



Industrie Service

Verification Report

Ecosecurities Ltd.

**Initial Verification and Verification of the
First Monitoring Period**

of the

“Nanjing Tianjingwa Landfill Gas to Electricity in China”

Report No. 828295, Version 01

14 June 2006

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

Initial Verification and Verification of the First Monitoring Period of the “Nanjing Tianjingwa Landfill Gas to Electricity in China”



Industrie Service

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Subject:	Initial and First Periodic Verification of a CDM Project				
Executing Operational Unit:	TÜV SÜD Industrie Service GmbH Carbon Management Service Westendstr. 199 – 80686 Munich, Federal Republic of Germany				
Client:	Ecosecurities Ltd. Park Central, 40/41 Parkend ST, Oxford OX1 1JD United Kingdom				
Contract approved by:	Werner Betzenbichler				
Report Title:	Initial Verification and Verification of the First Monitoring Period of the “Nanjing Tianjingwa Landfill Gas to Electricity in China”				
Number of pages	18 (excluding annexes)				
Summary:	<p>TÜV SÜD Industrie Service GmbH has performed a verification of the CDM project: “Nanjing Tianjingwa Landfill Gas to Electricity in China”. The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".</p> <p>The management of Ecosecurities Ltd. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions of the project “Nanjing Tianjingwa Landfill Gas to Electricity in China” on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version dated October 2005. The development and maintenance of records and reporting procedures is in accordance with that plan. The calculation and determination of GHG emission reductions from the project is in the responsibility of the management of the project.</p> <p>The verifier confirms that the project is implemented as planned and described in validated and registered project design documents. Installed equipment being essential for generating emission reduction runs reliably. The monitoring system is in place and the project is ready to generate GHG emission reductions.</p> <p>The verifier can confirm that the GHG emission reduction is calculated without material misstatements. Our opinion relates to the project’s GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated we confirm the following statement:</p> <p><u>Reporting period:</u> From 11-06-2005 to 29-05-2006</p> <p><u>Verified emission in the above reporting period:</u></p> <p>Baseline emissions: 26 921 t CO₂ equivalents Project emissions: t CO₂ equivalents Emission reductions: 26 921 t CO₂ equivalents</p>				
Work carried out by:	<ul style="list-style-type: none"> • Werner Betzenbichler (project manager, GHG lead auditor) • Cuiyun Zhang (lead auditor environmental management systems (ISO 14001), local expert, GHG auditor) • Dr. Sven Kolmetz (lead auditor emission inventory verification, technical expert, ISO 14001 auditor) 			Internal Quality Control by:	<ul style="list-style-type: none"> • Michael Rumberg (project manager, GHG lead auditor)



Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CR	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
JI	Joint Implementation
KP	Kyoto Protocol
MP	Monitoring Plan
MW	Megawatts
NGO	Non Governmental Organization
PDD	Project Design Document
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual



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1 INTRODUCTION

1.1 Objective

Ecosecurities has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its CDM project: “Nanjing Tianjingwa Landfill Gas to Electricity in China”. Verification is the periodic independent review and ex post determination by the Designated Operational Entity / Independent Entity of the monitored reductions in GHG emissions during the defined verification period.

The objective of verification can be divided in Initial Verification and Periodic Verification:

- § **Initial Verification:** The objective of an initial verification is to verify that the project is implemented as planned, to confirm that the monitoring system is in place and fully functional, and to assure that the project will generate verifiable emission reductions. A separate initial verification prior to the project entering into regular operations is not a mandatory requirement.
- § **Periodic Verification:** The objective of the periodic verification is to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan; further more the periodic verification evaluates the GHG emission reduction data and express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emission reduction data is “free” of material misstatements; and verifies that the reported GHG emission data is sufficiently supported by evidence, i.e. monitoring records. If no prior initial verification has been carried out, the objective of the first periodic verification also includes the objectives of the initial verification.

The verification shall consider both quantitative and qualitative information on emission reductions. Quantitative data comprises the monitoring reports submitted to the verifier by the project entity. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification follows UNFCCC criteria, refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Bonn Agreement and the Marrakech Accords.

1.2 Scope

Verification scope is defined as an independent and objective review and ex post determination by the Designated Operational Entity of the monitored reductions in GHG emissions. The verification is based on validated project design document including baseline. These documents are reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. TÜV SÜD has, based on the recommendations in the Validation and Verification Manual, employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of CERs.

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

The audit team has been provided with a Draft Monitoring Report in the beginning of June 2006, covering the period June 11, 2005 – May 29, 2006. A fact finding mission in form of an on-site



audit and - based on the documentation received - a document review has taken place. Afterwards the client decided to revise the Monitoring Report according to a minor finding during the on-site visit. There was a deviation between the electricity generation reported and the invoices checked by the audit team of 260 MWh. The revised Monitoring Report was then submitted again to the verifier and serves as the basis for the assessment presented herewith. The Monitoring Report has to be made publicly available on the UNFCCC website (see the following link: <http://cdm.unfccc.int/Issuance/MonitoringReports>).

