中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

VERIFICATION REPORT

(FINAL)

China Quality Certification Centre
(CQC)

"Luohe MSW Landfill Site LFG Recovery to Power Project"

Report No: CDM-VER-2013-0020
Date: 2013-10-30

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

Report No.	Date of first issue	Revision No.	Date of this revision
CDM-VER-2013-0020	2013-08-12	02	2013-10-30

Subject: 1st Periodic Verification	
China Quality Certification Center (CQC) Section 9, No.188, Nansihuan(the South Fourth Ring Road) Xilu (West Road), Beijing 100070, China	**Client:** Shanghai BCCY New Power Industry Co.,Ltd
Project site(s): The plant site of the proposed project activity is located in the northeast area inside of Luohe City MSW landfill site, one kilometre south of Chengang village, Luohe City. The coordinate of engine house of the power plant is longitude 113°59'59" E and latitude 33°30'20" N.	
Project Title: Luohe MSW Landfill Site LFG Recovery to Power Project **Registration Number:** 5238	
Monitoring period: 07/10/2011 ~ 31/03/2013 (both days included)	
Applied Methodology/version: AMS-III.G. (version 06) & AMS-I.D.(Version 16)	
First Monitoring Report (MR) version: Date of issuance: 17/06/2013 Version No: 01	**Final Monitoring Report (MR) version:** Date of issuance: 29/10/2013 Version No: 02
Verified Emission Reductions: 52,307 tCO_2e(08/02/2012-31/12/2012: 43,253tCO_2e, 01/01/2013-31/03/2013:9,054 tCO_2e).	
Work carried by: Mr. Dong Chunsong Ms. Nie Xi	**Work reviewed by:** Mr. WANG Zhenyang Ms. WANG Keli

Summary of the verification opinion:

The client - Shanghai BCCY New Power Industry Co.,Ltd, has commissioned China Quality Certification Centre (CQC) to verify the emission reductions of the project "Luohe MSW Landfill Site LFG Recovery to Power Project" (UNFCCC Reference Number 5238) in China against the relevant requirements for CDM project activities. The project activity generates electricity utilizing landfill gas at the project site then supplied to the grid. This verification covers the period from 07/10/2011 to 31/03/2013 (both days included).

The verification scope is defined as a periodic independent review and ex post determination by the Designated Operational Entity of the monitored reductions in GHG emissions during the defined monitoring period. CQC verification team conducted document review and a site visit to verify the data and activities submitted in the Monitoring report as per the requirements of VVS

(version 04.0).

During verification, 2 Corrective Action Requests (CARs) and 4 Clarification Requests (CLs) were raised by CQC verification team and successfully closed, attached in the Appendix A of this verification report.

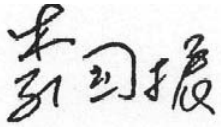
In summary, CQC confirms that:

- The project activity is implemented and operated in accordance with the registered project design document;
- The monitoring plan is in accordance with the monitoring methodology including applicable tool (s) applied by the CDM project activity;
- The monitoring activities have been carried out in accordance with the monitoring plan;
- The measuring instruments have been calibrated in accordance with the calibration frequency requirements;
- The GHG emission reduction is calculated without material misstatements and the data are recorded and stored as per the monitoring methodology.

Our opinions are related to the project's GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information reviewed and evaluated, CQC confirms the following statement:

- Reporting Period: 07/10/2011 - 31/03/2013;
- Emission Reductions: **52,307** tCO_2e (08/02/2012-31/12/2012: 43,253tCO_2e, 01/01/2013-31/03/2013: 9,054 tCO_2e)

Approved by: Li Guozhen(Vice president)



Abbreviations

AF	Adjusted Factor
CAR	Corrective Action Request
CCPG	Central China Power Grid
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CQC	China Quality Certification Centre
DOE	Designated Operational Entity
DR	Document Review
EB	Executive Board
FAR	Forward Action Request
GHG	Greenhouse Gas
I	Interview
LFG	Landfill Gas
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
PP	Project Participant
UNFCCC	United nations framework convention on climate change
VVS	Clean Development Mechanism Validation and Verification Standard

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1 INTRODUCTION

The client - Shanghai BCCY New Power Industry Co.,Ltd - has commissioned China Quality Certification Centre (CQC) to verify the emission reductions of the project "***Luohe MSW Landfill Site LFG Recovery to Power Project***" in Luohe City, Henan Province, P. R. China. This report summarizes the verification objective, scope, methodology and verification finding for the project, with regard to the applicable CDM requirements and VVS/1/. CQC verification team has reviewed the GHG data collected by the PP for the 1st monitoring period covering the time period from 07/10/2011 to 31/03/2013(both days included).

1.1 Verification Objective

The objective of the periodic verification is:

- to ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features of the project are in place;
- to ensure that the monitoring report and supporting documents are completed and verifiable and in accordance with applicable CDM requirements;
- to ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures in the monitoring plan and the approved methodology;
- to evaluate the data recorded and stored as per the monitoring methodology.

1.2 Verification Scope

The verification scope is given as an independent and objective review of the project's design document, monitoring plan, monitoring report and other relevant documents.

This verification is not intended to provide any consulting services to the project participants. However, stated requests for clarifications and/or corrective actions may provided input for improvement of the project monitoring towards reductions in the GHG emissions.

1.3 Verification Criteria

CQC has performed this verification according to AMS-III.G. (version 06) , Landfill methane recovery/3/, AMS-I.D. (Version 16) Grid connected renewable electricity generation/2/, Tool to determine project emission from flaring gases containing methane/4/, the registered PDD/5/ and related validation report/7/, , PS (version 04.0)/26/, PCP (version 04.0)/27/ and VVS (Version 04.0)/1/. In addition,

CQC verification team conducted this verification based on CQC's CDM quality manual and procedures.

1.4 History of the verification process

The Monitoring Report (Version 01)[/6/] was submitted to CQC on 24/06/2013. After completeness check, CQC publicized the Monitoring Report (Version 01) on UNFCCC web site (http://cdm.unfccc.int/UserManagement/FileStorage/1NTDQZ0XH2LP3BWVU6OMY9F8SACIER) on 24/06/2013. Based on the submitted documents and registered PDD, document review and a fact finding mission in form of an on-site visit was performed in Jul. 10th 2013.

Afterwards, CQC developed draft verification report and issued it to PP for confirmation, taking corrective actions and clarifications.

After reviewing the revised and resubmitted Monitoring Report[/25/], resolutions of the *CARs* and *CLs* raised, CQC issues this final verification report and a certification report. The main changes between the MR (Version01) and the MR (Version02) are:

- MR is revised according to the resolution of the CARs and CLs raised during the verification process;
- Typing errors and grammar mistakes are corrected.

2 VERIFICATION METHODOLOGY

2.1 Verification Team Appointment

Based on the requirements of competency, experience and qualified sectoral scopes, CQC has composed a verification team in accordance with CQC's internal procedures.

Table 1 Verification Team

Qualification	Last name	First name	Country
Verification team leader	Dong	Chunsong	China
CDM verifier	Nie	Xi	China
Technical reviewer	WANG	Zhenyang	China
Technical reviewer	WANG	Keli	China

2.2 Desk Review

PP submitted Monitoring Report (Version 01) on 24/06/2013.

Furthermore, the verification team has used technical information from sources other than Monitoring Report such as registered PDD, Approved methodology AMS-III.G. (version 06) , AMS-I.D. (Version 16), host party legislations. The list

of reviewed documents is included in the Appendix C of this final verification report.

In order to ensure the transparency of the decision making process, the reference codes listed in Appendix C of this verification report are used in the CDM Verification Protocol and - as far applicable - in the report itself.

2.3 On-site assessment

On 10/07/2013, CQC verification team (Mr. DONG Chunsong & Ms. NIE Xi) conducted an on-site visit for the project to confirm selected information and to resolve issues identified by the verification team in the document review. During the on-site visit, representatives of the PP (Shanghai BCCY New Power Industry Co.,Ltd[/28/]) and project operators (Luohe BCCY New Power Industry Co.,Ltd[/28/], the local branch of the PP) were interviewed. The key interviewees and main topics of the interviews are summarized in Table 2.

