south pole

Monitoring Report

Gold Standard Version 1

Suzhou Qizi Mountain Landfill Gas Recovery Project (GS 397)

The 2nd monitoring period: 01/08/2009- 31/07/2010

Monitoring report version no. 3
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1. Table of content

2. Project Background

By means of this Monitoring Report greenhouse gas emission reductions achieved by the project activity **"Suzhou Qizi Mountain Landfill Gas Recovery Project"** are being verified and certified as per requirements of the Gold Standard, Version 1. Its registered date is on 22/04/2009.

Further background information on the project activity can be found in the Project Design Document (PDD) Version 2 on 08/12/2008, 1st Monitoring Report and associated documents, which have also been submitted for validation or verification as per requirements of the Gold Standard, Version 1. The PDD, Monitoring Report of 1st Verification and associated documents are available upon request. The revised monitoring plan was approved by Gold Standard on 07/01/2010. A clarification of the project has been approved by GS registry on 19/01/2010, indicating that the emission reduction can be calculated based on the amount of electricity generation and the electrical efficiency of generator while the monitoring data of the parameters are not available.

3. Monitoring Background

Generator I and II started construction in November 2005 and started operation on 01/01/2007, Generator III started construction in August 2007 and started operation in September 2008, and Generator IV is still under plan.

Section B and D of the PDD (Application of the baseline and monitoring methodology) provides all details in regard to calculation of emission reductions and the monitoring plan to be followed by the project activity. The Emission reduction calculations and the monitoring plan are based on the approved CDM methodology ACM0001 Version 8, dated 30/11/2007.

4. Monitoring Results

4.1. Monitoring period

This is the second monitoring report of this project activity. It covers the period from 01/08/2009 to 31/07/2010 (Both days included).

4.2. ER Calculation

The calculation approach is fully in line with the approved revised monitoring plan in the section of D.3 in GS VER PDD Suzhou LFG this time. The calculation approaches are described as follows:

4.2.1 The Approved Revised Monitoring Plan Approach:

The emission reduction is calculated based on the LFG flow meter, methane analyzer, pressure and temperature.

$$ER_{CH4} = \frac{LFG_{electricity,y} \times W_{CH4} \times P_1 \times T_0 \times \rho_0 \times GWP_{CH4}}{P_0 \times T_1}$$

ER_{CH4} = Emission reduction from methane avoidance, t
$LFG_{electrcity,y}$ = Amount of landfill gas combusted in power plant, m^3
W_{CH4} [1] = Methane fraction in the landfill gas, m^3 CH_4/m^3 LFG
P_1 = Pressure of collected landfill gas, kPa
T_0 = Temperature under standard condition, 0 degree Celsius
ρ_0 = Density of methane under standard condition, 0.0007168t/m^3
GWP_{CH4} = Global warming potential of methane, 21 tCO_2e/tCH_4
P_0 = Pressure under standard condition, 101.3 kPa
T_1 = Temperature of collected landfill gas, degree Celsius

4.2.2 The Indirect Approach of Emission Reduction from Methane Avoidance approved by GS on 19/01/2010

The total emission reduction of this monitoring period is higher than expected one in PDD. The details of the analysis are shown in section 6 of this report. In order to be conservative, an indirect approach, which has been approved by GS registry on 19/01/2010 and applied in the first monitoring period, is applied for the emission reduction calculation of the project.

The emission reduction from methane avoidance is calculated based on the amount of electricity generation and the electrical efficiency of generator.

$$ER_{CH4} = \frac{EL_{generation}}{\eta \times NCV_{CH4} \times 1000} \times GWP_{CH4}$$

ER_{CH4} = Emission reduction from methane avoidance, t
$EL_{generation}$ = Electricity generation from the generator in the year y, MJ, 1kWh=3.6MJ
η = Electrical Efficiency of generators, all of three generators is the same model, 38.5%[2]
NCV_{CH4} = Net calorific value per mass of methane, 48. 00 MJ/kg[3]
GWP_{CH4} = Global warming potential of methane, 21 tCO_2e/tCH_4

[1] W_{CH4} is monitored periodically. The 95% confidence level is used and calculated for the project and the lower bound is used for ER calculation according to EB 48 annex 13

[2] the certificate with rated efficiency of the generator

[3] For natural gas as per IPCC, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (page 1.18)

Detailed emission reduction calculation information of the project has been stated in section 6 of the monitoring report.

4.3. Presentation of monitoring results

All monitoring data are available in the following Excel spreadsheets of monitoring data. The spreadsheets include:

1. A summary worksheet containing the results of the monitoring data for electricity, amount of landfill gas combusted in power plant, methane fraction in the landfill gas, pressure of landfill gas and temperature of landfill gas during the period from 01/08/2009 to 31/07/2010.

2. Worksheets containing the GS VER calculations.

All indicators, which are related to sustainable development, are available in this monitoring report. Monitored indicators include:

1. Air quality; Water quality; and other Pollutant,

2. Employment; Livelihood of the poor; Human and institutional capacity; Number of people engaged; and the ratio of LFG utilization.

4.4. Emission reductions

The calculated emission reductions achieved by the project activity within the covered monitoring period amount to **119,306 tCO_2e**.