Studying the existing documentation belonging to this project, it was obvious that the competence and capability of the audit team performing the verification have to cover at least the following aspects:

- Ø Knowledge of Kyoto Protocol and the Marrakech Accords
- Ø Environmental and Social Impact Assessment
- Ø Skills in environmental auditing (ISO 14000, EMAS)
- Ø Quality assurance
- Ø Technical aspects of landfill gas electricity generation
- Ø Monitoring concepts
- Ø Political, economical and technical random conditions in host country

According to these requirements TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV certification body “climate and energy”:

Werner Betzenbichler is head of the department “Carbon management Service” at TÜV Industrie Service GmbH TÜV SÜD Group. In his position he is also responsible for the implementation of validation, verification and certifications processes for greenhouse gas mitigation projects in the context of the Kyoto Protocol.

Cuiyun Zhang is a lead auditor for environmental management systems (according to ISO 14001) at Jiangsu TÜV Product Service Ltd. She is based in Shanghai. In her position she is implementing validation, verification and certifications audits for management systems. She has received extensive training in the CDM validation process and participated already in several CDM project assessments.

Dr. Sven Kolmetz is a lead auditor for GHG inventory verification (being an officially designated expert for verifications under the EU-ETS trading scheme). He holds a Master Degree in physics from the University of Karlsruhe, Germany. Dr. Kolmetz worked for 9 years as a consultant with concepts for reliable and efficient energy supply and has comprehensive experience with all types of energy generation equipment. He has received extensive training in the CDM and JI validation processes and participated already in several CDM and JI project assessments.

The audit team covers the above mentioned requirements as follows:

- Ø Knowledge of Kyoto Protocol and the Marrakech Accords (ALL)
- Ø Environmental and Social Impact Assessment (BETENBICHLER / ZHANG / KOLMETZ)
- Ø Skills in environmental auditing (ALL)
- Ø Quality assurance (ALL)
- Ø Technical aspects of landfill gas electricity generation (BETZENBICHLER / KOLMETZ)
- Ø Monitoring concepts (ZHANG / BETZENBICHLER / KOLMETZ)
- Ø Political, economical and technical random conditions in host country (ZHANG)

In order to have an internal quality control of the project, a team of the following persons has been composed by the certification body “climate and energy”:



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Ø Michael Rumberg (deputy head of the certification body “climate and energy”)

1.3 GHG Project Description

The purpose of the project activity is to utilize landfill gas from a nearby municipal landfill for effective generation of electricity for supply to the grid. The project activity will help in reducing the Green House Gases (GHG) emitted during use of mainly coal at grid-connected power plants and conserve the natural resource.

Project participants are Nanjing Green Waste Recovery Engineering Co. Ltd. (China) and Eco-securities Ltd. (UK).

The project starting date is 01/07/2004 and the 7 year renewable crediting period starts 01/05/2005.



2 METHODOLOGY

The project assessment aims at being a risk based approach and is based on the methodology developed in the Validation and Verification Manual (for further information see www.vvmanual.info), an initiative of all Applicant Entities, which aims to harmonize the approach and quality of all such assessments.

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

- It organizes, details and clarifies the requirements a CDM/JI project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been proved and the result of the verification.

The verification protocol consists of four tables. The different columns in these tables are described in Figure 1.

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

Initial Verification Checklist – table 1			
OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>Description of circumstances and further commendation to the conclusion.</i>	<i>This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report. The Initial Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further periodic verifications</i>



Periodic Verification Checklist		
Table 1: Data Management System/Controls		
Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
The project operator’s data management system/controls are assessed to identify reporting risks and to assess the data management system’s/control’s ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	<p>A score is assigned as follows:</p> <p>Full all best-practice expectations are implemented.</p> <p>Partial a proportion of the best practice expectations is implemented</p> <p>Limited this should be given if little or none of the system component is in place.</p>	<p><i>Description of circumstances and further commendation to the conclusion. This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report. The Initial Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further periodic verifications</i></p>

Periodic Verification Checklist		
Table 2: GHG calculation procedures and management control testing		
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Identification of potential reporting risks based on an assessment of the emission estimation procedures.</p> <p>Identification of key source data. Focus on those risks that impact the accuracy, completeness and consistency of the reported data.</p>	<p>Identification of the key controls for each area with potential reporting risks. Assessment of adequacy of the key controls and eventually test that the key controls are actually in operation.</p> <p>Internal controls include, Understanding of responsibilities and roles, Reporting, reviewing and formal management approval of data; Procedures for ensuring data completeness, conformance with reporting guidelines, maintenance of data trails etc.</p>	<p><i>Identification of areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks</i></p> <p><i>Areas where data accuracy, completeness and consistency could be improved are highlighted.</i></p>



Periodic Verification Checklist		
Table 3: Detailed audit testing of residual risk areas and random testing		
Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including FARs)
<p>List of residual areas of risks of Periodic Verification Checklist Table 2 where detailed audit testing is necessary.</p> <p>In addition, other material areas may be selected for detailed audit testing.</p>	<p>The additional verification testing performed is described. Testing may include:</p> <ul style="list-style-type: none"> § Sample cross checking of manual transfers of data § Recalculation § Spreadsheet ‘walk throughs’ to check links and equations § Inspection of calibration and maintenance records for key equipment § Check sampling analysis results <p>Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.</p>	<p>Having investigated the residual risks, the conclusions are noted here. Errors and uncertainties are highlighted.</p>

Figure 1 Verification Protocol Tables

2.1 Review of Documents

The monitoring report submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is attached as Annex 2 to this report.

