captured LFG is flared, and</li> <li>4. The captured LFG is used to produce electricity.</li> </ol>		OK
<b>B.2. Baseline Scenario Determination</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>					

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B.2.1. What is the baseline scenario?	/1/	DR	The baseline scenario is the total atmospheric release of the landfill gas.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	<p>The alternative scenarios were considered using the “Tool for demonstration and assessment of additionality”:</p> <p><u>Step 1:</u> Five alternative baseline scenarios were identified:</p> <ul style="list-style-type: none"> <li>- Scenario A - Continuation of the current practices of not collecting or utilizing LFG from waste disposal sites.</li> <li>- Scenario B - Installation of facilities for LFG collection, electricity generation and flaring of any excess LFG. Electricity generated will be sold to the Thai grid.</li> <li>- Scenario C - Collection of LFG and its disposal by flaring, without utilization in an electricity generator.</li> <li>- Scenario D – Installation of a composting facility for MSW at the landfill site.</li> <li>- Scenario E - Construction and operation of a waste incineration facility at the landfill site.</li> </ul> <p>All alternative baseline scenarios are in compliance with applicable laws and</p>	<del>CL1</del> <del>CL2</del> <del>CL3</del>	OK

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			<p>regulatory requirements.</p> <p><u>Step 3:</u> A barrier analysis was conducted to identify barriers that would prevent the implementation of the proposed project activity. The barriers include:</p> <p><u>Barriers Due to Prevailing Practice</u></p> <p>The project activity is the first LFG collection and utilization project in Thailand. Reference to the report from Electricity Generation Authority of Thailand (EGAT) which supports this statement was not provided in the PDD. The project participants are requested to identify the prevailing practice for MSW disposal.</p> <p><u>Investment Barriers</u></p> <p>It is claimed that Jaroensompong Corporation was not able to secure financing for the project activity due to its perceived high risks. The project participants are requested to provide documentary evidence to support this statement.</p> <p><u>Technological Barriers</u></p> <p>There are no other LFG collection and utilization projects in Thailand. This results</p>		

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			in high technological risks due to the lack of available technology and experience in Thailand. The identified barriers do not prevent Scenario A, which is the continuation of the current practices of not collecting or utilizing LFG from waste disposal sites. This would be the most likely baseline scenario if the project participants are able to provide the sufficient documentary evidence to support the elimination of Scenarios C, D and E.		
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	The baseline scenario was determined by using Step 1 and Step 3 of the “Tool for demonstration and assessment of additionality”. ACM0001 does not contain a specific methodology for baseline determination.		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes. The baseline scenario takes into account the fact that there is no requirement for the collection and utilization of LFG under Thailand’s waste management regulations.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR I	The project participants are requested to provide supporting data for the identified barriers in the barrier analysis.	<del>CL1</del>	OK

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B.2.7. Have the major risks to the baseline been identified?	/1/	DR	The material risk identified relates to the potential implementation of legislations and regulations requiring the destruction of LFG. To overcome this problem, the PDD indicates that the laws and regulations will be monitored every year and incorporated in the procedures.		OK
<b>B.3. 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.3.1. Is the project additionality assessed according to the methodology?	/1/	DR I	<p>Additionality is addressed through the use of “The tool for the demonstration and assessment of additionality”</p> <p><i>Please note that initially, version 02 was applied, but the final PDD applies version 03.</i></p> <p>Step 1: Five alternative baseline scenarios were identified.</p> <ul style="list-style-type: none"> <li>- Scenario A - Continuation of the current practices of not collecting or utilizing LFG from waste disposal sites.</li> <li>- Scenario B - Installation of facilities for LFG collection, electricity generation and flaring of any excess LFG. Electricity generated will be sold to the Thai grid.</li> <li>- Scenario C - Collection of LFG and its</li> </ul>	<del>CL1</del> <del>CL2</del> <del>CL3</del> <del>CL4</del>	OK

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			<p>disposal by flaring, without utilization in an electricity generator.</p> <ul style="list-style-type: none"> <li>- Scenario D – Installation of composting facilities for MSW at the landfill site.</li> <li>- Scenario E - Construction and operation of a waste incineration facility at the landfill site.</li> </ul> <p>Step 3: Three barriers were identified that would prevent the implementation of the proposed project activity.</p> <ul style="list-style-type: none"> <li>- Barriers due to prevailing practice,</li> <li>- Investment barriers, and</li> <li>- Technological barriers.</li> </ul> <p>The project participants are requested to provide documentary evidence to support the identified barriers.</p> <p>Please refer to Section B.2.2 for a detailed discussion of Step 3. Based on the barrier analysis, the most likely baseline scenario is the continuation of the current practices of not collecting or utilizing LFG from waste disposal sites.</p> <p>The inclusion of CDM revenue is said to improve the viability of the project and reduces its risks. The project participants are requested to clearly demonstrate the effects of CDM revenue on the viability of</p>		

