VALIDATION REPORT

"FUZHOU HONGMIAOLING LANDFILL GAS TO ELECTRICITY PROJECT" IN CHINA

REPORT NO. 2007-1055

REVISION NO. 02

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2006-10-15	Project No.: 63603188
Approved by: Miguel Rescalvo Santandreu Approval&Service Centre Norway	Organisational unit: DNV Certification, International Climate Change Services
Client: Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.	Client ref.: Ren Changchun

DET NORSKE VERITAS CERTIFICATION AS

Climate Change Services

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" in China (FHLGEP) on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design documents, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV's opinion that the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project", as described in the project design document of 25 February 2008, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodologies ACM0001 version 05 and AMS ID version 11. Hence, DNV requests the registration of the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" as CDM project activity.

Report No.: 2007-1055	Subject Group: Environment
Report title: Fuzhou Hongmiaoling Landfill Gas to Electricity Project in China	
Work carried out by: Shuyong Sun, Wilson Tang Weimin, Ramesh Ramachandran	
Work verified by: Mari Grooss Viddal	

Date of this revision: 2008-11-17	Rev. No.: 02	Number of pages: 17

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Waste handling and disposal

☒ No distribution without permission from the client or responsible organisational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
ECPG	East China Power Grid
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LOA	Letter of Approval
MP	Monitoring Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
FHLGEP	Fuzhou Hongmiaoling Landfill Gas to Electricity Project
FTRETU	Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.

1 INTRODUCTION

Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. has commissioned DNV Certification AS (DNV) to validate the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" (hereafter called "the project") in China. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consisted of the following personnel:

Mr. Shuyong Sun	DNV Certification Beijing	Team Leader, CDM Validator
Mr. Wilson Tang Weimin	DNV Certification Beijing	CDM Validator
Mr. Ramesh Ramachandran	DNV Certification Bangalore	Sector Expert
Ms. Mari Grooss Viddal	DNV Certification Oslo	Technical reviewer

1.1 Validation Objective

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

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0001 version 05, adopted at EB28 and AMS-I.D version 11 of EB 31. The validation team has, based on the recommendations in the Validation and Verification Manual /11/ employed a risk-based approach, been focusing on the identification of significant risks for project implementation and the generation of CERs.

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

1.3 Description of Proposed CDM Project

The objective of the project is to collect the landfill gas (LFG) generated at the Hongmiaoling landfill and to utilize the LFG for power generation. This project will involve investing in a gas collection system, leachate drainage system, flaring equipment and an electricity generation plant. The electricity generated will be supplied to East China Power Grid (ECPG). Excess LFG and all the gas collected during the period when electricity is not produced will be flared.
The project's average annual emission reduction forecast is 143 194 tCO_2e/year over a fixed crediting period of 10 years.

2 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design document, the baseline and the monitoring plan;
II follow-up interviews with project stakeholders;
III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /11/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

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

The completed validation protocol for the FHLGEP is enclosed in Appendix A to this report.

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

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

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

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

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*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.*	*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.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below).A request for **Clarification (CL)** is used when the validation team has identified a need for further clarification.*

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

Figure 1 Validation protocol tables

2.1 Review of Documents

The PDD /1/ version 1 of 5 July 2006, version 3 of 31 January 2007 and final version 4 of 25 February 2008 submitted by Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. and additional background documents /2/-/22/ related to the project design and baseline were assessed as part of validation.

2.2 Follow-up Interviews

In the period of 13-14 October 2006, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified during the document review. Representatives of Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. (FTRETU), the Government officers from Fuzhou Sanitation Department and the consultant company were interviewed /25/-/29/. The main interview topics are summarized in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Government officers from Fuzhou Sanitation Department	➢ National and section legal requirements and regulations for the recovery and utilization of LFG ➢ Past practise for LFG management ➢ Environmental impacts ➢ Municipal solid waste dumping rate ➢ Municipal solid waste management plan
Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.	➢ Status of letter of approval ➢ Stakeholders consultation process ➢ Project background and the status ➢ Project management ➢ Emission reduction monitoring plan ➢ Investment risks and barriers
consultant company, Easy Carbon	➢ Baseline determination of the project ➢ Applicability of selected methodologies ACM0001 and AMS ID ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation

2.3 Resolution of Clarification and Corrective Action Requests

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

The Corrective Action Requests and requests for Clarification raised by DNV, presented to the project participants in DNV's draft validation report of 15 October 2006 (rev. 0) have been resolved during communications between Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. and DNV. The PDD was published for public stakeholder comments twice due to methodology revision. Some initial findings were already addressed in the PDD published for the second stakeholder comments period.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent 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 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 as documented and described in the revised and resubmitted project design documentation.

3.1 Participation Requirements

The project participants are Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. of China, and ECO BANK LTD of Japan. The host Party China and the Annex 1 Party Japan meet the requirements to participate in the CDM.

The DNA of China has issued the letter of approval (LoA) on 2 July 2007/2/, authorizing Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. as project participant and confirming that the project assists Chinese sustainable development.

The DNA of Japan issued the LoA on 1 October 2007/3/, authorizing ECO BANK LTD as project participant.

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

3.2 Project Design

The main project characteristics are described in the PDD/1/. The project is a landfill gas (LFG) collection and utilization project at the Hongmiaoling landfill of Fujian Province, China. At present, there is not any system in place to actively capture or flare the LFG generated and vented to the atmosphere from the landfill. The objective of the project is to utilize the collected LFG for power generation and flare excess LFG. This involves investing in a highly efficient gas collection system, flaring equipment and the electricity generators with total installed capacity of 2.5 MW. The generators will combust the methane in the LFG for production of electricity for export to the East China Power Grid (ECPG). Excess LFG and all gas collected during periods when electricity is not produced will be flared.
The project reflects good practice for the collection of LFG, flaring of LFG and utilization of LFG for electricity generation.