2.2 Follow-up Interviews

On June 07, 2006 TÜV SÜD performed interviews with project stakeholders to confirm selected information. Representatives of Green Waste Recovering Engineering Co.,Ltd. were interviewed. The main topics of the interviews are summarized in Table 1.



Table 1 Interview topics

Interviewed organization	Interview topics
Green Waste Recovering Engineering Co.,Ltd	<ul style="list-style-type: none"> Ø Project design and implementation Ø Technical equipment and operation Ø Monitoring plan Ø Monitored data Ø Data uncertainty and residual risks Ø GHG calculation Ø Environmental impacts Ø Stakeholder process Ø Compliance with national laws and regulations

2.3 Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification was to resolve the requests for clarification and any other outstanding issues which needed to be clarified for TÜV SÜD’s positive conclusion on the GHG emission reduction calculation. The Clarification Requests, raised by TÜV SÜD were resolved during communication between the client and TÜV SÜD. Forward Action Requests are indicated issues which do not effect the generation of emission reduction in the verified period, but shall be improved in order to ensure the reliability of future data. To guarantee the transparency of the verification process, the concerns raised and responses that have been given are summarized in chapter 3 below and documented in more detail in the verification protocol in Annex 1.



3 VERIFICATION FINDINGS

In the following sections the findings of the verification are stated. The verification findings for each verification subject are presented as follows:

The findings from the desk review of the final monitoring report and the findings from interviews during the follow up visit are summarized. A more detailed record of these findings can be found in the Verification Protocol in Annex 1.

- 1) Where TÜV SÜD identified issues that needed clarification, corrective action or that represented a risk to the fulfillment of the project objectives, a Corrective Action Request or Forward Action Request, respectively, was issued. The Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1. The verification of the project resulted in one Corrective Action Request and two Forward Action Request.
- 2) Where Corrective Action Requests have been issued, the exchanges between the Client and TÜV SÜD to resolve these Requests are summarized.
- 3) In the context of Forward Action Requests, risks have been identified, which may endanger the delivery of high quality CERs in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions. Forward Action Requests are understood as recommendation for future project monitoring; they are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.
- 4) The final conclusions for verification subject are presented.

The verification findings relate to the project implementation as documented and described in the final monitoring report.



Initial Verification Findings

3.1 Remaining issues, CARs, FARs from previous validation

3.1.1 Discussion

Based on the validation report the verification team identified no missing steps. The project has been registered under the CDM by December 18, 2005 under the reference number UNFCCC00000071.

3.1.2 Findings

None.

3.1.3 Conclusion

The project complies with the requirements.

3.2 Project Implementation

3.2.1 Discussion

The Project has been implemented as defined in the PDD. The power generation system is delivered by Caterpillar as announced in the PDD.

The gas engine is a caterpillar 3516 LE with 800-850 kW. The system is running stable as could be confirmed during the on-site visit. 3 914 000 kWh were submitted to the grid during the monitored period according to the invoices of the local grid company. The landfill gas collected is less than expected in the PDD. Hence, the emission reductions of the first monitored period are less than expected. Based on the validation report the verification team identified no missing steps.

The physical components comprise the power generation system, the measurement equipment including the control system and the landfill gas collection system. The project boundaries are according to the PDD.

The data to be collected in order to monitor project emissions comprise the landfill gas flow (Nm³) and the electricity delivered to the grid. The gas flow metering is based on the measurement of the methane fraction, temperature, pressure and flow as stated in the monitoring plan. The resulting standardized gas flow is calculated by the control system.

The monitoring system is implemented according to the validated monitoring plan besides the methane flared and the flare efficiency. These measurements were not required during the first monitored period because there was no surplus methane that has to be flared due to low landfill gas production. Hence, the flare has not been used. This has been verified on-site by checking the gas production. The gas production was much lower than expected in the PDD. No emission reductions due to flaring methane are claimed.



It has been verified on-site that the data are complete since the beginning of the monitoring period until the data of verification. During the time the power system stops there are no data measured and recorded. It has been verified that in this cases no extrapolation has been applied. If one of the meters of the control system will fail, the whole power generation will be shut down to make sure the gas engine can not be damaged due to minor gas quality.

All relevant meters (flow, electricity methane fraction) are double; hence in any case a back-up system is available. The back-up is used for cross-checking the measuring results of the main system. The electricity meter is calibrated by the power supply company. The calibration label has been seen.

The flow meter is calibrated by the manufacturer. There is no recalibration procedure due to the measurement method but the flow meter and the methane fraction meter are regularly cross-checked by the back-up system. If there are deviations the main measurement equipment has to be exchanged. The methane fraction is cross-checked by a portable analyzer. This portable analyzer is calibrated with standard gas. The certificate of the standard gas has been seen on-site.