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				<p>the project.</p> <p>Step 4: It has been clarified that there are no other similar activities as the proposed project.</p> <p>In summary, if documentary evidence can be produced to support the barriers identified in the barrier analysis, and if the impact of CDM registration can be clearly demonstrated, the project can be assumed to be additional.</p>		
B.3.2.	Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Yes.		OK
B.3.3.	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR I	The project participants are requested to provide sufficient documentary evidence to support the barriers identified in the barrier analysis. The project participants are also requested to clearly demonstrate the effects of CDM revenue on the viability of the project.	<del>CL1</del> <del>CL2</del> <del>CL3</del> <del>CL4</del>	OK
B.3.4.	If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/	DR	The project started construction on 1 August 2004. Mitsubishi UFJ Securities Co., Ltd. commissioned DNV for the validation of the project already in May/June 2004 and thus before the starting date of the project.		OK

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<b>C. Calculation of GHG Emissions by Source</b> <i>It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.</i>					
<b>C.1. Calculation of GHG Emission Reductions – Project emissions</b> <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
C.1.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The project emissions are related to the fugitive methane emissions from LFG flaring, and the consumption of grid electricity for start up and restart operations. Emissions from flaring of LFG were calculated according to the “Methodological tool to determine project emissions from flaring gases containing methane”.		OK
C.1.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR I	Yes. The assumptions used in the calculations were assessed and found to be acceptable.		OK
C.1.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR I	No major uncertainties are foreseen.		OK



<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>C.2. Calculation of GHG Emission Reductions – Baseline emissions</b>  <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
C.2.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The baseline LFG emissions were determined by employing the IPCC first order decay model, and using the following data. <ul style="list-style-type: none"> <li>• <math>R_T = 0</math> (no LFG is recovered in the baseline scenario),</li> <li>• <math>O_X = 0.1</math> (IPCC default value for managed covered landfill),</li> <li>• <math>k = 0.15</math> (estimated based on the moisture content of the municipal solid waste),</li> <li>• <math>W = 1,277.5</math> ktonnes (sourced from project developer),</li> <li>• <math>DOC = 0.1874</math> (calculated based on MSW composition and IPCC default DOC content values),</li> <li>• <math>DOC_f = 0.5</math> (IPCC default value)</li> <li>• <math>MCF = 1.0</math> (IPCC default value for managed-anaerobic landfill site),</li> <li>• LFG collection efficiency – 60% (lower limit of estimated methane collection efficiency), and</li> </ul>	<del>CL-5</del> <del>CL-6</del>	OK

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			<ul style="list-style-type: none"> <li>Fraction of methane in LFG – 0.578 (laboratory analysis).</li> </ul> <p>Further justification is to be provided with regard to the assumed 'LFG collection efficiency.</p> <p>Baseline emissions for the electricity displaced by the project activity were calculated in accordance to ACM0001. The grid CEF for this project was calculated using data for 2002, 2003 and 2004. Data for the years 2002-2004 were the most recent statistics available at the time of PDD submission.</p> <p>The project participants are also requested to present the Build Margin and Operating Margin calculations in a transparent manner (e.g. spreadsheets). The CEF values for fossil fuels used in the calculations should also be clearly indicated.</p> <p>The excel spreadsheet for the baseline emission has been furnished and the baseline emissions calculations are reasonable.</p>		
C.2.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Yes. Acceptable assumptions have been made for the methane generation potential, annual waste acceptance, closing year and the methane generation rate.		OK

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Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	No relevant uncertainties have been identified.		OK
<b>C.3.Calculation of GHG Emission Reductions – Leakage</b> <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR I	As per the methodology ACM0001, leakage effects need not be accounted for.		OK
<b>C.4.Emission Reductions</b> <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
C.4.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/	DR	Yes, the project expects to reduce 471 851 tCO <sub>2</sub> e over its 10 year crediting period.		OK
<b>D. Monitoring Plan</b> <i>The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).</i>					
<b>D.1.Monitoring Methodology</b> <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					