The project activity started on 30 September 2006, which is the date of approval of construction/6/, and the length of the crediting period is a fixed 10 years, starting on 1 June 2008. The designed operation life of the project is 15 years.

Over the fixed crediting period of 10 years, the expected project average annual emission reduction are 143 194 tCO2e/year.

3.3 Baseline Determination

The FHLGEP applies the approved consolidated baseline methodology ACM0001 “Consolidated baseline methodology for landfill gas project activities” version 05, adopted at EB28 /12/ in

combination with the simplified baseline methodology AMS-I.D version 11 of EB 31 "*Grid connected renewable electricity generation*" /13/.

Its applicability has been justified by DNV due to that i) the LFG is captured to generate electricity and ii) the emission reductions are claimed for displacing the electricity generation from the grid. At the same time, iii) the capacity of electricity generated is 2.5 MW less than 15MW (the threshold for small scale projects).

The baseline scenario is the total atmospheric release of the landfill gas. There are some legal requirements/21/ on the recovery and utilization of landfill gas in China. DNV was able to verify that they are not systematically enforced and the non-enforcement is wide spread around the country/22/. During the site visit and interview, DNV was able to verify that all the LFG generated at the project site had been vented to the air without any treatment before the project. A 0% of the adjustment factor was selected for the project, which is deemed to be reasonable considering that the total atmospheric release of landfill gas (LFG) is the common practice for landfills in China/22/.

For the power generation of the project, the baseline is the electricity (in kWh) generated from the gas engines multiplied by the emission coefficient as the average of the operating margin (OM) and build margin (BM) of the ECPG. The calculation of OM and BM is as per AMS-I.D version 11 of EB 31, hence the average of the OM&BM will be determined ex-ante, respectively as 0.9411 tCO_2e/MWh and 0.7671tCO2/MWh. Default values from national standard (29.27 MJ/kg standard coal equivalent (SCE, GB2589-81) and IPCC version 1996 (25.8tC/TJ, 98% oxidation factor) are used. IPCC version 1996 default values are deemed acceptable as these are either identical or more conservative (e.g. the oxidation factor) than the default values of IPCC version 2006.

The application of the baseline methodology is transparent and conservative.

3.4 Additionality

The additionality of the project is demonstrated by applying the "*Tool for demonstration and assessment of additionality*" version 03, adopted at EB29 /14/ as follows:

Before the project starting on 30 September 2006, the feasibility study report was carried out by Fuzhou Municipal Project Design and Research Institute in October 2005, in which the project is strongly suggested to be undertaken as CDM project since the IRR of the proposed project is much lower than the sector benchmark of 8% without CDM revenues/4/. Therefore, the project developer decided to apply CDM to improve the project return through GHG emission reductions trading and sign a CDM consulting agreement with a consultant company, Easy Carbon, on 6 July 2006 /7/. DNV was able to verify that the incentive from CDM was seriously considered in the decision to proceed with the project activity/4//5//7/.

Step 1 – Identification of alternatives to the project activity consistent with current laws and regulations:

Since there is no demand for thermal energy in the surroundings of the landfill site, two alternative baseline scenarios to the project have been identified and discussed:

1) continuation of the current passive venting of LFG to the atmosphere and
2) the proposed project without the CDM support.

The analysis to the Chinese applicable legal and regulatory requirements and the national plan/22/ indicate that the most plausible scenario is business as usual, i.e. direct atmospheric

release of the LFG. Based on 1) our site visit, 2) project feasibility study report and 3) projrect EIA, DNV was able to verify that the Hongmiaoling landfill has been venting LFG directly to air without any treatment prior to project implementation/4/, /5/, /22/-/29/.

Step 2 – Investment analysis:

The "Tool for the Demonstration and Assessment of Additionality" version 03, adopted at EB29 recommends three analysis methods/14/, including simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The project generates financial and economic benefits through the sales of electricity other than CDM related income. Therefore the simple cost analysis (Option I) is not applicable. The investment comparison analysis (Option II) is only applicable when the alternatives are similar investment projects. The realistic and credible alternatives are not a new investment project. So the benchmark analysis (Option III) is chosen to assess the financial viability of the project activity.

In China, an IRR of 8% for total investment of a project is regarded as a benchmark /16/ for investments in electricity generation plant. Based on the data in the proposed project's feasibility study report /4/, the project IRR without CER revenues for a 15 years period is negative, which shows that the project in the absence of CDM benefits is not financially attractive compared to the benchmark.

To justify the reliability of input values used in the financial analysis, DNV validated the input parameters used in accordance with the guidance adopted at EB38 (paragraph 54):

Step A: Assess the sources of the input parameters

All input parameters used in the financial analysis are taken from Feasibility Study Reports (FSR) developed by Fuzhou Municipal Project Design and Research Institute in October 2005 and approved by the Fuzhou Development and Reform Commission on 16 November 2005 /4/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognized source. Moreover, DNV was able to verify that the operating hours of the power plant and landfill gas (LFG) recovery efficiency value applied in the PDD and this report are consistent with the values indicated in the FSR.

Step B: Confirm that the values used in the PDD are fully consistent with FSR

DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR /4/ and was able to confirm that the values applied are consistent with the values stated in the FSR.