The data to be collected in order to monitor project emissions have to be recorded each hour by the shift engineer on a daily record sheet according to the CDM manual. At the beginning of each month, the daily record sheet has to be combined into the monthly report and submitted to Mr. Pu.

The generation operation data has to be recorded continuously and automatically and the records are archived on CD monthly.

The company has clearly defined procedures for monitoring and measurement of process parameters as mentioned above. These procedures are documented in the CDM project management and operation manual.

The staff has been trained in using the control system. The training records have been verified and the training plan is available on CD.

The overall authority of the project is Mr Shigui Pu (general manager), who supervises a staff of 14 engineers and workers.

Because of the high relevance of gas quality to the gas engine the control system stops the power generation in case of meter failure.

3.2.2 Findings

Forward Action Request 1:

It is highly recommended to install the metering equipment for measuring the flared gas flow and the flare efficiency according to the monitoring plan. If the landfill gas flow will increase flaring may be necessary. Otherwise, no emission reductions can be claimed by destruction of methane through flaring, but only by electricity production.

3.2.3 Conclusion

The project is in compliance to the requirements.



3.3 Internal and External data

3.3.1 Discussion

The following internal parameters need to be obtained according to the monitoring plan:

- Net electricity generation continuously measured by calibrated meters
- Landfill gas flow (total, for power generation and for flaring)
- Flare efficiency
- Methane fraction, pressure, temperature for the standardization of the flow measurement

The data to be collected in order to monitor project emissions have to be recorded each hour by the shift engineer on a daily record sheet. At the beginning of each month, the daily record sheet has to be combined into a monthly report and submitted to Mr. Pu, who is rechecking the data. The generation operation data is recorded continuously and automatically and the records have to be kept on CD monthly (CDM Manual).

The automatic data record created by the generation system is the back-up for the cross-check and all the data are copied to CD. The staff is trained to know the quality assurance procedures

The electricity export to the grid has to be recorded by the local power company. The chances of misstatement are hereby low.

The following external parameters need to be obtained in the beginning of every crediting period:

- Regulatory Requirements related to landfill gas projects.

A year book is being published by some standard institutes in China where the new requirements and changes within the previous years can be found.

3.3.2 Findings

None.

3.3.3 Conclusion

The project complies with the requirements.

3.4 Environmental and Social Indicators

3.4.1 Discussion

No environmental and social indicators are defined in the monitoring plan. Hence the question is not applicable.

3.4.2 Findings

None.



3.4.3 Conclusion

The project complies with the requirements.

3.5 Management and Operational System

3.5.1 Discussion

The procedures are clearly defined and documented in the CDM project management and operational manual. The overall responsible person of the project is Mr. Pu (General Manager). Mr. Pu supervises further shift engineers. The allocation of responsibilities is documented in a written form, the necessary procedures have been defined in the internal documents and routines for the archiving of data are defined and documented.

The data trail from the meter to the monitoring report is clearly described in the CDM manual. The monitoring report has been send by email to the verifier; hence the source can be retraced.

No CDM specific internal audits are required because the monitoring and measurement of power exports are done diligently every month as core business and hence a permanent control of the figures in main and auxiliary supply meter readings takes place.

3.5.2 Findings

Forward Action Request No. 2:

Future monitoring reports should include a legally binding signature.

3.5.3 Conclusion

The project complies with the requirements.

Periodic Verification Findings

3.6 Completeness of Monitoring

The reporting procedures reflect the monitoring plan content. There were no requirements missing.

3.7 Accuracy of Emission Reduction Calculations

The critical parameters for the determination of GHG emissions are the produced amount of electricity and the landfill gas flow. All key parameters are measured twice.

The calibration and maintenance procedures are in appliance as described in the initial verification report. The calibration of the portable gas analyzer was been demonstrated during the audit.

The data of the monitoring report have been traced back exemplarily for one day from the original records to the excel sheet attached to the monitoring plan. The invoices of the grid company



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have been compared with the reported electricity supply. There was a deviation between the reported net electricity and the invoices of the power supplier of 260 MWh.

3.7.1 Findings

Corrective Action Request 1:

The deviation of the reported electricity supply and the invoiced electricity supply of 260 MWh has to be corrected.

3.7.2 Conclusion

The deviation was corrected on site by the project developer in the excel sheet and the revised monitoring report sent via email to the verifier. Now the project complies with the requirements.

3.8 Quality of Evidence to Determine Emission Reductions

The calculations reflect the methodology as mentioned in the initial verification and are applied according to monitoring plan.

The procedures are mainly applied according to the CDM manual. The procedures are described in the initial verification report: The data are manually recorded every hour and transferred into an excel sheet. Additional the data of the control system are recorded electronically according to the above mentioned CDM manual.

3.9 Management System and Quality Assurance

See Initial verification. The above mentioned procedures are working.