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D.1.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The monitoring plan was documented according to the approved consolidated monitoring methodology ACM0001 “Consolidated baseline methodology for landfill gas project activities”, version 5 adopted at EB28.		OK
D.1.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Monitoring data will be kept at least two years after the end of the crediting period.		OK
<b>D.2. Monitoring of Project Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	Yes. The consumption of grid electricity, flaring of residual LFG and the combustion of fossil fuels by the project activity will result in project emissions. The collection and archiving of project emissions data is based on the applied methodology.		OK
D.2.2. Are the choices of project GHG indicators reasonable and conservative?	/1/	DR	The following GHG indicators for project emissions were included in the monitoring plan: 1. $PE_{flare,y}$ – Project emissions from flaring of residual gas stream, 2. $fv_{i,h}$ – Volumetric fraction of		OK

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			individual gasses in the residual gas, 3. $FV_{RG,h}$ – Volumetric flow rate of the residual gas, 4. Flare operating parameter (min/hour), 5. $EL_{IMP}$ – Total amount of electricity imported, 6. $ET_y$ – Thermal energy used by the project activity generated from fossil fuel combustion, and 7. $CEF_{thermal,y}$ – CO <sub>2</sub> emission intensity of the thermal energy. Though the project activity is not expected to combust fossil fuels for thermal energy generation, $ET_y$ and $CEF_{thermal,y}$ will be monitored. The project GHG indicators chosen are in accordance to ACM0001.		
D.2.3. Is the measurement <i>method</i> clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	The GHG values will be monitored though on-site measurement or calculations.		OK
D.2.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR	The measurement equipment for each GHG indicator are as follows: 1. Project emissions from flaring of residual gas stream - <u>Calculated</u> , 2. Volumetric fraction of individual gasses in the residual gas –		OK

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			<u>Continuous Gas Analyser</u> , 3. Volumetric flow rate of the residual gas – <u>Flow Meter</u> , 4. Flare operating parameter (min/hour) – <u>Flame Detector</u> , 5. Total amount of electricity imported – <u>Electricity Meter</u> , 6. Thermal energy used by the project activity generated from fossil fuel combustion – <u>Weight or Volume Meters</u> will be used to measure the quantity of fossil fuel consumed. The quantity measured will be used to calculate the thermal energy used by the project , 7. CO <sub>2</sub> emission intensity of the thermal energy – <u>Calculated</u> .  The measurement equipment is deemed appropriate.		
D.2.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR I	Procedures for addressing erroneous measurement have not been identified. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL-7</del>	OK

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D.2.6. Is the measurement <i>interval</i> identified and deemed appropriate?	/1/	DR	The measurement intervals were identified in Section B.7.1 of the PDD and are in accordance to ACM0001.		OK
D.2.7. Are the <i>registration, monitoring, measurement</i> and <i>reporting</i> procedures defined?	/1/	DR I	The monitoring plan contains general statements regarding registration, monitoring and reporting procedures. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
D.2.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR I	Procedures for the maintenance and calibration of monitoring equipment in accordance to industrial standards and/or manufacturer's established procedures have not been incorporated in the PDD. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
D.2.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR I	The monitoring plan contains general statements regarding the procedures for record handling. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
<b>D.3. Monitoring of Baseline Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes. The project's baseline emissions are composed of (i) the amount of methane that is combusted by the flare system and generator, and (ii) CO <sub>2</sub> emissions from the grid electricity displaced by the project activity. The collection and archiving of project emissions data is based on the applied methodology.		OK
D.3.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	The following GHG indicators for baseline emissions were included in the monitoring plan: <ol style="list-style-type: none"> <li>1. LFG<sub>total,y</sub> – Total amount of landfill gas captured,</li> <li>2. LFG<sub>flare,y</sub> – Amount of landfill gas flared,</li> <li>3. LFG<sub>electricity,y</sub> – Amount of landfill gas combusted in power plant,</li> <li>4. w<sub>CH<sub>4</sub>,y</sub> – Methane fraction in the landfill gas,</li> <li>5. T – Temperature of the landfill gas,</li> <li>6. P – Pressure of the landfill gas,</li> <li>7. EL<sub>EX,LFG</sub> – Total amount of electricity exported, and</li> <li>8. Duration of plant operation (hours).</li> </ol> The regulatory requirements relating to landfill gas projects will be recorded annually.		OK



CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
				The baseline GHG indicators chosen are in accordance to ACM0001.		
D.3.3. Is the measurement <i>method</i> clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR		The GHG values will be monitored though on-site measurement or calculations.		OK
D.3.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR		<p>The measurement equipment for each GHG indicator are as follows:</p> <ol style="list-style-type: none"> <li>1. Total amount of landfill gas captured – <u>Flow Meters</u>,</li> <li>2. Amount of landfill gas flared – <u>Flow Meters</u>,</li> <li>3. Amount of landfill gas combusted in power plant – <u>Flow Meters</u>,</li> <li>4. Methane fraction in the landfill gas – <u>Continuous Gas Analyser</u>,</li> <li>5. Temperature of the landfill gas – <u>Thermocouple</u>,</li> <li>6. Pressure of the landfill gas – <u>Pressure Transmitter</u>,</li> <li>7. Total amount of electricity exported – <u>Electricity Meter</u>, and</li> <li>8. Duration of plant operation (hours) – <u>Recorded Annually</u>.</li> </ol> <p>The measurement equipment are deemed appropriate.</p>		OK
D.3.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on	/1/	DR I		Procedures for addressing erroneous measurement have not been identified. The	<del>CL-7</del>	OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
how to deal with erroneous measurements?			project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.		
D.3.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR	The measurement intervals were identified in Section B.7.1 of the PDD and are in accordance to ACM0001.		OK
D.3.7. Are the <i>registration, monitoring, measurement</i> and <i>reporting</i> procedures defined?	/1/	DR I	Detailed procedures for registration, monitoring, measurement and reporting were not included in the PDD. The project participant is requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL-7</del>	OK
D.3.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR I	Procedures for the maintenance and calibration of monitoring equipment in accordance to industrial standards and/or manufacturer's established procedures have not been incorporated in the PDD. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL-7</del>	OK
D.3.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR I	The monitoring plan contains general statements regarding the procedures for record handling. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL-7</del>	OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>D.4. Monitoring of Leakage</b> <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	As per ACM0001, no leakage is to be accounted under this methodology.		OK
<b>D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts</b> <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
D.5.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	Thailand does not require the monitoring of sustainable development criteria.		OK
D.5.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Not applicable. Please refer to D.5.1.		OK
D.5.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	Not applicable. Please refer to D.5.1.		OK
<b>D.6. Project Management Planning</b> <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
D.6.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR I	As indicated in Annex 4 of the PDD, an Executive appointed by Jaroensompong Corporation will be responsible for all data monitoring, acquisition and recording.	<del>CL-8</del>	OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			However, according Section B.7.2 of the PDD, an Operational and Management Team (comprising of a General Manager and a group of Operators) will be formed to monitor all project GHG indicators. The project participants are requested to clarify this discrepancy.		
D.6.2. Are procedures identified for training of monitoring personnel?	/1/	DR I	Though it is mentioned that training programmes will be conducted for the staff, specific procedures for the same have not been identified. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
D.6.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR I	No such emergencies were identified in the monitoring plan. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
D.6.4. Are procedures identified for review of reported results/data?	/1/	DR I	Monitoring reports will be reviewed by the General Manager on a monthly basis. Details of the reviewing procedures were not specified in the PDD. The project participants are requested to demonstrate that such procedures have been developed and implemented for the project activity.	<del>CL</del> 7	OK
D.6.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR I	Details of the corrective action procedures were not included in the PDD. The project participants are requested to demonstrate	<del>CL</del> 7	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
				that such procedures have been developed and implemented for the project activity.		
<b>E. Duration of the Project/ Crediting Period</b> <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>						
E.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/	DR		The project started constructed on 1 August 2004. The operational lifetime of the project is estimated to be 15 years. Evidence that the project started on 1 August 2004 is requested.	<del>CL-9</del>	OK
E.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR		A fixed crediting time of 10 years, starting from 1 January 2008 has been selected.		OK
<b>F. 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 validator.</i>						
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR I		As per ONEP (Office of Natural Resources and Environmental Policy and Planning) an EIA is not required for LFG collection and utilization projects that have a capacity of less than 10MW. Only an Initial Environmental Examination (IEE) has been carried out, and the IEE has been completed in Thai language and admitted.		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR I		Yes, the host party requirements for an EIA are as shown in Section F.1.1. An EIA is not required for the project activity.		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
F.1.3. Will the project create any adverse environmental effects?	/1/	DR I	The project activity is not expected to create any adverse environmental effects.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR I	No transboundary environmental impacts are expected.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR I	No negative impacts have been identified or are expected to occur.		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR I	Yes.		OK
<b>G. Stakeholder Comments</b> <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR I	Representatives from the relevant stakeholders, such as the local administration, factory, school, office of the Governor, hospital, nearby villages were consulted.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR I	Local stakeholders were invited to comment on the project during a public consultation meeting was held on 2 April 2004.		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out	/1/	DR	Yes.		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview		<b>Ref.</b>	<b>MoV*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
in accordance with such regulations/laws?						
G.1.4. Is a summary of the stakeholder comments received provided?		/1/	DR	No adverse comments were received from the stakeholders.		OK
G.1.5. Has due account been taken of any stakeholder comments received?		/1/	DR	No adverse comments were received from the stakeholders. Jaroensompong Co. is willing to keep the community informed and involved, and informed the participants of the meeting that the power plant would be open for all visitors.		OK