Step C: Assess the period of time between the finalization of FSR and the investment decision

The FSR was approved on 16 November 2005 /4/ and thus only ten months prior to the decision to proceed with the project activity which was on 30 September 2006. Given this relative short period of time between approval of the FSR and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed, and it is thus reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.

Step D: Cross-check the parameters used in the financial analysis with the parameters used by other similar projects

Since China has very few landfills that collect and utilize LFG, and the proposed project is the only landfill conducting a LFG collection and utilization project in Fujian province, the input parameters used in the financial analysis were compared with the data reported for other similar proposed CDM projects in China, by comparing investment costs per MW, electricity tariff, percentage of O&M costs relative to total investment costs, etc. By in addition applying our sectoral competence, DNV was able to confirm that input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

A sensitivity analysis shows that only if the changes of total investment, annual O&M cost, tariff and annual average output reach 53.6%, 184%, 29.3% and 29.59% respectively, the project IRR will match the benchmark of 8%.

Considering economical development in China and the price rising of materials during construction, both the total investment and the annual O&M cost couldn't decrease so great to make the project IRR reach benchmark.

The tariff determination is related to the Fujian Province Consumer Price Index (CPI). As per the Fujian Statistical Yearbook 2007, where the CPI from the year 1951 to 2006 is included, which indicate that from 1994 to 2006 the CPI of Fujian Province even decrease 19.5%(125.3 in 1994 and 100.8 in 2006)/24/. So it is impossible for the tariff increasing 29.3% to make the project IRR reach benchmark.

The power generation of the proposed project is determined by the annual landfill gas that can be generated, and the quantity of generated landfill gas is calculated scientifically by estimation model. According to the Feasibility Study Report /4/, the average operational hour of the proposed project is 7300h which was verified by DNV. When the power generation increases by 29.59%, the operational hour would be over 8760 hours/year, which will never happen. So it is also impossible for the annual average output increasing 29.59% to make the project IRR reach the benchmark.

Step 3 –Barrier analysis:

Not selected.

Step 4 – Common practice analysis:

The first LFG to power project, the Zhejiang Hangzhou Tianziling LFG to energy project, was built in 1997, but in the following 5 years there were no similar projects in China /22/. Eventually the Jiangsu Nanjing Shuige LFG to energy project was built with GEF funding. Currently there are other projects that seek to utilise LFG but their implementation is a direct result of CDM.

Furthermore, there is more than 20 Landfills in Fujian Province and this project is the first landfill gas recovery and utilization project/23/. It can be verified that landfill gas capture and utilization for energy generation is not common practice in Fujian Province.

In conclusion, the assessment of the arguments presented above is deemed to sufficiently demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.

3.5 Monitoring Plan

The project applies the approved consolidated monitoring methodology ACM0001 version 05, adopted at EB28 and AMS-I.D version 11 of EB 31 /12//13/. The monitoring parameters

proposed in the PDD are fully consistent with ACM0001 and AMS-I.D. The monitoring plan provides for monitoring of:

- Total amount of landfill gas captured, it will be measured continuously and aggregated monthly and yearly. (The flow meters (all used in the project) used can automatically measure temperature and pressure and express LFG volumes in normalized cubic meters.)
- Amount of landfill gas flared, it will be measured continuously and aggregated monthly and yearly.
- Amount of landfill gas combusted in power plant, it will be measured continuously and aggregated monthly and yearly.
- Methane fraction in the landfill gas, it will be measured continuously with a fixed gas analyser.
- Project emissions from flaring of the residual gas stream in year y, it will be calculated based on the default values for the flare efficiency and the flow meter readings according to the *"Tool to determine project emissions from flaring gases containing methane"* adopted in EB28 /15/. During determination the project emissions from flaring of the residual gas stream, the following parameters will be monitored:
    - Temperature in the exhaust gas of the flare, it will be measured continuously by a Type N thermocouple.
    - Volumetric flow rate of the landfill gas to flare in dry basis at normal conditions.
    - Volumetric fraction of the methane in landfill gas in dry basis if the temperature exceeds 60˚C
- Total amount of electricity exported to the grid, it will be measured continuously using an electricity meter directly.
- Total amount of electricity imported to meet project requirement, it will be measured continuously using an electricity meter directly.
- Operation hours of the power plant.
- Review of enforcement of the regulatory requirements relating to landfill gas projects.

Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are considered minor and will be monitored by the local environmental authority during the project lifetime.

Training of the current workforce will be provided by the technology provider. The management manual including responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures, procedures for calibration of metering equipment and procedures for training and maintenance are been elaborated in the monitoring plan /8/. Detailed procedures will be in place prior to the start of the crediting period to enable subsequent verification of emission reductions.

The application of the monitoring methodology is transparent.

3.6 Calculation of GHG Emissions

The emission reductions for LFG combustion will be directly monitored and calculated using the approach of the approved methodology, ACM0001 version 05.
Waste composition and quantity of the landfill site has been verified during follow-up interviews. In the baseline scenario there is no capture of the landfill gas, the adjustment factor (AF) is defined as 0%. It has been confirmed during validation that there are no enforcement for the landfill requiring capture of LFG/22/-/29/.
To estimate the emission reductions ex-ante, the Canyon Scholl Mode
l (first order decay model, IPCC Reference Manual 1996) is used to determine estimated emission reductions ex-ante. The following variables values have been applied:

- Methane content in the LFG= 45%.
- Recovery efficiency= 30%.
- Flare efficiency= 90%, which is the default value of *"Tool to determine project emissions from flaring gases containing methane"* adopted in EB28. (If the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during the hour *h,* 0% is set as the flare efficiency in that hour h; If the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour *h,* but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h,* 50% is set as the flare efficiency in that hour h)
- Methane generation rate (k) = 0.05.
- Potential generation capacity (Lo) = 159 m3 CH4/ton MSW.