Table 2: Interviewees and Interview Topics

Date	Interviewees	Organization	Interview Topics
10/07/2013	**Ms. Fang Yongmei** **Ms. Cao Rui** (CDM Manager)	Shanghai BCCY New Power Industry Co.,Ltd	**Project Implementation** ● General aspects of the project; ● Technical equipment and the operation of the project; ● Performance of the project; **Implementation of Monitoring Plan** ● Monitoring and measurement equipments; ● Training and practice of the operational personnel; ● Data Management, data quality, archiving and reporting procedures; ● Calibration of all metering equipments; ● Operation records. ● Cross-check with the monthly records ● Monitored data and monitoring report. **Calculation of GHG reductions**
	Mr. Liang Nan (Chief Operating CDM Manager) **Mr. Li Zhipeng** **Mr. Li Dingfeng** (CDM engineer)	Luohe BCCY New Power Industry Co.,Ltd	

2.4 Use of the Verification Protocol

In order to ensure transparency a verification protocol was customized for the project based on VVS. The protocol shows in transparent manner criteria (requirements), means of verification and findings. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements emission reduction is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been validated and the result of the verification.

The verification protocol consists of two tables. The different columns in these tables are described in the figure below. The verification protocol to be completed by PP for the project is enclosed in Appendix A to this report.

Negative findings established during the verification can either be seen as a non-fulfillment of CDM criteria or where a risk to the fulfillment of the implementation of emission reduction is identified.

Corrective action requests (CARs) are issued, where:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions; or
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

Clarifications (CLs) are issued if the information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Forward action requests (FARs) are issued if the monitoring and reporting require attention and/or adjustment for the next verification period.

Verification Protocol Table 1:

verification checklist for Clean Development Mechanism (CDM) Project Activities

Verification checklists	***Reference***	***Means of verification (MoV)***	***Verification findings***	***Draft and/or Final Conclusion***
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organized in different sections, following VVS (Version 04.0)	*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*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to*	*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*

		interview (I). N/A means not applicable.	*explain the conclusions reached.*	*used when the verification team has identified a need for further clarification.*

Verification Protocol Table 2: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 1***	***Summary of project participant response***	***Verification conclusion***
If the conclusions from the draft Verification are either a CAR or a CL, these should be listed in this section.	*Reference to the checklist question number in Table 1 where the CAR or CL is explained.*	*The responses given by the project participants during the communications with the verification team should be summarised in this section.*	*This section should summarise the verification team's responses and final conclusions. The conclusions should also be included in Table 1, under "Final Conclusion".*

2.5 Final Verification Report

The draft verification report containing 2 CARs and 4 CLs were submitted to the PP to be confirmed and to take corrective action for addressing the CARs and CLs issued by CQC verification team. After reviewing the final MR[/25/] and response of the CARs and CLs raised, CQC issues this final verification report and certification report.

2.6 Internal Quality Control

This final verification report including the initial verification findings undergoes an internal technical review before being submitted to PP and requesting issuance of CERs according to CQC internal procedure CDMP09. The technical review was performed by two technical reviewers qualified in accordance with CQC's internal procedure CDMP01.

3 VERIFICATION FINDINGS

As mentioned above all findings are summarized in Table 1 of the attached verification protocol.

3.1 Remaining CARs, CLs, and FARs during validation

All CARs and CLs raised during the validation stage were successfully closed out and no FAR was issued during the previous validation[/7/].

3.2 Compliance of the project implementation with the registered PDD

This project was registered on 07/10/2011 and the project reference number is 5238[/8/]. The project chose fixed crediting period which has been changed from

01/12/2011 -30/11/2021 to 07/10/2011- 06/10/2021 based on the registration date and this change has been approved by EB. This is the 1st monitoring period, which covers a time period from 07/10/2011 to 31/03/2013 (both days included).

The construction of the project started on 03/08/2009/9/ and 1# and 2# gas engine was put into use and connected to CCPG on 31/05/2010/10/. 3# gas engine was put into use and connected to CCPG on 02/11/2012/10/.

During the onsite visit, it was found that a gas collection system, a gas pre-treatment system and 3 gas generator units as described in the registered PDD/5/ and their appendix had been installed on-site. As the quantity of landfill gas was not enough for 4 generator units during the onsite visit, the 4th generator unit was not installed and planned to be installed based on the quantity of landfill gas during this crediting period. The specification of the 3 gas engines are listed in the following table which is fully consistent with the registered PDD and confirmed by CQC team during the onsite visit.

Table 2: Specification of the 3 gas engines/11/

Model	500GF-N1(500GF-NK)
Rated power	500kW/625kVA
Rated voltage	400V
Frequency	50Hz
Rated speed	1000r/min
Size	5120X2040X2249mm
Manufacture	Jinan Diesel Engine Co,.Ltd.

The PP signed a *Grid connected agreement*/22/ in Dec. 2009 and a *Power Purchasing Agreements*/22/ with the local grid company in May 2010 respectively. The valid periods of these documents are 5 years and can cover this monitoring period. The generated electricity power is supplied to Central China Power Grid (CCPG). This has been confirmed by CQC verification team during the on-site visit.

The measurement equipments are installed on-site, which is shown in the final MR. All these equipments are calibrated by accredited third-party entity in accordance with Chinese national standards within this monitoring period. The detailed descriptions of the monitoring equipments' verification are described in Appendix D of this final verification report. This has been confirmed by CQC verification team during the on-site visit.

Duirng this verification, it was found that the working periods of the all the measurement equipments are not clearly stated in the MR version 01. With

respect to this issue ***CL01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

According to Para. 228 of VVS ver. 04.0, CQC verification team confirms that：

- The implementation and equipments installation of the project activity are consistent with the registered PDD;
- The actual operation of the proposed CDM project activity is as per the registered PDD by the PP;
- Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered PDD.

3.3 Compliance of the monitoring plan with the monitoring methodology including applicable tool(s)

The approved small-scale monitoring methodology AMS-III.G. (version 06) is applied to the project and the approved small-scale methodology AMS-I.D. (Version 16) is used for the energy displacement component.

As per the Registered PDD and the monitoring plan, in which contain:

- Meters and data;
- Monitoring management;
- Training

Quality Control and Quality Assurance procedures PP has implemented the monitoring according to the above monitoring planl during this monitoring period.

As per the requirements of Paragraph 232 of VVS version 04.0, CQC verification team confirms that the monitoring plan which was described in the Monitoring report is in accordance with the approved monitoring methodology applied by the project.

3.4 Compliance of Monitoring Activities with the Registered Monitoring Plan

3.4.1 Monitoring of all parameters stated in monitoring plan

3.4.1.1. $LFG_{total, y}$: Total landfill gas captured at Normal Temperature and Pressure in the year y (m^3)

As per the registered PDD[/5/], this parameter is measured by a flow meter continuously and aggregated monthly and yearly. Flow meter to continuously measure the flow of total collected LFG, which can automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters. The verification findings during on-site visit are as follows:

A temperature and pressure compensation vortex flow meter (Manufactured by Beijing Sailsors Instruments Ltd., Model: V10FTH3E5S, SN: ZN10F0302, Accuracy: ±1.0%) [/13/] is well installed on the main pipe and was checked by CQC verification team and the flow meter was in good condition.

The flow meter continuously measures the flow of total collected LFG, which automatically measure temperature and pressure, normalizing to 0℃, 1atm automatically. CQC team checked the algorithm which is used for converting the data under actual working condition into that under normal condition and found it correct. The data were recorded and electronic archived once per hour by computer automatically. The operators check the data everyday and archives them in a detailed CDM spreadsheet/12/.

CQC reviewed the operation log and found this flow meter was calibrated/21/ on 30/09/2011 and 24/09/2012 respectively during this monitoring period. During the onsite visit, it was found that another temporary substitute flow meter was installed to monitor this parameter during the calibration periods, ie. a few days, of the main flow meter. However, the specification and calibration information of the substitute flow meter was not listed in the MR version 01. With respect to this issue ***CAR01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

The detailed information of the meters is listed in Appendix D "*Measurement Equipments List"* of this report.