**Table 3 Resolution of Corrective Action and Clarification Requests**

<b>Draft report clarifications and corrective action requests by validation team</b>	<b>Ref. to checklist question in table 2</b>	<b>Summary of project owner response</b>	<b>Validation team conclusion</b>
CAR 1 The Letters of Approval from the DNA of Thailand and Japan are pending.	Table 1 A.2.2 A.2.3 A.4.1	Once the Letters of Approval from the DNA of Thailand and Japan are issued, it will be forwarded to DNV for request for registration.	OK Office of Natural Resources and Environment Policy and Planning (DNA of Thailand): Letter of Approval, 30 August 2007 The Liaison Committee for the Utilization of the Kyoto Mechanisms (DNA of Japan): Letter of Approval. 28 March 2007
CL 1 According to a report from EGAT, the project activity is the first LFG collection and utilization project in Thailand. The project participants are requested to reference this report in the PDD.	B.2.2 B.2.6 B.3.1 B.3.3 B.3.4	The documents/information from Energy Policy and Planning Office (EPPO) and World Bank that can show that the Project activity is the first LFG project in Thailand are referenced in the revised PDD.	OK. It has been confirmed through the references made in the PDD, page 13 that the project is first of its kind in Thailand. This CL is thus closed.
CL 2 Reference to the report from Electricity Generation Authority of Thailand (EGAT) which supports this statement was not provided in the PDD. The project participants are requested to identify the prevailing practice for MSW disposal.	B.2.2 B.2.6 B.3.1 B.3.3	The documents that show the prevailing practice for MSW disposal in Thailand are referenced in the revised PDD.	OK. Chapter three of the “Thailand Environment Monitor 2003” indicate that the prevailing practice for MSW disposal is landfilling. This CL is thus closed.
CL 3 It is claimed that Jaroensompong Corporation was not able to secure financing for the project activity due to its perceived high	B.2.2 B.2.6 B.3.1	The application forms for bank loan and letter that explains that such application was rejected are provided. Those documents will be submitted for request	OK. The organization has made a bank loan application on 14 June 2004 but the loan application was declined. It was demonstrated that the project has



<b>Draft report clarifications and corrective action requests by validation team</b>	<b>Ref. to checklist question in table 2</b>	<b>Summary of project owner response</b>	<b>Validation team conclusion</b>
risks. The project participants are requested to provide documentary evidence to support this statement.	B.3.3	for registration as supporting documents.	had difficulty getting a bank loan. This CL is thus closed.
CL 4 The project participants are requested to clearly demonstrate the effects of CDM revenue on the viability of the project.	B.3.1 B.3.3	The effects of CDM revenue is clearly demonstrated in the revised PDD.	OK. Page 15 of the revised PDD dated 27 June 2007, version 3, indicates that the revenue from CERs sale is estimated to be USD 2.9 million, which is larger than the initial capital investment of USD 1.69 million. The effect of revenue from CERs sales is clear. This CL is thus closed.
CL 5 Further justification is to be provided with regard to the assumed 'LFG collection efficiency.	C.2.1	60% of efficiency is the lowest value from the recommendation of US EPA. This value is confirmed during the feasibility study. Relevant feasibility study is provided to DNV.	OK. US EPA estimation of LFG collection efficiency is 60-80%. The lowest value has been selected. The feasibility study conducted has further confirmed the efficiency of LFG collection. This CL is thus closed.
CL 6 The project participants are also requested to present the Build Margin and Operating Margin calculations in a transparent manner. CEF values for fossil fuels used in the calculations should also be clearly indicated.	C.2.1	In the revised PDD, Combined Margin (Build Margin and Operating Margin) calculation is provided in a transparent manner as required by the methodology.	OK. Page 38 of the revised PDD, dated 27 June 2007, version 3, clearly states the methods of both OM and BM calculation. The calculation has been presented in a transparent manner. This CL is thus closed.
CL 7 The project participants are requested to demonstrate that the following procedures	D.2.5. D.2.7 D.2.8	As described in the PDD, an operational and management team has been formed by the project developer to monitor the parameters required for emission	OK. A copy of the monitoring procedure has been provided. The roles and responsibilities of relevant monitoring tasks have been clearly