This ex-ante emission reduction estimate is for reference only, as actual emissions reduction will be determined ex-post through direct monitoring of the destroyed methane.
For the calculation of emission reductions due to the displacement of electricity from the grid, the grid emission factor is calculated in accordance with AMS-I.D version 11 of EB 31.

For the calculation of the OM emission factor, the simple OM emission factor calculation method is selected because low cost must run projects constitute less than 50% of the total grid generation and data is not available for applying the dispatch data analysis.

The aggregated generation and fuel consumption data are used as more disaggregated data are not available in the ECPG. Country specific data for net calorific value (NCV_i) of each type of fossil fuel, the IPCC 1996 default values for the oxidation factor of each type of fossil fuel and the total electricity delivered to the ECPG selected are deemed reasonable. Vintage data for the years 2002, 2003 and 2004 are used for operating margin calculation. The OM is calculated to be 0.9411 tCO2e/MWh as a generation-weighted average for the three years.

Because plant specific fuel consumption and electricity generation data is not public available in China, DNV requested guidance from the CDM Executive Board for a deviation of the baseline methodology of AM0005 and received the following answers/20/ which are deemed to be applicable for this project;

- Use of capacity additions for estimating the build margin emission factor for grid electricity.
- Use of weights estimated using installed capacity in place of annual electricity generation.
- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Since AM0005 has been replaced by ACM0002, the application of the above confirmation from EB to this project is deemed to be acceptable.

Following the EB's guidance the build margin is calculated as follows:

- The capacity additions from the years 2002 to 2004 is chosen and reach 21.6% of total installed capacity.
- The weight of installed capacity additions for thermal power plant is accounted for 65.4% of total installed capacity additions.
- The standard coal consumption of 336.66 g SCE/kWh which is defined as the best technology commercially available in China by the DNA, is used to determine the BM emission factor.
- The local value of 29.27 GJ/t standard coal equivalent, 25.8 tC/TJ for carbon content of the coal and the IPCC default value of carbon oxidisation factor of 98% are used to calculate the BM.
- The BM is calculated as 0.7671tCO_2/MWh.

The weights ω_{OM} and ω_{BM} are selected as 0.5 and 0.5, respectively, as stipulated for hydropower project by ACM0002 version 05, adopted at EB28. The combined margin of 0.8541tCO_2/MWh is fixed *ex-ante* for the first crediting period.

The last data used to calculate OM is derived from China Energy Statistical Yearbooks 2003 to 2005/18/; the BM calculation is derived from China Power Electric Power Yearbooks 2003 to 2005 and the relevant statistic report/17/.

No leakage has been foreseen. This is in line with the applied methodology.

In summary, the GHG calculations are complete and transparent, and the data accuracy has been verified. Over the fixed crediting period of 10 years, the expected project average annual emission reductions are 143 194 tCO2e/year. Considering the amount of uncertainty related to the methane generation and collection efficiency, which depends on the actual design and engineering of the project, this might be achievable if the project is implemented suitably. However, experiences with other landfills have shown that the methane generation and collection efficiency of the landfills projected by the first order decay model has an inherent uncertainty of almost 50% and hence the amount of CERs, which will be monitored ex-post, might vary from the projected amount.

3.7 Environmental and Social Impacts

According to Chinese law on EIA, an EIA report /5/ has been completed for the project in October 2005 and subsequently approved by the local EPB/5/ on 16 November 2005.

Social and environmental impacts of the project have been sufficiently addressed. The project is not expected to create any significant adverse environmental effects. On the contrary, by collecting and combusting landfill gas, the project will reduce emissions from the uncontrolled release, reduce the risks of explosion and fire at the landfill as well as reduce the risks of toxic effects on the local community and local environment.

3.8 Comments by Local Stakeholders

Local stakeholders were invited to comment on the project. A stakeholder consultation event was performed together with EIA in 2005. DNV checked the consultation recording and was able to verify that all of them thought the project would have positive impacts to the local society, economy and environment.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of version 1 of 5 July 2006 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 28 August to 26 September 2006.

One comment was received on 28 August 2006. The comment received (in unedited form) is given in the below text box.

Comment by: g. hamaliuk, phascon technologies
Inserted on: 28 August 2006
Subject: Methodology
Comment: I do not think this Project can use the small-scale methodologies, as the project methane emissions are much more than 15,000 t/a, as the Project Proponent stated that only 30% of the methane expected to be generated by the landfill wastes is to be collected.
This is a very well-prepared PDD and looks like a very good project.

***How DNV has considered the comment received in its validation**:*

According to the requirement of ACM0001, when the installed capacity of renewable energy generation is less than 15MW, small scale CDM methodology AMS I D shall be applied. The installed capacity of the proposed project is 2.5MW which falls within the methodology requirement. So the methodology chosen is reasonable.

Due to the updating of ACM0001, the PDD of version 3 of 31 January 2007 was made publicly available again on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 25 April to 24 May 2007.

One comment was received on 8 May 2007. The comment received (in unedited form) is given in the below text box.