The audit team did verify the following parameters:

- Invoices of the power supplier
- sample record for the gas flow, pressure, temperature and methane fraction, net electricity production

All data were in compliance with the figures stated in the monitoring report.

The data measured on site are recorded manually and electronically. The electronic data are archived on CD. It has been verified that the CD were available. The net electricity supply to the grid is measured internally as well as externally by the grid company.

The IT system is based on standard PC and MS-office solutions. Hence the verification team feels confident about its use.



4 PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Emission Reductions	
Completeness	Source coverage/ boundary definition	ü	ü	ü	All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.
Accuracy	Physical Measurement and Analysis	ü	ü	ü	The indicated CAR1 has been resolved.
	Data calculations	ü	ü	ü	After resolving CAR1, it can be stated that emission reductions are calculated correctly.
	Data management & reporting	ü	ü	ü	A data management system is in place.
Consistency	Changes in the project	-	-	-	There are no changes in the project to date.



5 VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed a verification of the CDM project: "Nanjing Tianjingwa Landfill Gas to Electricity in China". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

The management of EcoSecurities is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions of the project "Nanjing Tianjingwa Landfill Gas to Electricity in China" on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version dated October 2005. The development and maintenance of records and reporting procedures is in accordance with that plan. The calculation and determination of GHG emission reductions from the project is in the responsibility of the management of the project.

The verifier confirms that the project is implemented as planned and described in validated and registered project design documents. Installed equipment being essential for generating emission reduction runs reliably. The monitoring system is in place and the project is ready to generate GHG emission reductions.

The verifier can confirm that the GHG emission reduction is calculated without material misstatements. Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated we confirm the following statement:

Reporting period: From 11-06-2005 to 29-05-2006

Verified emission in the above reporting period:

Baseline emissions: 26 921 t CO₂ equivalents

Project emissions: t CO₂ equivalents

Emission reductions: 26 921 t CO₂ equivalents

Munich, 2006-06-14

A handwritten signature in black ink, appearing to read 'M. Rumberg'.

Michael Rumberg

**Deputy Head of certification
body "climate and energy"**

Munich, 2006-06-14


A handwritten signature in black ink, appearing to read 'W. Betzenbichler'.

Werner Betzenbichler


Project Manager




Annex 1: Verification Protocol

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OBJECTIVE	Ref.	COMMENTS	Conclusion.(incl FARs/CARs)
		Mrs. Ziyuan Wang Ecosecurities Branch Office China Consultant	
1.2. Clarification of access to data archives, records, plans, drawings etc.	4-11	The verification team got open access to all required plans, data, records, drawings and to all relevant facilities.	þ
1.3. Contractors for equipment and installation works	1,2,3,4,5,	The Project has been implemented as defined in the PDD. The power generation system is delivered by Caterpillar as announced in the PDD.	þ
1.4. Actual status of installation works	1,2,3,4,5	The gas engine is a caterpillar 3516 LE with 800-850 kW. The system is running stable as could be confirmed during the on-site visit. 3 914 000 kWh were submitted to the grid during the monitored period according to the invoices of the local grid company. The landfill gas collected is less than expected in the PDD. Hence, the emission reductions of the first monitored period are less than expected.	þ
2. Open issues indicated in validation report			
2.1. Missing steps to final approval	1,2,3,4,4	Based on the validation report the verification team identified no missing steps. The project has been registered at the UNFCCC under the ref-	þ

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OBJECTIVE	Ref.	COMMENTS	Conclusion.(incl FARs/CARs)
		reference number 0071 on 18 December 2005.	
3. Implementation of the project			
3.1. Physical components	1,2,3,4	The physical components comprise the power generation system, the measurement equipment including the control system and the landfill gas collection system.	þ
3.2. Project boundaries	1,2,3,4	The project boundaries are according to the PDD.	þ
3.3. Monitoring and metering systems	1,2,3,4, 5,6,7,8, 11	<p>The data to be collected in order to monitor project emissions comprise the landfill gas flow (Nm³) and the electricity delivered to the grid. The gas flow metering is based on the measurement of the methane fraction, temperature, pressure and flow as stated in the monitoring plan. The resulting standardized gas flow is calculated by the control system.</p> <p>The monitoring system is implemented according to the validated monitoring plan besides the methane flared and the flare efficiency. These measurements were not required during the first monitored period because there was no surplus methane that has to be flared due to low landfill gas production. Hence, the flare has not been used. This has been verified on-site by checking the gas production. The gas production was much lower than expected in the PDD. No emission reductions due to flaring methane are claimed.</p> <p><u>Forward Action Request 1:</u></p>	þ FAR1

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OBJECTIVE	Ref.	COMMENTS	Conclusion.(incl FARs/CARs)
		It is highly recommended to install the metering equipment for measuring the flared gas flow and the flare efficiency according to the monitoring plan. If the landfill gas flow will increase flaring may be necessary. Otherwise, no emission reductions can be claimed by destruction of methane through flaring, but only by electricity production.	