Operator on duty checks the condition of the flow meter every day and did not find any breakdown during this monitoring period/10/..

CQC team confirms that $\boldsymbol{LFG_{total,\,y}}$ has been monitored as per the monitoring plan in the registered PDD/5/.

3.4.1.2. $\boldsymbol{LFG_{engines,\,y}}$; $\boldsymbol{LFG_{engines\ 2,\,y}}$; $\boldsymbol{LFG_{engines\ 3,\,y}}$: Landfill gas combusted in engines at Normal Temperature and pressure in year y (m^3)

As per the registered PDD, this parameter is measured by a flow meter each engine continuously and aggregated monthly and yearly. Flow meters to continuously measure the flow fed into the engines, which can automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters. The verification findings during on-site visit are as follows:

There were 3 engines well installed onsite which was fully consistent with the registered PDD and 3 temperature and pressure compensation Vortex flow meters, ie,F1, F2 and F3, were well installed on the inlet pipe of each engine. The 3 meters were checked by CQC verification team and the flow meter was in good condition. The 3 meters have the same model PRVZW-100 and the same accuracy ±1.0%/14/, which are manufactured by Shanghai Rotork Auto-instruments Ltd. During the onsite visit, it was found that 2# gas engine shut down for fault due to No.6 cylinder disfunctionon08/10/2012 and was sent back to manufacturer for repair until May 2013/10/. Then the 3# gas engine utilized the communication facilities of 2# gas engine including the flow meter of 2# engine since 3# gas was connected to CCPG on 02/11/2012. That is only meters F1 and F2 were used during this monitoring period 07/10/2011to 31/03/2013.

The 2 flow meters continuously measured the flow fed into the engines, which automatically measure temperature and pressure, normalizing to 0℃, 1atm automatically. CQC team checked the algorithm/14/ which is used for converting the data under actual working condition into that under normal condition and found it correct. The data were recorded and electronic archived once per one hour by computer automatically. The operators check the data everyday and archives them in a detailed CDM spreadsheet/12/.

The hourly values were aggregated daily, weekly, monthly and yearly in the detailed CDM monitoring spreadsheet. For conservative, the minimum of monthly values between total LFG amount and sum of LFG to engines 1# 、2#、3# are used for ER calculation.

CQC reviewed the operation log and found the 2 main flow meters were calibrated/21/ annually during this monitoring period. During this verification, it was found that other 2 flow meters were used as temporary substitute flow meters during the transient calibration periods, ie. a few days, of the 2 main flow meters. However, the specification and calibration information of the substitute flow meters was not listed in the MR version 01. With respect to this issue ***CAR01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

The detailed information of the meters is listed in Appendix D "*Measurement Equipments List"* of this report.

Operator on dutychecks the condition of the flow meter every day and did not find any breakdown during this monitoring period/10/..

CQC team confirms that $LFG_{engines,\ y}$; $LFG_{engines\ 2,\ y}$; $LFG_{engines\ 3,\ y}$ has been monitored as per the monitoring plan in the registered PDD/5/.

3.4.1.3. $\omega_{CH4,\ y}$: Methane Fraction in the Landfill Gas (m^3CH_4/m^3LFG)

As per the Registered PDD, this parameter is measured by a continuous gas quality analyzer and the data will be aggregated monthly and yearly. The verification findings during on-site visit are as follows:

A methane fraction meter (made by Germany ADOS GmBH, Model: GTR196, SN: 55300/7) with ±2%/15/ is installed on the main pipe of LFG. The equipment was checked by CQC team during the site visit and found it was in good condition.

The reading of this meter is recorded and electronic archived once per hour by computer automatically. Operator on dutyOperator on dutyOperator on dutychecks the data and archives them in the detailed CDM monitoring spreadsheet to calculate the mass flow of Methane.

CQC team found that the now installed gas analyzer(Type: GTR196, SN: 55300/7, accuracy: ±2%) replaced the former gas analyzer (Type: 97460, SN: 30101, accuracy: ±1.5%) during the monitoring period. However, the reason of this replacement was not clarified in MR Version 01. With respect to this issue ***CL02*** was raised during this verification and successfully closed out. (Ref.

Appendix A: CDM Verification Protocol - Table 2).

CQC reviewed the operation log and found the methane fraction meter was calibrated[/21/] annually during this monitoring period. During this verification, it was found other 2 flow meters were used as temporary substitute flow meters during the transient calibration periods, ie. a few days, of the 2 main flow meters. While the specification and calibration information of the substitute flow meters was not listed in the MR Version 01. With respect to this issue ***CAR01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

The detailed information of the meters is listed in Appendix D "*Measurement Equipments List"* of this report.

CQC team also checked the variations of methane percentage during this monitoring period and found that the range of methane concentration was between 44.78% and 70.27%. According to the researches[/32/] of landfill sites in China, methane concentration interrelates to waste ingredient, the efficiency of gas collecting system and environmental temperature, and the range of methane concentration is about 40~70%. Therefore, it was reasonable and acceptable that the methane concentration varied due to the operation of the engines and pipe extension, variation of environmental temperature, stable amount of collected LFG while more collecting wells were constructed during this monitoring period.

CQC team confirms that $\omega_{CH4,y}$ has been monitored as per the monitoring plan in the registered PDD[/5/].

3.4.1.4. $EL_{LFG,y}$: Total amount of electricity produced by all the engines of the proposed project in year y (MWh)

As per the Registered PDD, this parameter is to be measured by continuous electricity meter and the data will be aggregated monthly and yearly, Accuracy of installed electricity meter will meet the national standard for meters. Electricity meter will be subject to a regular maintenance, testing regime and calibration, in accordance with the manufacturer's specifications, to ensure measurement accuracy. The verification findings during on-site visit are as follows:
An electricity meter E1[/16/] (made by Holley Metering Limited, Model: DTSD546, SN: 100308008276) is well installed at the low voltage side of the onsite transformer substation.

The meter E1 was calibrated annually[/21/] and the accuracy is 0.5S, which fully meet the requirement of Regulation of Electrical Energy Meters with Electronics (JJG596-1999)[/23/] and Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)[/24/]. The detailed information of the meter is listed in Appendix D "*Measurement Equipments List"* of this report.

The data of $EL_{LFG,y}$ are recorded and archived by DCS per hour automatically and shown in the control system. The hourly records are aggregated into daily and monthly records.

It was found that temporary substitute flow meter (Model: DTSD546, SN: 5154-105002) was used during the transient calibration period of the main meter

E1. However, the specification and calibration information of the substitute meter was not listed in the MR version 01. With respect to this issue ***CAR01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

CQC team confirms that $EL_{LFG,y}$ has been monitored as per the monitoring plan in the registered PDD[/5/].

3.4.1.5. $EL_{onsite,y}$: The amount of electricity consumed by the project activity in year y (MWh)

As per the registered PDD, this parameter is continuously measured by continuous electricity meter and the data will be aggregated monthly and yearly, Accuracy of installed electricity meter will meet the national standard for meters. Electricity meter will be subject to a regular maintenance, testing regime and calibration, in accordance with the manufacturer's specifications, to ensure measurement accuracy. The verification findings during on-site visit are as follows:

An electricity meter E2[/16/] (made by Holley Metering Limited, Model: DTSD546, SN: 100308008277) is well installed at the low voltage side of the onsite transformer substation.

The meter E2 was calibrated annually[/21/] and the accuracy is 0.5S, which fully meet the requirement of and Regulation of Electrical Energy Meters with Electronics (JJG596-1999)[/09/] and Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)[/24/]. The detailed information of the meter is listed in Appendix D "*Measurement Equipments List"* of this report.

The data of $EL_{onsite,y}$ are recorded and archived by DCS per hour automatically and shown in the control system. The hourly records are aggregated into daily and monthly records.

It was found that substitute flow meter (Model: DTSD546, SN: 5154-10500266) was used during the transient calibration periodof the main meter E2. However, the specification and calibration information of the substitute meter was not listed in the MR version 01. With respect to this issue ***CAR01*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

CQC team confirms that $EL_{onsite,y}$ has been monitored as per the monitoring plan in the registered PDD[/5/].