Comment by: hagrid, Grinfindor
Inserted on: 8 May 2007
Subject: Laws and regulations on LFG in China

Comment: In this PDD, the explanation in the part "Sub-step 1b. Consistency with mandatory laws and regulations" is too simple. As i know regulations on LFG has changed three times from CJJ17-88 to revised CJJ17-2001 and to CJJ17-2004, and requirements for LFG collection or venting changed too. It is not clear that which one of the regulations above is applicable to the project. As a old landfill started dumping in 1995, the project is additional considering the laws and regulations in China. However, the explanation of this point is not satisfactory and too simple.

***How DNV has considered the comment received in its validation**:*

The regulation applicable to the proposed project is"Technical specification for operation and maintenance of municipal domestic refuse sanitary landfill", CJJ93-2004, which is stated in the revised PDD. Just as the description in the comments; this is an old landfill that started dumping in 1995, the project is deemed additional considering the laws and regulations in China. Please also refer to section 3.3 and 3.4 of this report. Annual review of enforcement of the regulatory requirements relating to landfill gas projects is included in the monitoring plan of the project.

5 VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party 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 China and the Annex I Party is Japan. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA from China confirmed that the project assists in achieving sustainable development.

The project correctly applies ACM0001 version 05, adopted at EB28"Consolidated methodology for landfill gas project activities" and AMS-I.D version 11 of EB 31*"Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories".*

By burning landfill gas instead of passively venting it to atmosphere and generating electricity which will displace grid electricity, the project results in reductions of CH_4/CO_2 emissions that are real, measurable and give long-term benefit 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 143 194 tCO2e/year over a selected fixed crediting period of 10 years. The emission reduction forecast has been checked and it is deemed likely that the state amount is achieved given that the underlying assumptions do not change. However, experiences with other landfills have shown that the methane generation and collection efficiency of the landfills projected by the first order decay model has an inherent uncertainty of almost 50% and hence the amount of CERs, which will be monitored ex-post, might vary from the projected amount.

The monitoring methodology ACM0001 version 05 has been correctly applied and the monitoring plan sufficiently provides for collection of data to determine the project's emission reductions. Adequate training and monitoring procedures will be implemented before the starting date of the crediting period.

In summary, it is DNV's opinion that the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" in China, as described in the PDD of 25 February 2008, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0001 version 05, adopted at EB28. DNV thus requests the registration of the project as a CDM project activity.

REFERENCES

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

/1/ Project Design Document for Fuzhou landfill gas to energy project, version 1 of 5 July 2006, version 3 of 31 January 2007 and version 4 of 25 February 2008.

/2/ Letter of Approval issued by Chinese DNA on 2 July 2007.

/3/ Letter of Approval issued by the DNA of Japan to authorize ECO BANK LTD as a participant on 1 October 2007.

/4/ The project feasibility study report in October 2005 and the approval letter by Fuzhou Development and Reform Commission in 16 November 2005 .

/5/ The project environmental impact assessment report in October 2005 and the approval letter by Fuzhou Environmental Protection Bureau on 16 November 2005.

/6/ The letter of construction permission by supervision company, 30 September 2006.

/7/ The CDM consulting agreement between consultant company and Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. on 6 July 2006 .

/8/ Monitoring Manual for Fuzhou Hongmiaoling Landfill Gas to Electricity Project version 1 of November 2006.

/9/ Additional information about the monitoring equipment for Fuzhou Landfill Gas to Energy Project.

/10/ The letter that the Fuzhou Sanitation Department commissioned Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. to develop the proposed project, July 2006.

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

/11/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/12/ ACM 0001 Approved methodology, *"Consolidated methodology for landfill gas project activities"*, version 05 of EB 28 .

/13/ AMS-I.D version 11 of EB 31, "*Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories*"

/14/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, version 03 of EB 29.

/15/ CDM Executive Board: *"Tool to determine project emissions from flaring gases containing methane"* adopted in EB28

/16/ State Power Corporation of China. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects. Beijing: China Electric Power Press, 2003

/17/ China Electric Power Yearbook 2001, 2002, 2003, 2004 and 2005

/18/ China Energy Statistical Yearbook 2003, 2004 and 2005

/19/ Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

/20/ The guidance for deviation in use of methodology AM0005 by several project activities in China by EB. http://cdm.unfccc.int/Projects/Deviations

/21/ *"Technical specification for operation and maintenance of municipal domestic refuse sanitary landfill",* CJJ93-2003

/22/ *"National Action Plan for Recovery and Utilization of Landfill Gas"* carried out by State Environmental Protection Administration of China together with United Nations Development Programme, Global Environment Fund and United Nations Department of Economic and Social Affairs in December 2001

/23/ *http://www.cpnn.com.cn/dw/200711230008.htm*

http://www.msw.com.cn/ArticleShow.asp?ArticleID=1707

/24/ Fujian Statistical Yearbook 2007

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

/25/ Zheng Shizhong,factory director, Fuzhou Hongmiaoling landfill operation Company, 13 October 2006.

/26/ Wang Xiaoyan, project manager, Fujian TianYi Renewable Energy Technology & Utilization Co., Ltd., 13 October 2006.

/27/ Liu yu, Project manager, MicroPowers Ltd-general contractor of the proposed project, 13 October 2006.

/28/ Cao Shi Xing, MicroPower Ltd-general contractor of proposed project, 13 October 2006.

/29/ Guan Yisong, project manager, Easy Carbon Consultancy Co. Ltd., 13 October 2006.