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3.4. Data uncertainty	1,2,3,4, 5,6,7,8,11	<p>It has been verified on-site that the data are complete since the beginning of the monitoring period until the data of verification. During the time the power system stops there are no data measured and recorded. It has been verified that in this cases no extrapolation has been applied. If one of the meters of the control system will fail, the whole power generation will be shut down to make sure the gas engine can not be damaged due to minor gas quality.</p> <p>All relevant meters (flow, electricity, methane fraction) are double; hence in any case a back-up system is available. The back-up is used for cross-checking the measuring results of the main system.</p>	Ⓟ
3.5. Calibration and quality assurance	1,2,3,4, 5,6,7,8, 11	<p>The electricity meter is calibrated by the power supply company. The calibration label has been seen.</p> <p>The flow meter is calibrated by the manufacturer. There is no recalibration procedure due to the measurement method but the flow meter and the methane fraction meter are regularly cross-checked by the back-up system. If there are deviations the main measurement equipment has to be exchanged. The methane fraction is cross-checked by a portable analyzer. This portable analyzer is calibrated with standard gas. The certificate of the standard gas has been seen on-site.</p>	Ⓟ
3.6. Data acquisition and data processing systems	1,2,3,4, 5,6,7,8, 11	<p>The data to be collected in order to monitor project emissions have to be recorded each hour by shift engineer on "daily re-</p>	Ⓟ


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		cord sheet". At the beginning of each month, the daily record sheet has to be combined into the monthly report and submitted to Mr. Pu.	
3.7. Reporting procedures	1,2,3,4,5,6,7,8,11	The generation operation data has to be continuous recorded automatically and the records are archived on CD monthly.	Ⓟ
3.8. Documented instructions	1,2,3,4,5,6,7,8,11	The company has clearly defined procedures for monitoring and measurement of process parameters as mentioned above. These procedures are documented in the CDM project management and operation manual.	Ⓟ
3.9. Qualification and training	1,2,3,4,9	The staff has been trained in using the control system. The training records have been verified and the training plan is available on CD.	Ⓟ
3.10. Responsibilities	1,2,3,4,11	The overall authority of the project is Mr Shigui Pu (general manager), who supervises a staff of 14 engineers and workers.	Ⓟ
3.11. Troubleshooting procedures	1,2,3,4,11	Because of the high relevance of gas quality to the gas engine the control system stops the power generation in case of meter failure.	Ⓟ
4. Internal Data			
4.1. Type and sources of internal data	1,2,3,4,5,6,7,8,	The following internal parameters need to be obtained according to the monitoring plan:	Ⓟ


	11	<ul style="list-style-type: none"> • Net electricity generation continuously measured by calibrated meters • Landfill gas flow (total, for power generation and for flaring) • Flare efficiency • Methane fraction, pressure, temperature for the standardization of the flow measurement 	
4.2. Data collection	1,2,3,4, 5,6,7,8, 11	The data to be collected in order to monitor project emissions have to be recorded each hour by shift engineer on "daily record sheet" according to the CDM Manual. At the beginning of each month, the daily record sheet has to be combined into monthly report and submitted to Mr. Pu. The generation operation data is continuously recorded automatically and the records have to be kept on CD monthly.	Ⓟ
4.3. Quality assurance	1,2,3,4, 5,6,7,8, 11	According to the CDM Manual the hourly operation data have to be comprised into a monthly report and Mr. Pu has to re-check this data each month. The automatic data record created by generation system is the back-up for the cross-check. And all the data are copied to CD. The staff is trained to know the quality assurance procedures	Ⓟ
4.4. Significance and reporting risks	1,2,3,4, 5,6,7,8, 11	All the data to be collected according to the monitor plan have to be recorded on hourly basis (CDM Manual). And the electricity export to the grid has to be recorded by local power company. The chances of misstatement are hereby low.	

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5. External Data			
5.1. Type and sources of external data	1,2,3,4,	Regulatory Requirements related to landfill gas projects.	Ⓟ
5.2. Access to external data		A year book is being published by standard institutes in the bigger cities of China for the new requirements and changes within previous years. With this yearbooks the legal requirements can be checked according to the monitoring plan.	Ⓟ
5.3. Quality assurance		Not applicable	Ⓟ
5.4. Data uncertainty		Not applicable	Ⓟ
5.5. Emergency procedures		Not applicable	Ⓟ
6. Environmental and Social Indicators			
6.1. Implementation of measures	1,2,3,4,	No environmental and social indicators are defined in the monitoring plan. Hence the question is not applicable.	Ⓟ
6.2. Monitoring equipment		See chapter 6.1.	Ⓟ

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6.3. Quality assurance procedures		See chapter 6.1.	þ
6.4. External data		See chapter 6.1.	þ
7. Management and Operational System			
7.1. Documentation	1,2,3,4,11	The procedures are clearly defined and documented in the CDM project management and operational manual.	þ
7.2. Qualification and training	1,2,3,4,9	The overall responsible person of the project is Mr. Pu (General Manager). Mr. Pu supervises further shift engineers.	þ
7.3. Allocation of responsibilities	1,2,3,4,11	The allocation of responsibilities is documented in a written form.	þ
7.4. Emergency procedures	1,2,3,4,11	The necessary procedures have been defined in the internal documents.	þ
7.5. Data archiving	1,2,3,4,11	Routines for the archiving of data are defined and documented.	þ
7.6. Monitoring report	1,2,3,4,	The data trail from the meter to the monitoring report is clearly described in the CDM manual. The monitoring report has been send by email to the verifier; hence the source can be retraced.	þ