3.4.1.6. $EL_{grid,y}$: Net amount of electricity exported to CCPG by the proposed project in year y (MWh)

As per the registered PDD, this parameter is continuously measured by continuous electricity meter and the data will be aggregated monthly and yearly, Accuracy of installed electricity meter will meet the national standard for meters. Electricity meter will be subject to a regular maintenance, testing regime and calibration, in accordance with the manufacturer's specifications, to ensure measurement accuracy. The verification findings during on-site visit are as follows:

An electricity meter E3/16/ (made by Holley Metering Limited, Model: DSSD536, bidirectional, SN: 10006653840) is well installed and sealed at the central control room of project site by Luohe grid company.

The meter E3 was calibrated annually and the accuracy is 0.5S, which fully meet the requirement of and Regulation of Electrical Energy Meters with Electronics (JJG596-1999)/23/ and Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)/24/. The detailed information of the meters is listed in Appendix D "*Measurement Equipments List"* of this report.

This meter is bidirectional and recording both the electricity exported to the grid and the electricity imported from the grid. The data of electricity exported to and imported from the grid are recorded and archived by DCS per hour automatically and shown in the control system/12/. The hourly records are aggregated into daily and monthly records by PP /17/. The monitoring data are checked by the operators every day and reported to General Manger by CDM manager monthly. The local state grid company records the reading of E3 at 24:00 o'clock on the last day of every month /18/. The monthly records by PP/17/ and monthly records/18/ by the grid company/18/ were cross checked by CQC team and found they were consistent with each other. Since the values of E1 were larger than the ones of E3 due to the transformer loss between the 2 meters, CQC team confirms that it is conservative and acceptable for PP to adopt the values of E3 in ER calculation.

However, it was found that the parameter $EL_{imported,y}$ in the MR version 01 is not included in the MP in the registered PDD. This issued has been included in ***CL03*** of this report and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

CQC team confirms that $EL_{grid,y}$ has been monitored as per the monitoring plan in the registered PDD/5/.

3.4.1.7. Operation hours of the generators: Operation hours of the generators in year y (h)

As per the Registered PDD, Source of data to be used about this parameter is record from project participants and the data are measured and archived electronically and recorded annually. The verification findings during on-site visit are as follows:

The data are recorded and archived by DCS automatically and shown in the control system/10/. The data is recorded once per hour. The monitoring data are checked by the operators every day and reported to General Manger by CDM manager monthly. The aggregated values of this parameter are listed in the MR. CQC has checked related operation records and confirms they are correct.

CQC team confirms that this parameter has been monitored as per the monitoring plan in the registered PDD/5/.

3.4.1.8. $MD_{reg,y}$: Methane emissions that would be captured and destroyed to comply with national or local safety requirement or legal regulation in the year y (tCO_2e)

As per the monitoring plan[5], the source of data to be used is publicly available information of the Chinese regulatory requirements relating to landfill gas as well as any form of investigation, news and/or report of their implementation. The data will be recorded annually. The verification findings during on-site visit are as follows:

The Chinese national standard - *"Standard for pollution control on the landfill site of Municipal Solid Waste (GB16889-2008)*[20] was published in 2008 and is effective from 01/07/2008 onwards. Wherein, solid waste landfill site requirements, infrastructure design and construction requirements of solid waste landfill site, admission requirements of solid waste landfill disposal have been added or amended. This has no impact on parameters monitored during this crediting period. Therefore, $MD_{reg,y}$ remains zero.

3.4.2 Management System and Quality Assurance

PP has developed a detailed monitoring management system and quality assurance, which is documented in CDM Monitoring & Quality Control Manual[19]. CQC verification team confirms this through reviewing the records and interviewing the interviewees during on-site visit.

Therefore, CQC verification team confirms that the monitoring is in accordance with the monitoring plan.

3.5 Compliance with the Calibration Frequency Requirements for Measuring Instruments

The calibration information of the measuring instruments and the corresponding requests are listed in Appendix D "*Measurement Equipments List"* of this report.

During this verification, it was found that the calibration information of the electricity meter E3 in MR version 01 is not consistent with related calibration records. With respect to this issue ***CAR02*** was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

CQC team has carefully checked the information in Appendix D with related nameplates, operation logs, relate calibration reports of these measuring instruments, and confirms they are consistent. All the involved instruments are calibrated as related calibration frequency requirements.

Therefore, as per the VVS (Version 04.0), CQC verification team confirms that the calibration is conducted at the frequency as specified by the registered monitoring plan of the project.

3.6 Assessment of data and calculation of GHG emission reductions

According to AMS-III.G. (version 06), the registered PDD and the Monitoring Report, the emission reduction for this project is determined as follows:

$$ER_y = (MD_{project,\,y} - MD_{reg,\,y}) \times GWP_{CH4} + (EL_y - EL_{onsite,y}) \times CEF_{electricity,\,y} \quad 1)$$

$$MD_{project,\,y} = \min(LFG_{total,y}, LFG_{engines,\,y}) \times \omega_{CH4,y} \times D_{CH4} \quad 2)$$

In the above formula, $LFG_{total,y}$, $LFG_{engines,y}$ and $\omega_{CH4,y}$ have been aggregated and reported. The smaller monthly value between F and the sum of F1+F2+F3+F4 is used to calculate the parameter $MD_{project,y}$. As demonstrated as above, $MD_{reg,y}$ is zero.

The value of D_{CH4} under standard temperature and air pressure (1.013bar and 0°C) $(\rho_{CH4,n})$ is 0.0007168tCH_4/m$^3CH_4$. The value of $CEF_{electricity,y}$ is 0.8529tCO_2e/MWh as specified in the PDD during the crediting period.

PP adopted Transmission and Distribution Loss (TDL_y) discount of 20% for $EL_{onsite,y}$ in ER calculation in the MR version 01, which is inconsistent with the register PDD. CQC team confirms it is conservative. In the MR version 02, the calculation method on $EL_{onsite,y}$ in the MR version 02 is fully consistent with the registered PDD and CQC team confirms it is reasonable.

The verification team cross-checked the reading records of the meters by local grid company/18/, monthly records/17/ and the daily log books by PP, confirms that appropriate methods and formulae for calculation baseline emissions, project emissions and leakage have been followed, the readings of the meters are consistent with the related records and the daily log books.

The total emission reductions have been confirmed as follows:

Parameter	Reported value	
	08/02/2012-31/12/2012	01/01/2013-31/03/2013
$MD_{project,y}$	1,753.64t CH_4	313.64 tCH_4
$MD_{reg,y}$	0	0
$EL_{LFG,y}$	7,535.088MWh	1422.487 MWh

Thus total emission reductions achieved in this monitoring period is calculated as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) \times GWP_{CH4} + EL_y \times CEF_{electricity,y}$$

For period 08/02/2012-31/12/2012:

ER=(1,753.64-0)tCH_4×21tCO_2e/tCH_4 + 7,535.088MWh× 0.8529 tCO_2e/MWh

=***43,253*** tCO_2e

For period 01/01/2013-31/03/2013:

ER=(313.64-0)tCH_4×25tCO_2e/tCH_4 + 1422.487MWh× 0.8529 tCO_2e/MWh

=***9,054*** tCO_2e

The verified emission reductions during this monitoring period is 52,307 tCO2e (08/02/2012-31/12/2012: 43,253tCO_2e, 01/01/2013-31/03/2013:9,054tCO_2e) while the ex-ante estimated emission reductions for the same period is 48,297 tCO2e based on the registered PDD. So the actual ERs are higher than the estimated emission reductions. While the remarks on difference from estimated value in registered PDD are not sufficient demonstrated in MR version 01. With

respect to this issue *CL04* was raised during this verification and successfully closed out. (Ref. Appendix A: CDM Verification Protocol - Table 2).