4.5. Monitoring Parameters

Emission reduction related parameters:

Parameter	Data variable	Source of data	Data Unit	Monitoring frequency	Uncertainty of data (High/ Medium /Low)	QA/QC procedure	comments
EL $_{generation}$	Electricity generation from the generator in the year y	Electricity Meters (M1, M2 and M3)	MWh	Continuously measurement Recorded every hour	Low	This electricity is measured by two DSSD331-3-TH electricity meters and one DSSD331-MB3 electricity meter for each generator. The electricity from coming generator IV will be measured by a separate meter, which has not been installed. Those instruments are considered as critical instruments in the QA/QC procedure.	Unit 1 (M1): -Type: DSSD331-3-TH -Serial No.: 100791967 Unit 2 (M2): -Type: DSSD331-3-TH -Serial No.: 100791936 Unit 3 (M3): -Type: DSSD331-MB3 -Serial No.: 101997920 The calibration standard is JJG307-2006.
EL $_{internal\ consumption}$	Electricity imported from the grid in the year y. It includes the electricity consumption of the gas collection system.	Electricity Meters (M5, M6)	MWh	Continuously Measurement Recorded every hour	Low	This electricity is measured by the DT862YM and DT862-2K electricity meters. Those instruments are considered as critical instruments in the QA/QC procedure.	M5: -Type: DT862YM -Serial No.: 2355946 M6: -Type: DT862-2K -Serial No.: 2008-0577129 The calibra-

							tion standard is JJG307-2006.
EL_{LFG}	Net amount of electricity generated using LFG	$EL_{LFG} = EL_{generation} - EL_{internal\ consuption}$	MWh	Continuously Measurement Recorded every hour	Low	The related electricity meters are subject to regular maintenance and testing to ensure accuracy.	N/A
H operation	Operation of the energy plant	Central Control System	hours	annually	Low	This operation hour is measured by TEM EVO System. This instrument is considered as critical instruments in the QA/QC procedure.	TEM EVO System
$\mathbf{LFG}_{electricity,y}$	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure	Flow meter	m^3	Continuously Recorded every hour	Low	This amount of landfill gas is measured by the CD2A02A1AB1H2 and 454FT-12-MT DN200 flow meters. Those instruments are considered as critical instruments in the QA/QC procedure.	F1: -Type: CD2A02A1-AB1H2 -Serial No.: 01965563 F2: -Type: 454FT-12-MT DN200 -Serial No.: FD21246A The calibration standard of F1 is JJG882-2004. The calibration standard of F2 is JJG198-1994.
$\mathbf{w}_{CH4}$	Methane fraction in the landfill gas	Methane Analyzer	m^3 CH_4 / m^3 LFG	Recorded every hour	Low	This methane fraction in the landfill gas is measured by the GEM 2000 methane analyzer. This instrument is considered as critical instruments in the QA/QC procedure.	W1: -Type: GEM 2000 -Serial No.: GM0801810S The calibration standard is JJG693-2004.
T	Temperature of the landfill gas	Temperature meter	℃	Continuously Recorded	Low	This temperature is measured by four temperature	**1st Phase:** Old T1: -Type: WSS

				every hour		meters. These four meters have been replaced by other four meters during this monitoring period. Those instruments are considered as critical instruments in the QA/QC procedure. Four temperature meters were replaced to new ones on 10/05/2010.	-Serial No.: 313-3 New T1: -Type: WSS-311 -Serial No.: 3 Old T2: -Type: WSS -Serial No.: 313-4 New T2: -Type: WSS-311 -Serial No.: 4 **2nd Phase:** Old T3: -Type: WSS -Serial No.: 313-1 New T3: -Type: WSS-311 -Serial No.: 1 Old T4: -Type: WSS -Serial No.: 313-2 New T4: -Type: WSS-311 -Serial No.: 2 The calibration standard is JJG226-2001
P	Pressure of the landfill gas	Pressure meter	Pa	Continuously Recorded every hour	Low	This pressure is measured by four pressure meters. These four meters have been replaced by other four meters during this monitoring period. Those instruments are considered as critical instruments in the QA/QC procedure.	**1st Phase:** Old P1: -Type: YE-100 -Serial No.: 09 06 1003 New P1: -Type: YE-100 -Serial No.: 09.4.13.163 Old P2: -Type: YE-100

						P1 and P3 were replaced on 25/03/2010. P2 and P4 were replaced on 11/11/2009.	-Serial No.: 09 06 1004 New P2: -Type: YE-100 -Serial No.: 10.3.2.254 **2nd Phase:** Old P3: -Type: YE-100 -Serial No.: 09 06 1001 New P3: -Type: YE-100 -Serial No.: 09.4.13.158 Old P4: -Type: YE-100 -Serial No.: 09 06 1002 New P4: -Type: YE-100 -Serial No.: 10.3.2.267 The calibration standard is JJG573-2003
Laws and regulations about waste management system in China				annually	Low	Regular follow-up of law and regulations by project participants (e.g. governmental publications, official communications, official journal, conferences)	The same situation as validation.