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		<u>Forward Action Request No. 2:</u> Future monitoring reports should include a legally binding signature.	
7.7. Internal audits and management review	1,2,3,4,	No CDM specific internal audits are required because the monitoring and measurement of power exports are done diligently every month as core business and hence a permanent control of the figures in main and auxiliary supply meter readings takes place.	þ

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2 PERIODIC VERIFICATION CHECKLIST

Table 1: Data Management System/Controls


Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
8. Defined organizational structure, responsibilities and competencies		
8.1. Position and roles	Full	The overall authority of the project is supervised by Mr. Pu Shigui (General manager). Mr. Pu is an experienced project manager and executive in operation and maintenance of the plant and academically qualified to carry out the task. Meanwhile, all the staff is trained for daily operation and maintenance by EGS.
8.2. Responsibilities	Full	The responsibilities are clearly defined as detailed in section 8.1 above.
8.3. Competencies needed	Full	All competencies needed are met by the operating staff.
9. Conformance with monitoring plan		

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
9.1. Reporting procedures	Full	The reporting procedures are working as described in the initial verification protocol. The required documents were shown to the audit team and Mr. Pu was totally aware of the reporting procedures.
9.2. Necessary Changes	Full	No changes to the monitoring plan are required.
10. Application of GHG determination methods		
10.1. Methods used	Full	The calculations reflect the methodology as mentioned in the initial verification and are applied according to monitoring plan.
10.2. Information/process flow	Full	The procedures are mainly applied according to the CDM manual. The procedures are described during the initial verification protocol.
10.3. Data transfer	Full	The data are manually recorded every hour and transferred into an excel sheet. Additional the data of the control system are recorded electronically according to the above mentioned CDM manual.

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
10.4. Data trails	Full	<p>The data of the monitoring report have been traced back exemplarily for one day from the original records to the excel sheet attached to the monitoring plan. The invoices of the grid company have been compared with the reported electricity supply. There was a deviation between the reported net electricity and the invoices of the power supplier of 260 MWh.</p> <p><u>Corrective Action Request 1:</u></p> <p>The deviation of the reported electricity supply and the invoiced electricity supply of 260 MWh has to be corrected.</p>
11. Identification and maintenance of key process parameters		
11.1. Identification of key parameters	Full	The critical parameters for the determination of GHG emissions are the produced amount of electricity and the landfill gas flow. All key parameters are measured twice.
11.2. Calibration/maintenance	Full	The calibration and maintenance procedures are in appliance as described in the initial verification protocol. The calibration of the portable gas analyzer was been demonstrated during the audit.
12. GHG Calculations		
12.1. Use of estimates and default data	Full	The carbon emission factor is used as a predetermined default value which has been defined in the PDD and confirmed during validation of the project.

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
12.2. Guidance on checks and reviews	Full	See Initial verification. The above mentioned procedures are mainly applied.
12.3. Internal validation and verification	Full	<p>See Initial verification. The above mentioned procedures are working.</p> <p>The audit team did verify the following parameters:</p> <ul style="list-style-type: none"> • Invoices of the power supplier • sample record for the gas flow, pressure, temperature and methane fraction, net electricity production <p>All data were in compliance with the figures stated in the monitoring report.</p>
12.4. Data protection measures	Full	The data measured on site are recorded manually and electronically. The electronic data are archived on CD. It has been verified that the CD were available. The net electricity supply to the grid is measured internally as well as externally by the grid company.
12.5. IT systems	Full	The IT system is based on standard PC and MS-office solutions. Hence the verification team feels confident about its use.

Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Potential reporting risks based on an assessment of the emission estimation procedures can be expected to occur in the following fields of action:</p> <ol style="list-style-type: none"> 1. raw data collection 2. calculation methods 3. data transfer <p>Key source data applicable to the project assessed are hereby:</p> <ul style="list-style-type: none"> • Metering records (for electricity production, and landfill gas flow) • Invoices from the grid company <p>Appropriate calibration and maintenance of equipment resulting in a high accuracy of data supplied should be in place.</p> <p>It is hereby needed to focus on those risks that impact the accuracy, completeness and consistency of the reported data. Risks are weakness in the GHG calculation systems and may include:</p> <ul style="list-style-type: none"> Ø manual transfer of data/manual calculations, Ø position of metering equipment 	<p>Regarding the potential reporting risks identified in the left column the following mitigation measures have been observed during the document review and the on site mission:</p> <p>Raw data collection:</p> <p>All data are metered twice and cross checked regularly. The meters are purchased from well-known international companies.</p> <p>Key source data for this parameter are:</p> <ul style="list-style-type: none"> • Main & backup meter readings • Invoices for electricity supply <p>The allocation of responsibilities is documented in a written form.</p> <p>The necessary procedures have been defined in the internal documents.</p> <p>Calculation methods:</p> <p>The reporting procedures reflect the monitoring plan content and the calculation of the emission reduction is applied correctly.</p> <p>Data transfer:</p>	<p>The issue remaining is missing metering of landfill gas flow for flaring and flare efficiency due to the underperformance of landfill.</p> <p>In case of increasing landfill gas production flaring may occur in the future. Momentarily no emission reduction can be claimed by destruction of methane through flaring.</p>