- o0o -

APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	OK	Table 2, Section E.4.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK ~~CAR 1~~	Table 2, Section A.3
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK ~~OK~~ ~~CAR 1~~	Table 2, Section A.3
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards China
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	Chinese DNA is the State Development and Reform Commission. DNA of Japan is

Requirement	Reference	Conclusion	Cross Reference / Comment
			the Liaison Committee for the Utilization of the Kyoto Mechanisms Ministry of Foreign Affairs
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	China ratified the Kyoto Protocol on 30 August, 2002. Japan ratified the Kyoto Protocol on 4 June 2002.
10. 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 emission level in 1990.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	The validation has not in detail assessed Japan compliance with article 5 and 7 of the Kyoto Protocol. Japan have in place a national system for estimating GHG emissions and annually submits is most recent inventory to the UNFCCC.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously	CDM Modalities and	OK	Table 2, Section B.1.1 and

Requirement	Reference	Conclusion	Cross Reference / Comment
approved by the CDM Executive Board	Procedures §37e		D.1.1
15. 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, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD has been published on www.dnv.com/certification/ClimateChange, Parties, stakeholders and NGOs were invited through the UNFCCC CDM website to provide comments on the validation requirement during a period of 30 days, from 28 August to 26 September 2006 and 25 April to 24 May 2007. 2 comments were received. Refer to section 4 of the report.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	PDD format version 4 is used.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	Yes, Fuzhou Hongmiaoling Landfill Gas to Electricity Project is located at Fuzhou, Fujian Province, P.R.China. Geographical location of Fuzhou city is clearly identified in a map of China.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	Yes, 30% of LFG will be captured to flare and generate electricity transmitted to East China Power Grid through Fujian provincial grid. Hence the project site and ECPG are defined as the project's system boundary.		OK
A.2. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR	Yes, the design engineering reflects current good practices. Many parameters stated in PDD are different from in FSR.	~~CL 1~~	OK
A.2.2. Does the project use state of the art technology	/1/	DR	Yes. The equipment installed can be		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
or would the technology result in a significantly better performance than any commonly used technologies in the host country?		I	considered state-of-the-art technology. The equipment to be installed comprises: a highly efficient gas collection system, flaring equipment and the electricity generators.		
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR I	No. The technology is not likely to be substituted by other efficient technologies within the project period.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR I	Initial training and maintenance efforts are required by the project.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR I	Yes. The project owner will make provisions for the training and maintenance needs before the operation of the project.		OK
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/ /4/ /5/	DR	The project is in line with relevant legislation and plans in China. The approvals of feasibility study report and EIA have been provided to DNV.		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR I	The project is in line with the Chinese requirements for CDM and thus the DNA of China issued a LoA on 2 July 2007.	~~OK~~ ~~CAR 1~~	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR I	This is confirmed by DNA of China. The LoA was issued on 2 July 2007.	~~OK~~ ~~CAR 1~~	OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /5/	DR I	Yes, through treating the LFG, the quality of air around the site will be improved obviously with the decreasing of the concentration of methane, which will be a positive effect on the health of local population. The treatment of LFG also		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			significant reduces the risk of explosion in local surroundings. Improves the overall management practices of the landfill. The proposed project is consistent with local sustainable development strategy.		
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/	DR	Yes, the project applies the methodology of ACM0001*"Consolidated methodology for landfill gas project activities"*, version 05, adopted at EB28 and the methodology of AMS-I.D version 11 of EB 31, "Indicative *simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories"*. The two methodologies are both approved by EB.		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/ /12/ /13/	DR	Yes. The baseline methodology is applicable for the project and the appropriateness is justified. The LFG is captured to generate electricity and the emission reductions are claimed for displacing the electricity generation from grid. At the same time, the capacity of		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			electricity generated is 2.5 MW less than 15MW (the threshold for small scale projects). The formula used to calculate the emission reduction in PDD comply with the methodology ACM0001 version 02(not the version 05 as described)	~~CL 2~~	
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/ /12/ /13/ /22/	DR I	Yes, the discussion and application of the chosen baseline is transparent. The selected baseline scenario is the continuation of the current practice of passive venting the LFG, which is still a common practice in landfills throughout China.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/ /22/	DR I	Yes. It has been determined considering that no methane destruction is occurring in the baseline. It was verified during the follow-up interviews that there are no contractual agreements for the landfill requiring capture of LFG. The applied adjustment factor (AF) for the project is chosen as 0%.		OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Yes. The baseline has been established on a project-specific basis.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes. All relevant national and sectoral policies, regulations and department rules and disciplines are considered.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/ /21/ /22/	DR I	Yes. The capacity and component of waste historically delivered to the landfill is available. The measurement reports for the air component around the landfill site have been provided to DNV. It can be verified that passive venting the LFG to air is common practice in China		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	Yes. The selected baseline is the most likely scenario among other possible and/or discussed scenarios.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/ /4/ /5/ /7/ /22/	DR I	Yes. The "tool for the demonstration and assessment of additionality" version 03, adopted at EB29 is applied exactly. Before the project starting on 30 September 2006, the feasibility study report was carried out by Fuzhou Municipal Project Design and Research Institute in October 2005, in which the project is strongly suggested to be undertaken as CDM project since the IRR of the proposed project is much lower than the sector benchmark of 8% without CDM revenues/4/. Therefore, the project developer decided to apply CDM to improve the project return through GHG emission reductions trading and sign a CDM consulting agreement with a consultant company, Easy Carbon, on 6 July 2006 /7/.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			DNV was able to verify that the incentive from CDM was seriously considered in the decision to proceed with the project activity/4//5//7/. Step 1 – Identification of alternatives to the project activity consistent with current laws and regulations: two alternative baseline scenarios to the project have been identified and discussed. See B.2.1. Step 2 – Investment analysis: Since the project will generate the economic benefit other than CDM-related income through the electricity sale and that the project developer does not have alternative and comparable investment choices, the benchmark analysis – option 3 is used to assess the financial viability of the project activity. Please provide the data source and calculation spreadsheet of the IRR calculation. Step 3 – Barrier analysis 1. Not selected. Step 4 – Common practice Furthermore, there is more than 20 Landfills in Fujian Province and this project is the first landfill gas recovery and utilization project/23/. It can be verified that landfill	**CL 3**	