Sustainable development related parameters:

Parameter	Data variable	Source of data	Description of measurement methods and procedures to be applied	QA/QC procedures to be applied	Remark
AQy	Negative air quality effects (emis-	Report of Environment Protection for	Processing units are maintained periodically according to	Air quality has been monitored by Centre	Centre Testing International (Suzhou) Limited is an authorized and independent

	sions other than GHG) that are prevented by processing units.	Check & Accept from Local Environment Protection Agency/The Environmental Impact Report	relevant national standards. Centre Testing International (Suzhou) Limited published a report on 29/08/2010	Testing International (Suzhou) Limited. The air quality is in compliance with relevant national standard GB 13271-2001	third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 2009190738Z and valid until 12/05/2012. Report Serie: - SUH1009276160101 The Environmental Impact Assessment report and accreditation certificate have been obtained and supplied to the assessment team.
WQy	Negative water quality effects that are prevented by processing units.	Report of Environment Protection for Check & Accept from Local Environment Protection Agency/The Environmental Impact Report	The landfill leachate is collected properly and transported to Suzhou Everbright leachate treatment plant finally. Centre Testing International (Shenzhen) Corporation Shanghai Branch published a report in August 2010.	Water quality has been monitored by Centre Testing International (Shenzhen) Corporation Shanghai Branch. The water quality is in compliance with national standard GB 14848-93 and GB18918-2002.	Centre Testing International (Shenzhen) Corporation Shanghai Branch is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 2008090879U and valid until 17/03/2011. Report Serie: - SUH10070261601 The Environmental Impact Assessment report and accreditation certificate have been obtained and supplied to the assessment team.
Other Pollutant	Noise impacts that are prevented by several approaches.	Report of Environment Protection for Check & Accept from Local Environment Protection Agency/The Environmental Impact Report	In order to minimize the noise impacts, few measures are carried out, such as the high dB (A) is strictly forbidden from 10 pm to 6 am and 12 am to 2pm; enforcement of the onsite management and establishing related by laws. The noise during the construction period has locality and temporality characteristic; it disappears when the construction work finished. After the project is put into operation,	Noise quality has been monitored by Centre Testing International (Suzhou) Limited. Noise quality is in compliance with relevant national standard GB 12348-2008 and GB/T14366-1993.	Centre Testing International (Suzhou) Limited is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 2009190738Z and valid until 12/05/2012. Report Serie: - SUH1009276160101 The Environmental Impact Assessment report and accreditation certificate have been obtained and supplied to the assessment team.

			the major resource of noise pollution is from running of the turbines, generator and valves. Muffler is installed to avoid the noise impact on the local citizens and employees. Centre Testing International (Suzhou) Limited published a report on 29/08/2010		
Employment	Job quality, fulfillment of labour standards.	Documents of training program	Fulfillment of labour standards is checked by local labour authority.	Documents of training program are provided to DOE. The content of training program including: Basic Knowledge of Environment and Safety; Case Study and Assessment on Plant Accidents; Study on ERP system; Theory of Gas Engine and Maintenance and Safe Operation of LFG Pretreatment System.	Project workers and administrators in the plant also have the chance to learn new knowledge of sophisticated monitoring equipments, computer operations, environment and safety.
Livelihood of the poor	Wages	Pay roll of these employees	People engaged during the fiscal year are recorded in the accounting system of the plant. The number of people engaged, the gender, the responsibilities of them and the training they take are all covered in the report.	Payrolls of these employees are provided as evidence for contribution in employment of local people	The accounting report is recorded by the human resource office of the project. People engaged during the monitoring period were recorded in the accounting system of the plant.
Human and institutional capacity	Education or training fee and gender	Training invoices of these employees or local officials	People engaged during the fiscal year are recorded in the accounting system of the plant. The	Training invoices of local officials have been provided as evidence for	Training fee is monitored. The number of people engaged, the gender, the re-

		or local people	number of people engaged, the gender, the responsibilities of them and the training they take all be covered in the report.	contribution in employment of local people.	sponsibilities of them and the training they had taken are all covered in the accounting record. People engaged during the monitoring period were recorded in the accounting system of the plant.
Empy	Number of people engaged	Pay roll of these employees	People engaged during the fiscal year are recorded in the accounting system of the plant. The number of people engaged, the gender, the responsibilities of them and the training they take all be covered in the report.	Payrolls of these employees are provided as evidence for contribution in employment of local people	The number of people engaged is monitored. The number of people engaged, the gender and the responsibilities of them are all covered in the accounting record. People engaged during the monitoring period were recorded in the accounting system of the plant.
RLFG, y	The ratio between the LFG collected and the LFG used within the engines on average each year	The actual layout of the entire collection pipelines	If there is no other way, such as flaring or venting, to treat the collected LFG besides generating electricity, this ratio can be nearly close to 100%, at least higher than 65%.	The actual layout of the entire collection pipelines, which covers from the well to electricity generator, has been supplied to the assessment team.	The actual layout of the entire collection pipelines, which covers from the well to electricity generator, shows that all the collected landfill gas has been used to generate electricity. There is no other pipeline connected at the project site and no landfill gas was used for any other purpose than electricity generation or sent to the atmosphere directly.

4.6. Procedures to calculate the emission reduction

The emission reduction is calculated as per the approved revised monitoring plan for this monitoring period from 01/08/2009 to 31/07/2010.