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Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<ul style="list-style-type: none"> Ø unclear origins of data, Ø accuracy due to technological limitations, 	<p>It has been verified that the datatransfer is applied according to the described procedures.</p>	

Table 3: Detailed audit testing of residual risk areas and random testing

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
<p>The issue remaining is missing metering of landfill gas flow for flaring and flare efficiency due to the underperformance of landfill.</p> <p>In case of increasing landfill gas production flaring may occur in the future. Momentarily no emission reduction can be claimed by destruction of methane through flaring.</p>	<p>There has been a complete check of data transferred from readings and invoices for fuels to the calculation tool. There was a small deviation in the electricity production that could be corrected directly.</p> <p>It can be confirmed that due to low performance of the landfill no flaring took place. The electricity has been sold over the complete monitored period and it would be unreasonable to flare the gas instead of selling it if there is no over production.</p>	<p>Having investigated the residual risks, the audit team comes to the following conclusion:</p> <p><u>Corrective Action Request 1:</u></p> <p>The deviation of the reported electricity supply and the invoiced electricity supply of 260 MWh has to be corrected.</p> <p><u>Forward Action Request No. 1:</u></p> <p>It is highly recommended to install the metering equipment for measuring the flared gas flow and the flare efficiency according to the monitoring plan. If the landfill gas flow will increase flaring may be necessary otherwise no emission reductions can be claimed by destruction of methane through flaring but only by electricity production.</p> <p><u>Forward Action Request No. 2:</u></p> <p>Future monitoring reports should include a legally binding signature.</p>



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Table 4: Compilation of open issues


Draft report corrective and forward action requests by audit team	Summary of project owner response	Audit team conclusion
<u>Corrective Action Request 1:</u> The deviation of the reported electricity supply and the invoiced electricity supply of 260 MWh has to be corrected.	The deviation was corrected on site by the project developer in the excel sheet and the revised monitoring report sent via email to the verifier.	þ
<u>Forward Action Request No. 1:</u> It is highly recommended to install the metering equipment for measuring the flared gas flow and the flare efficiency according to the monitoring plan. If the landfill gas flow will increase flaring may be necessary otherwise no emission reductions can be claimed by destruction of methane through flaring but only by electricity production.	No action required yet.	þ
<u>Forward Action Request No. 2:</u> Future monitoring reports should include a legally binding signature.	No action required yet.	þ



Annex 2: Information Reference List

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Reference No.	Document or Type of Information
1	Final Project Design Document for CDM project “Nanjing Tianjingwa Landfill Gas to Electricity Project in China”, submitted in Oct., 2005
2	Validation Report No. 2005-1240, rev. 01 issued by DNV Certification, International Climate Change Service, dated Aug. 7 th , 2005
3	<p>On-site interviews and inspection at the offices and the project site conducted on 07.06.2006 by auditing team of TÜV SÜD.</p> <p>Verification team:</p> <p>Sven Kolmetz TÜV Industries Service GmbH Cuiyun Zhang Jiangsu TUV Product Service</p> <p>Interviewed persons:</p> <p>Mr.Henk Harmsen Eco Securities Ms. Wang Ziyuan Eco Securities Mr. Pu Shigui Green Waste Recovery Engineering Co., Ltd. General Manager</p>
4	Draft Monitoring Report “Nanjing Tianjingwa Landfill Gas to Electricity Project in China – Document ID: CDM0071-M1” for the period June 11 th , 2005 until May 29 th , 2006, submitted June 7 th , 2006.
5	Monthly Receipts of electricity to grid for the period June 2005 to May 2006, Nanjing Power Company, submitted on June 7 th , 2006
6	Sample of daily operation report for each hour data, dated Mar. 1 st , 2006, Green Waste Recovery Engineering Co., Ltd. , submitted on June 7 th , 2006
7	Monthly Summary of data operation report for the period June, 2005 to May, 2006, Green Waste Recovery Engineering Co., Ltd. , submitted on June 7 th , 2006
8	Sample of record of continuous generator operation data, dated Mar. 1 st , 2006, Green Waste Recovery Engineering Co., Ltd. , submitted on June 7 th , 2006

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Reference No.	Document or Type of Information
9	EGS training material of operation date on Sept. 16 th , 2005, EGS Electrical Group, submitted on June 7 th , 2006
10	Revised Monitoring Report “Nanjing Tianjingwa Landfill Gas to Electricity Project in China” – Document ID: CDM0071-M1” for the period June 11 th , 2005 until May 29 th , 2006, submitted June 8 th , 2006.
11	CDM project management and operational manual, June 2005 submitted June 2 nd 2006