As per the response of PP, CQC team confirms that the actual emission reductions increase due to following reasons: (1) the value of methane fraction was taken as 50% in the PDD, while the actual average monitored value is up to 57.68% during the monitoring period.(2) The rate of self-consumption electricity is 10% assumptive in the PDD, while as per the monitored records, the actual value is only 4.4% during the monitoring period(this data can be calculated as per the ER calculation spreadsheet). (3) PP has supplied the records of MSW quantity covering the period from Jan. 2010 to Mar.3013 issued by the refuse landfill site of Luohe city dated Jul.17th 2013/29/. It can be found that the estimated quantity of waste in the PDD is quite different with the real values and the detailed data are listed as the table 3 below. (4) PP also supplied the monitored weight fraction of waste components provided by the refuse landfill site of Luohe city covering the period from Jan. 2010 to Mar.3013/30/. The monitored values and the estimated ones of weight fraction of waste components are listed in the table 4 below.

Table 3 Quantity of waste

Year	Estimated values in the PDD (tons)	Actual values(tons)
2010	161695	169650
2011	168265	180630
2012	175314	189854
2013.1-2013.3	44820	54387

Table 4 Waste components

Component	Estimated values in the PDD	Actual values
	Weight Fraction % (wet waste)	Weight Fraction % (wet waste)
Wood and wood products	3	4.2
Pulp, paper and cardboard	7	15.7
Food, food waste, beverages and tobacco	35	22.4
Textiles	4	5.4
Garden, yard and park waste	14	13.4
Glass, plastic, metal other inert	37	38. 9

When the actual monitored data of methane fraction, rate of self-consumption electricity, waste quantity, waste components mentioned above and actual net amount of electricity exported to CCPG by the project replace the ex-ante estimated values in the ER sheet calculated in the project design stage, we can get the adjusted emission reduction 56,676tCO2e during the period (08/02/2012-31/03/2013)/31/.Then the actual ER 52,307 tCO2e is 7.7% lower than the adjusted emission reduction 56,676tCO2e.

CQC team confirm the actual emission reduction is 8.3% higher than the estimated value in the PDD is reasonable.

As per the requirements of VVS (Version 04.0), CQC verification team confirms the following information:

- The reported ERs during this monitoring period are *52,307* tCO_2e;
- The parameters were measured and monitored correctly by the PP and the operational and measurement equipments were well maintained and calibrated;
- The recorded values were cross-checked with the daily operational records, meter readings and electricity balance bills;
- The formulas and emission factors used in baseline emissions, project emissions and leakage were consistent with the registered PDD and the applied methodologies.

APPENDIX A: CDM Verification Protocol

Table 1 verification checklist for Clean Development Mechanism (CDM) Project Activities

(MoV =Means of Verification, DR=Document Review, I=Interview)

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
1. Compliance of the project implementation with the registered PDD					
1.1 The detailed information on the site(s) of the project being implemented and starting date of operation for each site	PDD /6/ /28/	I DR Visit	The project – Luohe MSW Landfill Site LFG Recovery to Power Project is located in the northeast area inside of Luohe City MSW landfill site, one kilometre south of Chengang village, Luohe City, Henan Province, P. R. China. The project was registered on 07/10/2011, with a reference number of 5238. The project chose fixed crediting period which has been changed from 01/12/2011 -30/11/2021 to 07/10/2011- 06/10/2021 based on the registration date. This is the 1st monitoring period, which covers a time period from 07/10/2011 to 31/03/2013 (both days included).	OK	OK
1.2 For CDM project activities with phased implementation, describe the progress of the proposed CDM project activity achieved in the each phase under verification. If the phased implementation is delayed, whether the reasons and the expected implementation date are described clearly and relevant evidence provided?	/5/ /6/	I DR Visit	The project is phased implemented. The project expected to install a gas collection system, a gas pre-treatment system, 4 generators and transmitting system. During the onsite visit, it was found 3 generators were installed on-site.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
			1# and 2# gas engine was put into use and connected to CCPG on 31/05/2010. 3# gas engine was connected to CCPG on 02/11/2012/.		
1.3 Are all physical features of the proposed CDM project activity, proposed in the registered PDD, in place? (the detailed information on title, specification, installation time and operation status of the equipments installed)	/5/ /6/	I DR Visit	The project is phased implemented. The project expected to install 4 generators on-site; 3 generators and related monitoring system were installed on-site in this monitoring period. The implementation and equipments installation of the project activity are consistent with the registered PDD. However, it was found the working periods of the measurement equipments are not clearly stated in the MR version 01. (***CL01)***	~~CL01~~	OK
1.4 Is there any information (data and variables) provided in the MR that is different from that stated in the registered PDD? If so, - Has it caused an increase in estimates of the emission reductions in the current monitoring period? - Is it highly likely to increase the estimates of emission reductions in the future monitoring periods?	/5/ /6/	DR	No, all the data and variables provided in the MR are consistent with the registered PDD.	OK	OK
1.5 Are there any deviation or the proposed or actual changes in the implementation or operation of the project activity complied with the requirements of the Project Standard?	/5/ /6/	I DR	No.	OK	OK
1.6 Has the CDM project activity been implemented and operated as per the registered PDD?	/5/	I	As per the MR, the project activity has been implemented and operated as per and the registered	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
	/6/	DR	PDD.		
2. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s)					
2.1 Which approved monitoring methodology has been applied by the project?	/2/ /3/ /4/	I DR	The approved small-scale monitoring methodology AMS-III.G. (Version 06) is applied to the project and the approved small-scale methodology AMS-I.D (Version 16) is used for the energy displacement component.	OK	OK
2.2 Is the monitoring plan of the project activity in accordance with the applied methodology including applicable tool (s)?	/2//3//4/5/	I DR Visit	Yes. The monitoring plan in accordance with the methodologies AMS-III.G. (version 06) and AMS-I.D (Version 16) has been applied by the CDM project activity.	OK	OK
2.3 Is the project implementation in accordance with the provisions of the registered PDD and/ or an approved revised PDD?	/5/ /6/	I DR	The project implementation in accordance with the provisions of the registered PDD.	OK	OK
2.4 Are there any monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)? If yes, will CQC bring to the attention of the Board issues to enhance the level of accuracy and completeness of the monitoring plan?	/5//6/	I DR Visit	No.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
3. Compliance of monitoring activities with the registered monitoring plan					
3.1 management system of Monitoring					
3.1.1 Have the project operator established management and operational system for the monitoring?	/19/	I DR Visit	Yes. PP has established management and operational system for the monitoring, which is consistent with the MP.	OK	OK
3.1.2 Are the responsibilities and authorities for monitoring and reporting in accordance with the responsibilities and authorities stated in the monitoring plan?	/19/	I DR Visit	***General Manager***: In charge of and manages the issues related to CDM project monitoring. ***CDM Manager***: Responsible for meter calibration, checking the daily operation, and archiving emergency situation reports. Report monthly to the General Manager (GM) of the project developer about the project performance and monitored data. In case non-conformances are identified, in terms of performance during the production and/or problems in the performance of the monitoring equipments (e.g. flow meters are not working, data are not correct, etc), the CDM manager will inform the GM about the irregular situation and the measures that will be taken to fix the problems. Also responsible for aggregating the monitoring data monthly and annually and for archiving and keeping it during the crediting period and tow year after. ***Operators***: Take turns to work in the control room 24 hours a day and take charge of data supervision, filling in operation report forms as well as checking and inspecting the control system.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
3.1.3 Is the equipment used for monitoring controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification?	/13/1-/16//21/22/23/24/	I DR Visit	Yes. The calibration and maintenance specifications of the equipments appropriate and PP has calibrated and maintained the equipments as per related specifications. See Appendix D for the detailed information. During this verification, it was found that other temparay substitute flow meters used during the transient calbration periods of the frequently-used flow meters in the monitoring parameters $LFG_{total,\ y}$, $LFG_{engines,\ y,}\omega_{CH4,\ y,}$ $EL_{EX,\ LFG,y}$ and $EL_{onsite,y}$.. However, the specification and calibration information of the substitute flow meters was not listed in the MR version 01. (***CAR01)*** During this verification, it was also found that the calibration information of the electricity meter E3 in MR version 01 is not consistent with related calibration records. (***CAR02)*** According to calibration reports, the valid period of the verification and calibration certificates covers the monitoring period. In the verification on the monitoring of parameter$\omega_{CH4,\ y}$, it was found that one gas analyzer (Type: 97460, SN: 30101, accuracy: ±1.5%) was replaced by another r(Type: GTR196, SN: 55300/7, accuracy: ±2.0%) during the monitoring period. However, the reason of	~~CAR01~~ ~~CAR02~~ ~~CL02~~ ~~CL03~~	OK