Emission Reduction Calculation of Methane Avoidance:

The emission reduction is calculated based on the LFG flow meter, methane analyzer, pressure and temperature.

$$ER_{CH4} = \frac{LFG_{electricity,y} \times W_{CH4} \times P_1 \times T_0 \times \rho_0 \times GWP_{CH4}}{P_0 \times T_1}$$

ER_{CH4} = Emission reduction from methane avoidance, t
$LFG_{electrcity,y}$ = Amount of landfill gas combusted in power plant, m^3
W_{CH4} = Methane fraction in the landfill gas, m^3 CH_4/m^3 LFG
P_1 = Pressure of landfill gas, kPa
T_0 = Temperature under standard condition, 0 degree Celsius
ρ_0 = Density of methane under standard condition, 0.0007168t/m^3
GWP_{CH4} = Global warming potential of methane, 21 tCO_2e/tCH_4
P_0 = Pressure under standard condition, 101.3 kPa
T_1 = Temperature of landfill gas, degree Celsius

Emission Reduction Calculation of Electricity Generation:

$$ER_{electricity} = \left(EL_{generation} - EL_{Internal\_consumption}\right) \times EF_{CM}$$

$ER_{electricity}$ = Emission reduction from electricity generation, t
$EL_{generation}$ = Electricity generation from the generator in the year y, MWh
$EL_{Internal\_consumption}$ = Electricity imported from the grid in the year y, MWh
EF_{CM} = Combined margin CO_2 emission factor of East China Power Grid in year *y,* 0.8847 tCO2e/MWh

Total Emission Reduction:

$$ER_{total} = ER_{CH4} + ER_{electricity}$$

As described before, the emission reduction calculation of methane avoidance is also calculated by the indirect approach for the project.

$$ER_{CH4} = \frac{EL_{generation}}{\eta \times NCV_{CH4} \times 1000} \times GWP_{CH4}$$

ER_{CH4} = Emission reduction from methane avoidance, t
$EL_{generation}$ = Electricity generation from the generator in the year y, MJ, 1kWh=3.6MJ
η = Electrical Efficiency of generators, all of three generators is the same model, 38.5%
NCV_{CH4} = Net calorific value per mass of methane, 48. 00 MJ/kg
GWP_{CH4} = Global warming potential of methane, 21 tCO_2e/tCH_4

4.7. QA/QC procedure and Calibration for monitored parameters

QA/QC procedure

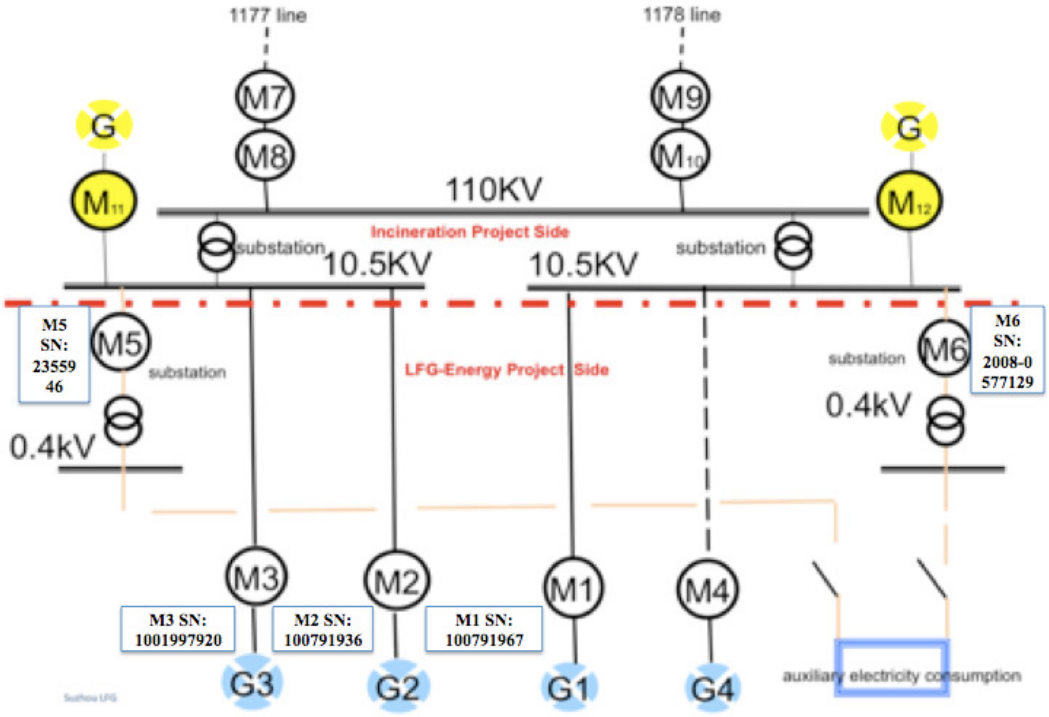
The measurement equipment for gas quality (humidity, particulate, etc.) is sensitive, so a strong QA/QC procedure for the calibration of this equipment is needed.