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>have been developed and implemented for the project activity.</p> <ul style="list-style-type: none"> <li>a. Procedure for handling of erroneous measurements, monitoring data adjustments and data uncertainties,</li> <li>b. Procedures for registration, monitoring, measurement and reporting,</li> <li>c. Procedures for calibrating and maintaining monitoring equipment,</li> <li>d. Procedure for handling of day-to-day records,</li> <li>e. Procedures for training of monitoring personnel,</li> <li>f. Procedure for handling of emergencies situations,</li> <li>g. Procedure for review of reported results/data, and</li> <li>h. Procedures for corrective actions in order to provide for more accurate future monitoring and reporting.</li> </ul>	<p>D.2.9 D.3.5 D.3.6 D.3.7 D.3.8 D.3.9 D.6.2 D.6.3 D.6.4 D.6.5</p>	<p>reductions calculation. Such procedures have been developed by the operational and monitoring team to ensure the credibility of the monitored information. Other relevant procedures shall be established, employees will be trained and implemented prior to the starts of crediting period.</p>	<p>stated. Other relevant procedures shall be established, employees will be trained and the procedures be implemented prior to the starts of crediting period. This CL is thus closed.</p>
<p>CL 8 As indicated in Annex 4 of the PDD, an Executive appointed by Jaroensompong Corporation will be responsible for all data monitoring, acquisition and recording. However, according Section B.7.2 of the PDD, an Operational and Management Team</p>	<p>D.6.1</p>	<p>This is just a typing error and corrected in the revised PDD.</p>	<p>OK. The section B 7.2 and Annex 4 have been corrected. This CL is thus closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
(comprising of a General Manager and a group of Operators) will be formed to monitor all project GHG indicators. The project participants are requested to clarify this discrepancy.			
CL 9 Evidence that the project started on 1 August 2004 is requested.	E.1.1	The agreement, dated as of 1 August 2004, signed between Jaroensompong and Pairojsompong shows the commencement date of the construction.	OK.A copy each of the Thai language agreement and translated agreement have been provided. It has been confirmed that the agreement was signed on 1 August 2004. This CL is thus closed.

## **APPENDIX B**

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### **CERTIFICATES OF COMPETENCE**



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## CERTIFICATE OF COMPETENCE

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***Chee Keong Lai***

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

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

Høvik, 6 November 2006

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Tse Wei Cheong***

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

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

Høvik, 5 February 2007

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Tsuyoshi Nakao***

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

<b><i>GHG Auditor:</i></b>	Yes		
<b><i>CDM Validator:</i></b>	--	<b><i>JI Validator:</i></b>	--
<b><i>CDM Verifier:</i></b>	--	<b><i>JI Verifier:</i></b>	--
<b><i>Industry Sector Expert for Sectoral Scope(s):</i></b>	13		

Høvik, 6 November 2007

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Thivakaran Narayanan***

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

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

Høvik, 6 November 2006

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*





# CERTIFICATE OF COMPETENCE

***Michael Lehmann***

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

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	Yes	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	Sectoral scope 1, 2, 3		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0030	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0031	Yes
ACM0004, ACM0012	Yes	AM0032	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0035	Yes
ACM0007	Yes	AM0038	Yes
ACM0008	Yes	AM0041	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0034	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0043	
AM0009, AM0037	Yes	AM0046	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	AM0047	
AM0014	Yes	AMS-II.A-F, AM0044	Yes
AM0017	Yes	AMS-III.A	Yes
AM0018	Yes	AMS-III.E, AMS-III.F	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

**Einar Telnes**  
Director, International Climate Change Services

**Michael Lehmann**  
Technical Director