<table>
<tr><th>Verification checklists</th><th>Ref</th><th>Mov</th><th>Verification findings</th><th>Draft. Concl.</th><th>Final Concl.</th></tr>
<tr><td></td><td></td><td></td><td>this replacement was not supplied. (CL02)
During this verification, it was found that parameter EL_{imported,y} in the MR version 01 is not included in the MP in the registered PDD. (CL03)</td><td></td><td></td></tr>
<tr><td>3.1.4 Are monitoring results consistently recorded as per approved frequency?</td><td>/21/</td><td>I
DR
Visit</td><td>Yes.
All of the monitoring results were consistently recorded as per approved frequency. The detailed information is as follow:
<table>
<tr><th>Parameter</th><th>Monitoring/recording frequency</th><th>Required frequency</th></tr>
<tr><td>LFG_{total,y}</td><td>Continuously/ Every hour</td><td>Continuously/ Monthly aggregation</td></tr>
<tr><td>LFG_{engines, y}</td><td>Continuously/ Every hour</td><td>Continuously/ Monthly aggregation</td></tr>
<tr><td>ω_{CH4,y}</td><td>Continuously/ Every hour</td><td>Continuously Monthly aggregation</td></tr>
<tr><td>EL_{EX,LFG,y}</td><td>Continuously / Every hour</td><td>Continuously / Monthly aggregation</td></tr>
<tr><td>EL_{onsite,y}</td><td>Continuously / Every hour</td><td>Continuously / Monthly aggregation</td></tr>
<tr><td>EL_{grid,y}</td><td>Continuously / Every hour</td><td>Continuously / Monthly aggregation</td></tr>
<tr><td>operation hours of the generators</td><td>Continuously /yearly</td><td>Continuously /yearly</td></tr>
<tr><td>MD_{req,y}</td><td>Yearly</td><td>Yearly</td></tr>
</table></td><td>OK</td><td>OK</td></tr>
<tr><td>3.1.5 Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or the monitoring plan?</td><td>/5 //19/</td><td>I
DR
Visit</td><td>Yes.
The operations quality control and monitoring manual documented and applied by PP in accordance with the monitoring plan.</td><td>OK</td><td>OK</td></tr>
</table>

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
3.2 implementation and quality control of monitoring					
3.2.1 Have the parameters for project emissions been monitored?	/2/3/4//5//6/	I DR Visit	See the discussion of section 3.4.1.1-3.4.1.8	OK	
3.2.2 Have the parameters for Baseline emission been monitored?	/2/3/4//5//6/	I DR Visit	See the discussion of section 3.4.1.1-3.4.1.8	OK	OK
3.2.3 Have the parameters for Leakage emission been monitored?	/2/3/4//5//6/	I DR Visit	See the discussion of section 3.4.1.1-3.4.1.8	OK	OK
3.2.4 Has the actual monitoring been implemented in accordance with the monitoring plan contained in the registered PDD (or the accepted monitoring plan)?	/2/3/4//5//6/	I DR Visit	All the parameters have been monitored in accordance with the MP. See CAR01 and CAR02.	~~CAR01~~ ~~CAR02~~	OK
4. Compliance with the calibration frequency requirements for measuring instruments					
4.1 Has the calibration been delayed and implemented after the monitoring period in consideration? If so, -whether the following conservative approach is adopted? (a) Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in	PDD MR /21/	DR, I	The calibration of the monitoring equipments has not been delayed. During this verification, it was also found that the calibration information of the electricity meter E3 in MR version 01 is not consistent with related calibration records. (***CAR02)***	~~CAR02~~	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
the measuring equipment, or if the error is smaller than the maximum permissible error; or (b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.					
4.2 Are the results of the delayed calibration not available, or the calibration not been conducted at the time of verification?	PDD MR /21/	DR, I	The calibration of the monitoring equipments has not been delayed. During this verification, it was also found that the calibration information of the electricity meter E3 in MR version 01 is not consistent with related calibration records. (***CAR02)***	~~CAR02~~	OK
4.3 Is it necessary to request any post registration change (the requested calibration is impossible to PP)?	PDD MR /21/	DR, I	No.	OK	OK
4.4 Whether the equipments are calibrated either in accordance with the specification of the local/national standards, or as per the manufacturer's specification? If not, whether the international standards are used?	PDD MR /21/	DR, I	The equipments are calibrated in accordance with the monitoring plan.	OK	OK
5. Assessment of data and calculation of emission reductions					
5.1 Is a complete set of data for the specified monitoring period available?	/10//12//17/	I DR Visit	Yes. A completed set of data which can cover the monitoring period of this monitoring report have been provided to the verification team.	OK	OK
5.2 Is there any data not available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan?	/10//12//17/	DR, I	No. All of the parameters have been measured and are available.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
If so, - How to make the most conservative assumption? - Is it necessary to raise a CAR or request for deviation from the MP?					
5.3 Have the reported data been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis? Especially, has an attention been paid to completeness and reasonableness of records in, for example, a daily operation log.	/10/12/17/18/	DR, I	Yes. The monitoring report is cross-checked with work logs, the receipts from the grid company, measurement equipments calibration records, and monitored parameters records.	OK	OK
5.4 Have the calculations of baseline emissions, project emissions and leakage been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	/6//10/12/	DR, I	Yes. The calculations of baseline emissions, project emissions have been carried out in accordance with the formula and methods described in the monitoring plan and then applied methodology document.	OK	OK
5.5 Has any assumption used in emission calculations been justified?	/6/10/12/	DR, I	There are no any assumptions in emission calculations.	OK	OK
5.6 Have appropriate emission factors and default values been correctly applied?	/5/6/	DR	The emission factor of electricity (CEF electricity), which was determined ex-ante and was fixed as 0.8529 tCO_2/MWh. Methane density and GWP_{CH4} are applied correctly.	OK	OK
5.7 Has a comparison of actual GHG emission reductions of the project activity achieved during this monitoring period with the estimates in the registered PDD been provided?	PDD MR	DR	Yes It was been carried out at Section E.5 in MR. While the remarks on difference from estimated value in registered PDD are not sufficient demonstrated in MR version 01(***CL04***).	~~CL04~~	OK
5.8 If there is an increase in the actual GHG	PDD MR	DR	No. The actual GHG emission reductions higher than	~~CL04~~	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
emission reductions achieved during this monitoring period, has the cause of such increase been explained?			the estimated values. While the remarks on difference from estimated value in registered PDD are not sufficient demonstrated in MR version 01(***CL04***).		
6. Post registration changes					
6.1 Temporary Deviations from the registered monitoring plan and/or applied methodology					
6.1.1 If the parameters related to the baseline GHG emission have temporarily not monitored or the related evidences are not provided, are these parameters reported as zero in the MR?	PDD MR	DR	N.A	OK	OK
6.1.2 If the parameters related to the baseline GHG emission have temporarily not monitored or the related evidences are not provided, are these parameters reported as zero in the MR?	PDD MR	DR	N.A	OK	OK
6.1.3 In the case of project GHG emissions related to the consumption of electricity, does the estimate include an addition of 10% to account for transmission and distribution losses.	PDD MR	DR	N.A	OK	OK
6.2 Correction					
6.2.1 Does the correction to the project information affect the design of the project activity?	PDD MR	DR	N.A	OK	OK
6.3 Changes to the start date of the crediting period					
Does the PP wish to change of the start date of the crediting period? If so, whether the proposed changes result in a less conservative baseline?	PDD MR	DR	The project chose fixed crediting period which has been changed from 01/12/2011 -30/11/2021 to 07/10/2011- 06/10/2021 based on the registration date. The change has been approved by EB and this change has no influence on the baseline of the project.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
6.4 Permanent changes from the registered monitoring plan or monitoring methodology					
6.4.1 Is the accuracy level of the monitoring equipment actually installed and controlled by the PP lower than the one stipulated in the applied methodology and/or in the registered monitoring plan?	PDD MR	DR	N.A	OK	OK
6.4.1.1 If the parameter is used for calculating baseline GHG emissions, has the difference between the accuracy level of the installed monitoring equipment and the accuracy prescribed by the applied methodology and/or the registered monitoring plan been deducted from the measured value?	PDD MR	DR	N/A. The accuracy of all meters is in line with the requirements of the registered PDD.	OK	OK
6.4.1.2 If the parameter is used for calculating project GHG emissions, has the difference between the accuracy level of the installed monitoring equipment and the accuracy prescribed by the applied methodology and/or the registered monitoring plan been added to the measured value?	PDD MR	DR	N/A	OK	OK
6.4.2 Does the change to the monitoring of the registered CDM project activity belong to a type listed below: (a) Change of calibration frequency or practice for monitoring equipment not within the control of project participants; (b) Change of accuracy/type/model of meter(s) as per a power purchase agreement (PPA);	PDD MR	DR	NA.	OK	OK