Electricity Generation

According to the Chinese national standard "*Technical Management Code for Electricity Metering" (DL/T448-2000),* the electricity metering equipments were properly configured and the metering equipments were checked by both the project owner and the grid company before the project is in operation.

The electricity generation is measured by Meter M1, M2 and M3, which have an accuracy of 0.5S and bidirectional electronic meters. M4 will be installed to measure electricity generation of the fourth generator, which will be installed before the operation of the fourth generator. The electricity imported from the grid is measured by M5 and M6, which are with an accuracy of 2. During this monitoring period, M1, M2, M3, M5 and M6 work properly and are the main meters for monitoring data. Please see Fig. 1 for the simplified diagram of electric layout.

Fig. 1 Simplified Diagram of the Electric Layout



LFG utilization

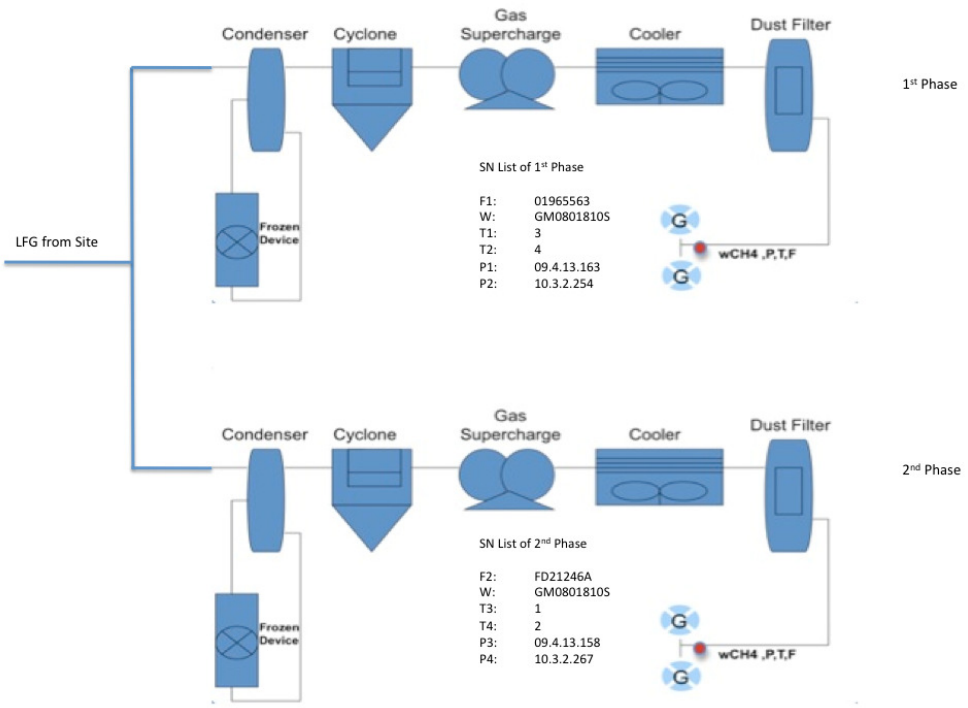
Temperature (*T*) and pressure (*p*) of the landfill gas are required to determine the

density of methane in the landfill gas. Therefore temperature and pressure meters are installed between gas treatment package and generator sets. The accuracy of temperature meter is 1.5; The accuracy of pressure meter is 2.5. For the purpose of crosscheck, additional temperature and pressure meters are installed at the same location.

At the same location there is a flow volume meter which has an accuracy of 0.5 and methane percentage analyzer, which has an accuracy of 0.5.

Please see Fig. 2, the simplified diagram of pre-processing treatment layout.

Fig. 2, the simplified diagram of pre-processing treatment layout for the period from 01/08/2009 to 31/07/2010.



*A*ccording to GS requirements, potential mitigation and/or compensation measures from the EIA

In section F of PDD, noise impact and impacts on aquatic environment and air quality can be evaluated. The institute which wrote the EIA, and the Environmental Protection Agency are conducting the re-evaluation monitoring for the first phase since the first two generators started operation.

The project meets the following environment standards during operation:

-Air Quality Standard

-Aquatic Environment standard

-Noise Controlling Standard

After that, the local EPA is responsible for the further monitoring, but this is not conducted annually. As the project's environmental impact will only differ from the outcomes of the first re-evaluation if changes in the project design happen. These aspects were monitored for the first verification, and later only if project design changes happen.

The ratio ($R_{LFG,y}$) between the LFG collected and the LFG used within the engines on average each year must be a monitoring parameter. During this monitoring period, there is no other way, such as flaring or venting, to treat the collected LFG besides generating electricity. Therefore this ratio shall be nearly close to 100%, at least higher than 65%. The actual layout of the entire collection pipelines, which covers from the wells to electricity generators, is considered as the evidence.

Data Collection:

Data related to LFG

The project owner is responsible for operation monitoring of the main meters and guarantee that the measuring equipments are in good operation and completely sealed.

The main monitoring process is as follows:

I. Methane fraction is measured and recorded hourly by project participants using certified equipment. It is measured and recorded separately for each phase.

   Flow volume is continuously measured continuously and recorded hourly by project participants using certified equipment. It is measured and recorded separately for each phase.

   Temperature and pressure are measured continuously and recorded hourly. They are measured and recorded separately for each phase.