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			gas capture and utilization for energy generation is not common practice in Fujian Province		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	There are no significant risks to the baseline except the enforcement of the Chinese renewable law. However, this law does not need to be taken into account as it is being implemented only now i.e. after the entry into force of decision 17.CP 7.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes.		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR I	Yes. The starting date of the project activity was 30 September 2006, and the operational lifetime of the project activity is 15 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	Yes. A fixed crediting period of 10 years with no renewals is selected.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D. Monitoring Plan *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).*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	Yes. The project applies the approved monitoring methodology ACM0001 version 05, adopted at EB28 *"Consolidated methodology for landfill gas project activities"* .		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes. The project activity fulfils the applicability criteria of the approved methodology ACM0001 and AMS-I.D version 11 of EB 31"Landfill projects where the captured gas is used to produce energy (e.g. electricity), and emission reductions are claimed for displacing the electricity generation from grid.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	Yes. Monitoring parameters proposed in the PDD are fully consistent with ACM0001and AMS-I.D version 11 of EB 31.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.2. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
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/ /13/ /15/	DR	Most relevant data necessary for the estimation of GHG emissions within the project boundary have been included in the monitoring plan, among others: - Total amount of landfill gas captured, it will be measured continuously and aggregated monthly and yearly. (The flow meters (all used in the project) used can automatically measure temperature and pressure and express LFG volumes in normalized cubic meters.) - Amount of landfill gas flared, it will be measured continuously and aggregated monthly and yearly. - Amount of landfill gas combusted in power plant, it will be measured continuously and aggregated monthly and yearly. - Methane fraction in the landfill gas, it will be measured continuously with a fixed gas analyser. - Project emissions from flaring of the residual gas stream in year y, it will be calculated based on the default		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			values for the flare efficiency and the flow meter readings according to the *"Tool to determine project emissions from flaring gases containing methane"* adopted in EB28 /15/. During determination the project emissions from flaring of the residual gas stream, the following parameters will be monitored: - Temperature in the exhaust gas of the flare, it will be measured continuously by a Type N thermocouple. - Volumetric flow rate of the landfill gas to flare in dry basis at normal conditions. - Volumetric *fraction of the methane in landfill gas in dry basis* if the temperature exceeds 60˚C - Total amount of electricity exported to the grid, it will be measured continuously using an electricity meter directly. - Total amount of electricity imported to meet project requirement, it will be measured continuously using an electricity meter directly. - Operation hours of the power plant. - Review of enforcement of the regulatory requirements relating to		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			landfill gas projects.		
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	Yes, the above mentioned indicators are reasonable.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	Yes. It will be possible to monitor the specified project GHG indicators.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	The parameters to be monitored to valuate the emissions due to the project activities are measurable.		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	Yes.		OK
D.3. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	No leakage affects needs to be accounted under this methodology ACM0001.		OK
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Yes.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/ /8/ /9/	DR I	Yes. The monitoring manual and additional information about the monitoring equipment for the project have been provided to DNV.		OK
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR I	Neither ACM0001 nor the Chinese DNA requires collection and archiving of relevant data concerning environmental, social and economic impacts. However the environmental impacts will be monitored by local environmental authority.		OK
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/ /8/	DR I	Yes. The authority and responsibility of project management is described in the PDD and project O&M Manual.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/ /8/	DR I	The authority for project monitoring, measurement and reporting is described in monitoring plan.		OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR I	The procedures for training of monitoring personnel are identified and will be implemented by a third part.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /8/	DR I	There are no likely cases of emergencies leading to unintended emissions. An operating and monitoring manual has been prepared and will be implemented before the start of the crediting period.		OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/ /8/	DR I	The procedures for calibration of monitoring equipment are identified in the monitoring plan.		OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	Ditto		OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/ /8/	DR	Yes. The procedures for monitoring, measurements and reporting are identified in the monitoring plan.		OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /8/	DR	The procedures for records handling are identified in the monitoring plan.		OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/ /8/	DR	Yes. It is described in monitoring manual.		OK
D.6.10. Are procedures identified for review of reported results/data?	/1/ /8/	DR	Yes. There are supervising procedures for the reported data identified in the monitoring plan.		OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/ /8/	DR I	Detailed procedures for internal audits of GHG project compliance with operational requirements have not being developed yet. These will be in place and maintained and implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.		OK
D.6.12. Are procedures identified for project performance reviews before data is submitted	/1/	DR	Ditto		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
for verification, internally or externally?					
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	Ditto		OK
E. Calculation of GHG Emissions by Source *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.*					
E.1. Project GHG Emissions *The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR I	Relevant direct and indirect GHG emissions have been captured in the project design and through the application of the methodology. The amount of electricity used at the landfill itself will be monitored and accounted for in the project emissions.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes.		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	Yes.		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	No major uncertainties related to project GHG emissions are foreseen.		OK
E.1.5. Have all relevant greenhouse gases and source	/1/	DR	Yes. Project emissions arising due to		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