Verification checklists	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
(c) Change of location of meter(s) as per a power purchase agreement (PPA).					
6.5 Changes to the project design of a registered project activity					
6.5.1 Does the change adversely impact the project design in any of the following way: (a) The applicability and application of the applied methodology under which the project activity has been registered; (b) The additionality of the project activity; (c) The scale of the project activity.	PDD MR	DR	N.A	OK	OK

Table 2 Resolution of Corrective Action and Clarifications

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 2	Summary of project owner response	Verification conclusion
Corrective Action Requests (CARs)			
CAR01 During this verification, it was found other temparay substitute meters used during the transient calbration periods of the frequently-used meters in the monitoring parameters $LFG_{total,\ y}$, $LFG_{engines,\ y}$, $\omega_{CH4,\ y,}$ $EL_{EX,\ LFG,y}$ and $EL_{onsite,y}$. While the specification and calibration information of the substitute meters was not listed in the MR version 01.	3.1.3 3.2.4	Information about temporary substitute measurement equipments are listed in the section D.2 of Luohe MR version 02.Please see the Table 5 Detailed calibration information in section D.2 of MR version 02.	OK. Based on the operation records of this project, the calibration certificates of these temporary substitute measurement equipments and the onsite interview, CQC team confirms that the specification and calibration information of temporary substitute measurement equipments listed in the section D.2 of Luohe MR version 02 are correct. So ***CAR01*** is closed out.
CAR02 The caibration information of the electricity meter E3 in MR version 01 is not consistent with related calibration records.	3.1.3 3.2.4 4.1,4.2	The calibration reports of electricity meter E3 were rechecked, and found that calibration information of the electricity meter E3 in MR version 01 was wrong and corresponding modification in the Luohe MR version 02 was made.	OK. CQC team has cross checked the calibration information of the electricity meter E3 in MR version 02 with related calibration records of E3 and confirms they are consistent with each other. So ***CAR02*** is closed out.
Clarificaiton Requests(CLs)			

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 2	Summary of project owner response	Verification conclusion
CL01 The working periods of the measurement equipments are not clearly stated in the MR version 01.	1.3	The working periods of main measurement equipments have been added in the section D.2 of MR version 02.Temporary substitute measurement equipments during the transient calibration periods of main measurement equipments also have been added in the MR version 02.	OK. The working periods of all measurement equipments, including the main and temporary substitute measurement equipments, have been added in the section D.2 of MR version 02. CQC team has checked related opreation records and confirms the working periods of the measurement equipments are correct. So ***CL01*** is closed out.
CL02 The gas analyzer (Type: 97460, SN: 30101, accuracy: ±1.5%) was replaced by another gas analyzer(Type: GTR196, SN: 55300/7, accuracy: ±2.0%) during the monitoring period. However, the reason of this replacement was not supplied	3.1.3	According to the operation and management experience of power plant, the project adopted a new gas analyzer to replace the old one, which has more high-quality and more stably running.	OK. During the onsite visit, it was confirmed by CQC team that the installed gas analyzer was made in Germany and had higher quality than the old one. So ***CL02*** is closed out.
CL03 The parameter $EL_{imported,y}$ in the MR version 01 is not included in the MP in the registered PDD.	3.1.3	The MP of the project was rechecked and found the parameter $EL_{imported,y}$ in the MR version 01 were wrong reported. The parameter in the MR version 02 was deleted as per the MP.	OK. The parameter $EL_{imported,y}$ was deleted in the MR version 02, which is consistent with the MP. So ***CL03*** is closed out.

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 2	Summary of project owner response	Verification conclusion
CL04 The remarks on difference from estimated value in registered PDD are not sufficient demonstrated in MR version 01.	5.7,5.8	The actual emission reductions during the whole monitoring period are 52,307 tCO2e, which is higher than the estimation value 48,297 tCO2e in the PDD in the same period. The actual emission reductions increase due to following reasons: (1) the conservative value of methane fraction 50% was taken in the PDD, while the actual monitored value is up to 57.68% during the monitoring period.(2)the rate of self-consumption electricity is 10% assumptive in the PDD, while the actual value is only 4.4% during the monitoring period. (3) the estimated quantity of waste is conservative in the PDD. (4) the weight fraction of waste components provided by the refuse landfill site of Luohe city is different from that in ex-ante calculation of registered PDD. The detailed data of waste quantity and waste components are listed in the section E.6 of MR version 02. if the actual monitored data of methane fraction, rate of self-consumption electricity , waste quantity, waste components, actual net amount of electricity exported to CCPG by the project replace and and the value of GWPCH4 25 for the second commitment the ex-ante estimated	OK. CQC team has checked related data mentioned in the response of the PP. The actual average value of methane fraction is 57.68% during the monitoring period, while the default value used in the registered PDD is 50%. The actual value of self-consumption electricity is 4.4% while estimated value int the PDD is 10% during this monitoring period. PP has supplied the records of MSW quantity and weight fraction of waste components covering the period Jan. 2010 to Mar.3013 issued by the refuse landfill site of Luohe city dated Jul.17th 2013. PP also supplied an adjusted ER calculation spreadsheet based on the data mention above and the adjusted emission reduction is 56,676tCO2e during the period (08/02/2012-31/03/2013). Then the

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 2	Summary of project owner response	Verification conclusion
		values in the ER sheet calculated in the project design stage, we can get the adjusted emission reduction 56,676tCO2e during the period (08/02/2012-31/03/2013). Actual values achieved during this monitoring period is 52,307 tCO2e, which dosen't exceeded.	actual ER 52,307 tCO2e is 7.7% lower than the adjusted emission reduction 56,676tCO2e. CQC team confirm the actual emission reduction is 8.3% higher than the estimated value in the PDD is reasonable. So ***CL04*** is closed out.

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

APPENDIX B: CERTIFICATE OF COMPETENC

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name:	Dong Chunsong
CDM validator:	Yes
CDM verifier:	Yes
Technical expert:	/
Technical areas:	***TA1.2:***Energy generation from renewable energy sources ***TA13.1:*** Waste handling and disposal

Approved by:
(Quality manager)

Date: 2011-03-17

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name:	Nie Xl
CDM validator:	Yes
CDM verifier:	Yes
Technical expert:	/
Technical area:	*TA13.1:* Waste handling and disposal *TA1.2:*Energy generation from renewable energy sources

Approved by:
(Quality manager)

Date: 2011-11-18

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name:	Wang Zhenyang
CDM validator:	Yes
CDM verifier:	Yes
Technical expert:	/
Technical areas:	***TA1.2:***Energy generation from renewable energy sources ***TA 8.1:***Mining and mineral processes, excluding those included in TA 8.2 ***TA 10.1:***Mining and mineral processes, excluding those included in TA 10.2

Approved by:
(Quality manager)

Date: 2011-03-17

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name:	Wang Keli
CDM validator:	Yes
CDM verifier:	Yes
Technical expert:	/
Technical area:	***TA1.2:***Energy generation from renewable energy sources ***TA13.1:*** Waste handling and disposal ***TA 13.2/TA15.2:*** Animal waste management

Approved by:
(Quality manager)