II. The project owner keeps the records of the main meter's data readings for verification by the DOE.

If inaccuracy of the reading data from the main meter exceeds the allowable tolerance, when the meter operates abnormally during a month or any other unexpected problems occur, the amount of LFG generated shall not be counted.

Data related to Electricity Generation

The project owner and the Grid Company are responsible for operation monitoring of the main meters and guarantee that the measuring equipments are in good operation and completely sealed.

The electricity recorded by the main meter alone suffices for the purpose of billing and emission reduction verification as long as the main meter error is within the allowable tolerance. The main monitoring process is as follows:

III. Electricity generation of each generator is measured continuously and recorded hourly by project participants using certified equipment.

Electricity internal consumption is measured continuously and recorded hourly by project participants using certified equipment. It is measured and recorded separately for each phase.

IV. The project owner and Grid Company read and check the main meter and record the data at 00:00 a.m. on the second to last day of every month;

V. The project owner sells the electricity to the Grid Company;

VI. The project owner records the net electricity supplied to the grid electronically;

VII. The project owner keeps the records of the main meter's data readings for verification by the DOE.

The meter readings are readily accessible for the DOE. Calibration test records are maintained for verification.

Calibration

The verification and calibration of electricity meters are carried out periodically according to relevant national electric industry standards and regulations. After verification and calibration, meters are sealed. Meters related to the electricity generation are jointly inspected and sealed on behalf of the project owner and Grid Company and shall not be accessible by either party except in the presence of the other party or its accredited representatives.

Monitoring Parameter	Monitoring equipment Serial number	Date of calibration	Valid till	Accuracy level	Calibration Entity	Comments
EL generation	Unit 1 (M1): 100791967	07/08/2008 11/08/2009	10/08/2010	0.5S	Suzhou Power Supply Measurement Management Centre The SN of Authorization Certificate: -[2007] Liangbiao Shengshou Zhengzidi 200 valid until 03/06/2011.	4 days delayed in August 2009 (From 07/08/2009 to 10/08/2009) as per the frequency specified in approved revised monitoring plan.
	Unit 2 (M2): 100791936	07/08/2008 11/08/2009	10/08/2010	0.5S		4 days delayed in August 2009 (From 07/08/2009 to 10/08/2009) as per the frequency specified in approved revised monitor-

						ing plan.
	Unit 3 (M3): 101997920	15/12/2008 11/08/2009	10/08/2010	0.5S		N/A
EL internal consumption	M5: 2355946	12/06/2009 04/06/2010	03/06/2011	2	Suzhou Institute of Measurement and Testing Technology The SN of Authorization Certificate: -(SU) Faji (2008) 1005 Valid until 29/06/2013.	N/A
	M6: 2008-0577129	22/07/2009 04/06/2010	03/06/2011	2		
$LFG_{electricity,y}$	F1: 01965563	13/07/2009 30/07/2010	29/07/2011	0.5		17 days delayed in July 2010 (from 13/07/2010 to 29/07/2010) as per the national Verification Regulation of Flow Meter.
	F2: FD21246A	01/07/2009 29/06/2010	28/06/2011	0.5		N/A
w_{CH4}	W: GM0801810S	05/05/2009 16/06/2010	15/06/2011	0.5		42 days delayed (from 05/05/2010 to 15/06/2010) as per the national standard JJG 693-2004.
T	Old T1: 313-3	12/06/2009	11/06/2010	1.5		N/A
	New T1: 3	22/04/2010	21/04/2011	1.5		

	Old T2: 313-4	12/06/2009	11/06/2010	1.5		
	New T2: 4	22/04/2010	21/04/2011	1.5		
	Old T3: 313-1	12/06/2009	11/06/2010	1.5		
	New T3: 1	22/04/2010	21/04/2011	1.5		
	Old T4: 313-2	12/06/2009	11/06/2010	1.5		
	New T4: 2	22/04/2010	21/04/2011	1.5		
P	Old P1: 09 06 1003	13/06/2009	12/12/2009	2.5		103 days delayed (from 12/12/2009 to 24/03/2010) as per the national standard JJG 573-2003.
	New P1: 09.4.13.163	14/03/2010	13/09/2010	2.5		
	Old P2: 09 06 1004	13/06/2009	12/12/2009	2.5		N/A

	New P2: 10.3.2.254	05/11/2009	04/05/2010	2.5		
		25/04/2010	24/10/2010			
	Old P3: 09 06 1001	13/06/2009	12/12/2009	2.5		103 days delayed (from 12/12/2009 to 24/03/2010) as per the national standard JJG 573-2003.
	New P3: 09.4.13.158	14/03/2010	13/09/2010	2.5		
	Old P4: 09 06 1002	13/06/2009	12/12/2009	2.5		N/A
	New P4: 10.3.2.267	05/11/2009	04/05/2010	2.5		
		25/04/2010	24/10/2010			

Therefore, the maximum error of each parameter is applied for ER calculation during calibration delay period. The details are as follows.

M1: According to the calibration report of M1 checked on 11/10/2010, the maximum error of M1 is 0.5%. Therefore, 99.5% of discount factor is applied for the electricity generation of M1 from 07/08/2009 to 10/08/2009 in ER calculation.