categories listed in Kyoto Protocol Annex A been evaluated?			operation of capture and utilization equipment have been included.		
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	According to ACM0001, no leakage effects need to be accounted under this methodology.		OK
E.3. Baseline Emissions *The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	The PDD is using 159 m3 CH4/ton MSW for the Lo and 0.05 (1/yr) for k. Considering the waste composition data presented and the local climate, the choices of the above values are deemed to be reasonable.		OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	Yes. For ACM0001, the baseline is the direct air release of LFG. For power generation component, it is the electricity generated in the East China Power Grid multiplied by the emission coefficient (tCO2e/MWh).		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes. The GHG calculations are documented in a completed and transparent manner.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			And the calculation spreadsheet has been provided and verified by DNV.		
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	To estimate the emission reductions ex-ante, the Canyon Scholl Mode l (first order decay model, IPCC Reference Manual 1996) is used to determine estimated emission reductions ex-ante. The following variables values have been applied: - Methane content in the LFG= 45%. - Recovery efficiency= 30%. - Flare efficiency= 90%, which is the default value of *"Tool to determine project emissions from flaring gases containing methane"* adopted in EB28. (If the temperature in the exhaust gas of the flare (Tflare) is below 500°C for more than 20 minutes during the hour *h,* 0% is set as the flare efficiency in that hour h; If the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour *h,* but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h,* 50% is set as the flare efficiency in that hour h) - Methane generation rate (k) = 0.05. - Potential generation capacity (Lo) = 159 m3 CH4/ton MSW.	~~CL 4~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			For the power generation component, it is conservative. The local value of 29.27 GJ/ t standard coal (data source: China Energy Statisics Yearbook 2004) and the IPCC default value of 25.8 tC/TJ, carbon oxidised OXIDi 98% are used to calculate the CO2 coefficient. The spreadsheet containing the calculations of foreseen emissions from the landfill in the absence of the project should be provided. Furthermore, the calculations for the grid emission factor according to AMS-I.D should be transparently presented.		
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	Actual emissions reductions will be calculated ex post and the baseline estimates are based on a consolidated methodology and experience.		OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	Yes.		
E.4. Emission Reductions *Validation of ex-ante estimated emission reductions*.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	Yes.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Yes. The impacts including on air, water, bio-environment, noise, solid waste are all described.		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /5/	DR	Yes. The EIA has been approved by Environmental Protection Bureau.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	No adverse environmental impacts are expected to occur.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	There are no transboundary environmental impacts foreseen for the project.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes. The environmental impacts identified have been addressed in the project design.		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	Yes.		OK
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR I	Yes. Local stakeholders were invited initially through a survey during the EIA process. The stakeholders consist of employee of landfill, officers and villagers.		OK
G.1.2. Have appropriate media been used to invite	/1/	DR	Yes. The site surveys, distribution of		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
comments by local stakeholders?	/5/		questionnaires have been used to invite comments by local stakeholders.		
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	Yes. The stakeholder consultation process is in accordance with Chinese EIA regulations.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes. A summary of the stakeholder comments received is described in the PDD.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	All the comments are positive and supporting the project activity.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
~~OK~~ ~~CAR 1~~**:** The LoA of China DNA has not been received.	A.3.2, A.3.3	The formal LoAs from the DNA of China and Japan have been obtained.	OK. The LoAs are received and the CAR is closed.
~~CL 1~~: Many parameters stated in PDD are different from in FSR.	A.2.1	The parameters in PDD have been adjusted to be the same as FSR.	DNV has checked the revised PDD and FSR and was able to confirmed the parameters in PDD are from FSR. CL closed.
~~CL 2~~**:** The formula used to calculate the emission reduction in PDD comply with the methodology ACM0001 version 02(not the version 05 as described)	B.1.2	In the final PDD, it has been revised accordingly.	DNV has checked the final PDD and was able to verify the formula is correctly applied. CL closed.
CL 3: Please provide the data source and calculation spreadsheet of the IRR calculation.	B.2.7	All the data used for the IRR calculation are from the feasibility study report, which has been provided. The spreadsheet has been provided to DNV.	The parameters used in the calculation have been listed in the PDD and the data source has been elaborated in the PDD. DNV has checked the spreadsheet for IRR calculation and was able to verify that IRR calculation is reasonable. The investment analysis and sensitivity assessment have shown that the project activity is unlikely to be the most financially attractive option. CL closed.
~~CL 4~~**:** The spreadsheet containing the	E.3.4	The spreadsheet has been provided to	DNV has checked the spreadsheet and

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
calculations of foreseen emissions from the landfill in the absence of the project should be provided. Furthermore, the calculations for the grid emission factor according to AMS-I.D should be transparently presented.		DNV.	compared it with the calculation from NDRC and was able to verify the calculation is reasonable. CL closed.

- o0o -

APPENDIX B

CERTIFICATES OF COMPETENCE

Mari Viddal

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

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	--
CDM Verifier:	--	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	--		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes		
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 26 September 2007

Michael Lehmann
Technical Director, International Climate Change Services

Ramesh Ramachandran

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

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	--
CDM Verifier:	Yes	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 4, 5, 13		
Technical Reviewer for (group of) methodologies:			
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 22 December 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

Wilson Tang

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

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	--
CDM Verifier:	--	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 13		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes		
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Shu Yong Sun

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

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

Høvik, 12 March 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director