Date: 2011-07-11

APPENDIX C: REFERENCE LIST

Reference code	Document
/1/	CDM Validation and verification standard, version 04.0
/2/	AMS-I.D. – Grid connected renewable electricity generation , Version 16
/3/	AMS-III.G.– Landfill methane recovery, version 06
/4/	Tool to determine project emissions from flaring gases containing methane, version 1
/5/	Registered PDD of *Luohe* MSW Landfill Site LFG Recovery to Power Project (version 06, dated 15/09/2011)
/6/	Monitoring Report for *Luohe* MSW Landfill Site LFG Recovery to Power Project, version 01, 17/06/2013
/7/	Validation report of this project, NO.031.001, Rev.08.
/8/	The registration information of the project at UNFCCC website: http://cdm.unfccc.int/Projects/DB/Germanischer1316505026.06/view
/9/	The construction permission letter dated Aug.2009.
/10/	The daily operation log covering this monitoring period.
/11/	The specification of the gas engines
/12/	CDM daily report sheet.
/13/	Specification of flow meter installed on the main pipe
/14/	Specification of flow meters installed on the power plant pipes
/15/	Specification of methane fraction meter installed on the main pipe
/16/	Specification of the electricity meters, ie. E1, E2 and E3.
/17/	The aggregated daily and monthly records by PP covering this monitoring period.
/18/	Monthly records of electricity issued by local Grid company
/19/	CDM Monitoring & Quality Control Manual, version 02, dated Sep.2011.
/20/	Standard for pollution control on the landfill site of municipal solid waste (GB16889-2008)
/21/	Calibration reports of monitoring equipments
/22/	Grid connected agreement (Dec. 2009) Power purchase agreement (May 2010)
/23/	Regulation of Electrical Energy Meters with Electronics (JJG596-1999)
/24/	Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)
/25/	Monitoring Report for Luohe MSW Landfill Site LFG Recovery to Power Project, version 02, 29/10/2013
/26/	Clean Development Mechanism Project Standard (version 04.0)
/27/	Clean Development Mechanism Project Cycle Procedure, Ver.04.0
/28/	The license of Shanghai and Luohe BCCY New Power Industry Co.,Ltd.
/29/	The records of MSW quantity covering the period from Jan. 2010 to Mar.3013 issued

	by the refuse landfill site of Luohe city dated Jul.17th 2013
/30/	The monitored weight fraction of waste components provided by the refuse landfill site of Luohe city covering the period from Jan. 2010 to Mar.3013.
/31/	The adjusted ER calculation spreadsheet based on the actual monitored data of methane fraction, rate of self-consumption electricity, waste quantity, waste components and net amount of electricity exported to CCPG by the project.
/32/	A research of Landfill Gas Production and Usage in China, Journal of Sichuan University of Science & Engineering (Natural Science Edition), by Huang Yi & He Qiang, February 2008 Gas Generation and Pollution in Sanitary Landfill Site, Environmental Science and Technology (Vol. 28, No.1, January 2005), by SHI Qian & LIU Li-xia Research into Transport Law of Landfill Gas under Temperature Effect, Journal of Liaoning Technical University (Vol. 23 No. 1, February 2004), by CAO Guo-qiang, LIANG Bing, BAO Ming-yu Recovery and landfill gas, Environmental protection (Aug 2001) by Zhouhongjun, Wuquangui Optimum design of landfill gas collection system with vertical extraction well, Techniques and Equipment for Environmental Pollution Control, Vol. 4, No.3, March 2003), by Peng Xuya, Liu Guotao & Yu Yi

APPENDIX D: MEASUREMENT EQUIPMENTS LIST

In the host country China, the measurement equipments used for trade are required to take compulsively verification during the usage period according to *Metrology Law of the People's Republic of China* and *Rules for the Implementation of the Metrology Law of the People's Republic of China*. The measurement equipments of this project activity are in accordance with the requirements mentioned above. The equipments were verified by qualified labs and the detailed technical standards are listed in Appendix C as reference (reference /21/). CQC verification team confirms the verification certificates of the measurement equipments during the on-site visit.

Measured parameter	Equipments used in this monitoring period	Working period in this monitoring period	Calibration valid period	Calibration frequency requirement	Calibration entity
$LFG_{total,y}$	Temperature and pressure compensation vortex flow meter, Model: V10FTH3E5S, SN: ZN10F0302, ; accuracy:1.0% (main)	07/10/2011 ~ 21/09/2012 26/09/2012 ~ 31/03/2013	30/09/2011 ~ 29/09/2012 24/09/2012 ~ 23/09/2013	Annually	Henan Province Institute of Metrology
	Temperature and pressure compensation vortex flow meter, Model: V10FTH3E5S, SN: ZN10F0361, ; accuracy:1.0%	21/09/2012 ~ 26/09/2012	25/05/2012 ~24/05/2013	Annually	Henan Province Institute of Metrology
$LFG_{engines, y}$	Temperature and pressure compensation vortex flow meter, Model: PRVZW-100, SN: F16-1007-10318, ; accuracy:1.0%(main 1)	07/10/2011 ~ 16/08/2012 23/08/2012 ~ 31/03/2013	01/09/2011 ~ 31/08/2012 20/08/2012 ~ 19/08/2013	Annually	Shanghai Institute of Measurment and Testing Techology National Center of Measurment and Test for East China.
	Temperature and pressure compensation vortex flow	16/08/2012~23/08/2012	20/04/2012 ~ 19/04/2013		

	meter, Model: PRVZW-100, SN: F16-1007-10321, ; accuracy:1.0%				
	Temperature and pressure compensation vortex flow meter, Model: PRVZW-100, SN: F16-1007-10319, ; accuracy:1.0%(main 2)	07/10/2011 ~ 16/08/2012 23/08/2012 ~ 31/03/2013	01/09/2011 ~ 31/08/2012 20/08/2012 ~ 19/08/2013	Annually	Shanghai Institute of Measurment and Testing Techology National Center of Measurment and Test for East China.
	Temperature and pressure compensation vortex flow meter, Model: PRVZW-100, SN: F16-1007-10323, ; accuracy:1.0%	16/08/2012~23/08/2012	20/04/2012 ~ 19/04/2013		
$w_{CH,y}$	CH_4 fraction meter, Type: 97460, SN: 30101; accuracy:1.5%(main)	07/10/2011 ~ 14/12/2011	18/01/2011 ~ 17/01/2012	Annually	Jiangsu Institute of Metrology
	CH_4 fraction meter, Type: GTR196, SN: 55300/7;accuracy:2%(main)	14/12/2011~ 15/09/2012	09/12/2011 ~ 08/12/2012	Annually	Shenzhen Academy of Metrology and Quality Inspection
		22/09/2012~ 31/03/2013	18/09/2012 ~ 17/09/2013		
	CH_4 fraction meter, Type: GTR196, SN: 55477/3;accuracy:2%	15/09/2012~ 22/09/2012	08/02/2012 ~ 07/02/2013		
$EL_{LFG,y}$	Electricity energy meter E1, Model: DTSD546, SN: 100308008276, accuracy: 0.5S.(main)	07/10/2011 ~ 29/06/2012 02/07/2012 ~ 31/03/2013	07/09/2011~06/09/2012 01/07/2012~30/06/2013	Annually	Henan Province Institute of Metrology
	Electricity energy meter E1, Model: DTSD546, SN: 5154-10500264, accuracy: 0.5S.	29/06/2012 ~ 02/07/2012	20/12/2011~19/12/2012	Annually	Henan Province Institute of Metrology

$EL_{onsite,y}$	Electricity energy meter E2, Model: DTSD546, SN: 100308008277, accuracy: 0.5S.(main)	07/10/2011 ~ 29/06/2012 02/07/2012 ~ 31/03/2013	07/09/2011~06/09/2012 01/07/2012~30/06/2013	Annually	Henan Province Institute of Metrology
	Electricity energy meter E2, Model: DTSD546, SN: 5154-10500266, accuracy: 0.5S.	29/06/2012 ~ 02/07/2012	20/12/2011~19/12/2012	Annually	Henan Province Institute of Metrology
$EL_{grid,y}$	Electricity energy meter E3, Model: DSSD536, SN: 10006653840, accuracy: 0.5S.	07/10/2011 ~ 31/03/2013	14/04/2011~13/04/2012 13/04/2012~12/04/2013	Annually	Metrology Center of Luohe Power Supply company