M1 (07/08/2009 ~ 10/08/2009)	Without 99.5% discount factor	With 99.5% discount factor
EL Generation(MWh)	75.72	75.34
ER from M1 (t)	67	67

M2: According to the calibration report of M2 checked on 11/10/2010, the maximum error of M2 is 0.5%. Therefore, 99.5% of discount factor is applied for the electricity generation of M2 from 07/08/2009 to 10/08/2009 in ER calculation.

M2 (07/08/2009 ~ 10/08/2009)	Without 99.5% discount factor	With 99.5% discount factor

EL Generation(MWh)	0	0
ER from M2 (t)	0	0

F1: According to the calibration report of F1 checked on 11/10/2010, the maximum error of F1 is 0.5%. Therefore, 99.5% of discount factor is applied for the flow volume of F1 from 13/07/2010 to 29/07/2010 in ER calculation.

F1 (13/07/2010 ~ 29/07/2010)	Without 99.5% discount factor	With 99.5% discount factor
Total Flow Volume (m3)	392,284	390,323
ER from Phase 1 (t)	2,967	2,953

W: According to the calibration report of W checked on 11/10/2010, the maximum error of W is 0.5%. Therefore, 99.5% of discount factor is applied for the methane fraction of W from 05/05/2010 to 15/06/2010 in ER calculation.

W (05/05/2010~ 31/05/2010)	Without 99.5% discount factor	With 99.5% discount factor
ER from Methane Avoidance (t)	10,293	10,242

W (01/06/2010~ 15/06/2010)	Without 99.5% discount factor	With 99.5% discount factor
ER from Methane Avoidance (t)	3,414	3,397

P3 measures the pressure of 2nd phase. Since P4 is also the pressure meter for 2nd phase, its calibration record is fine. There is no need to apply maximum error for P3.

P1 measures the pressure of 1st phase. Since P2 is also the pressure meter for 1st phase, its calibration record is fine. There is no need to apply maximum error for P1.

In addition, ER is not counted when the relevant parameter is not monitored. The details are as follows.

The methane analyzer was sent to the calibration entity for calibration from 10/06/2010 to 17/06/2010. Therefore, the ER from methane avoidance during the period from 10/06/2010 to 17/06/2010 has been not counted in ER calculation.

The Flow meter F1 was sent to the calibration entity for calibration from 27/07/2010 to 03/08/2010. The parameter amount of landfill gas combusted in power plant at normal temperature and pressure of Line 1 for these two periods can not be monitored. Therefore, the ER from methane avoidance during the period from 27/07/2010 to 31/07/2010 has been not counted in ER calculation.

The Flow meter F2 was sent to the calibration entity for calibration from 29/06/2010 to 04/07/2010. The parameter amount of landfill gas combusted in power plant at normal temperature and pressure of Line 2 for these two periods can not be monitored. Therefore, the ER from methane avoidance during the period from 29/06/2010 to 04/07/2010 has been not counted in ER calculation.

The meters, which are related to the electricity generation, installed were tested by the qualified metrical organization co-authorized by the project owner and the Grid Company within 10 days after:

i The detection of a difference larger than the allowable tolerance in the readings of the main meter and/or the backup meters;

ii Repair to the faulty meter caused by improper operation.

Data Management

Data were archived at the end of each month using electronic spreadsheets. The electronic files were stored on hard disk and CD-ROM. In addition, a printed hard copy is as well archived.

The project owner also collected sales receipts for the power delivered to the grid as a crosscheck. At the end of each crediting year, a monitoring report is compiled detailing the metering results backed up by sales receipts.

Physical documentation were collected and stored by the project owner in a central place, together with the monitoring plan. In order to facilitate the auditor's reference, monitoring results were indexed. All data records are kept for a period of 2 years following the end of the crediting period.

5. Summary of Monitoring Data

Emission reduction related parameters:

Monitoring data of Electricity:

	$EL_{generation}$ (MWh)	$EL_{internal\ consumption}$ (MWh)	EL_{LFG} (MWh)
01/08/2009-31/08/2009	1,008	74	934
01/09/2009-30/09/2009	1,161	76	1,085
01/10/2009-31/10/2009	1,896	105	1,791
01/11/2009-30/11/2009	2,285	103	2,182
01/12/2009-31/12/2009	2,359	105	2,254
2009	**8,709**	**463**	**8,246**
01/01/2010-31/01/2010	1,810	82	1,728
01/02/2010-28/02/2010	2,203	97	2,106

01/03/2010-31/03/2010	2,204	97	2,107
01/04/2010-30/04/2010	2,299	105	2,194
01/05/2010-31/05/2010	2,358	119	2,239
01/06/2010-30/06/2010	2,203	119	2,084
01/07/2010-31/07/2010	2,409	136	2,011
2010	**15,486**	**755**	**14,731**
Total	**24,195**	**1,218**	**22,977**

$EL_{LFG} = EL_{generation} - EL_{internal\ consumption}$

Emission Reduction Calculation of Methane Avoidance:

$$ER_{CH4} = \frac{LFG_{electricity,y} \times W_{CH4} \times P_1 \times T_0 \times \rho_0 \times GWP_{CH4}}{P_0 \times T_1}$$

ER_{CH4} = Emission reduction from methane avoidance, t
$LFG_{electrcity,y}$ = Amount of landfill gas combusted in power plant, m^3
W_{CH4} = Methane fraction in the landfill gas, m^3 CH_4/m^3 LFG
P_1 = Pressure of landfill gas, kPa
T_0 = Temperature under standard condition, 0 degree Celsius
ρ_0 = Density of methane under standard condition, 0.0007168t/m^3
GWP_{CH4} = Global warming potential of methane, 21 tCO_2e/tCH_4
P_0 = Pressure under standard condition, 101.3 kPa
T_1 = Temperature of landfill gas, degree Celsius

	LFG electricity (m^3)	ER of Methane avoidance (t CO_2e)
01/08/2009-31/08/2009	**820,233**	6,728
01/09/2009-30/09/2009	**843,637**	7,344
01/10/2009-31/10/2009	**1,062,080**	9,745
01/11/2009-30/11/2009	**1,217,284**	12,833
01/12/2009-31/12/2009	**1,185,290**	13,037
2009	**5,128,524**	**49,688**
01/01/2010-31/01/2010	**968,358**	10,575
01/02/2010-28/02/2010	**1,142,659**	11,994
01/03/2010-31/03/2010	**1,184,801**	12,101
01/04/2010-30/04/2010	**1,219,367**	12,017
01/05/2010-31/05/2010	**1,308,935**	11,844
01/06/2010-30/06/2010	**1,221,383**	7,002
01/07/2010-31/07/2010	**956,895**	9,078
2010	**8,002,398**	**74,610**
Total	**13,130,922**	**124,298**

Calculate the Lower bound of the 95% confidence interval of fraction of methane in

the landfill gas:

(1) Calculate sample mean (μ)

$$\mu_{WCH4,y} = \frac{\sum_{m=1}^{n_m} W_{CH4,m,y}}{n_m}$$

$\mu_{WCH4,y}$ = Mean of the fraction of methane in the landfill gas in year *y* (m^3 CH_4/m^3 LFG)

$W_{CH4,m,y}$ = Monitored fraction of methane in the landfill gas in measurement *m* in year *y*, (m^3 CH_4/m^3 LFG)

n_m = Number of measurements *m* in year *y* (minimum is 4)

(2) Calculate the sample standard deviation (σ)

$$\sigma_{WCH4,y} = \sqrt{\frac{\sum_{m=1}^{n_m} (W_{CH4,m,y} - \mu_{WCH4,y})^2}{n_m - 1}}$$

$\sigma_{WCH4,y}$ = Standard deviation of the fraction of methane in the landfill gas in year *y* (m^3 CH_4/m^3 LFG)

(3) Calculate the 95% confidence interval.

$$\mu_{WCH4,y} - t \cdot \frac{\sigma_{WCH4,y}}{\sqrt{n_m}} \leq W_{CH4,m,y} \leq \mu_{WCH4,y} + t \cdot \frac{\sigma_{WCH4,y}}{\sqrt{n_m}}$$

t[4] =Value from standard *t* distribution for a confidence level of 95% with degrees of freedom $n_m - 1$

(4) Use the lower bound of the 95% confidence interval obtained below to ensure conservativeness.

$$W_{CH4,Ib,y} = \mu_{WCH4,y} - t \cdot \frac{\sigma_{WCH4,y}}{\sqrt{n_m}}$$

$W_{CH4,Ib,y}$ =Lower bound of the 95% confidence interval of fraction of methane in the landfill gas (m^3 CH_4/m^3 LFG)

Therefore,

[4] For this project, t is 1.960. Source: Engineering Statistics Handbook, Information Technology Laboratory, US, http://www.itl.nist.gov/div898/handbook/eda/section3/eda3672.htm

Phase 1	Lower Bound of W	Higher Bound of W
01/08/2009-31/12/2009	64.36%	64.38%
01/01/2010-31/07/2010	65.41%	65.63%

Phase 2	Lower Bound of W	Higher Bound of W
01/08/2009-31/12/2009	64.65%	64.67%
01/01/2010-31/07/2010	68.42%	68.73%

	ER of Methane avoidance (t CO_2e)	ER of Methane avoidance with $W_{CH4,lb,y}$ (t CO_2e)	To be conservative (t CO_2e)
01/08/2009-31/08/2009	6,728	7,589	
01/09/2009-30/09/2009	7,344	7,897	
01/10/2009-31/10/2009	9,745	9,974	
01/11/2009-30/11/2009	12,833	11,812	
01/12/2009-31/12/2009	13,037	11,617	
2009	**49,688**	**48,889**	**48,889**
01/01/2010-31/01/2010	10,575	9,959	
01/02/2010-28/02/2010	11,994	11,488	
01/03/2010-31/03/2010	12,101	12,158	
01/04/2010-30/04/2010	12,017	12,090	
01/05/2010-31/05/2010	11,844	12,756	
01/06/2010-30/06/2010	7,002	11,816	
01/07/2010-31/07/2010	9,078	11,436	
2010	**74,610**	**81,703**	**74,610**
Total	**124,298**	**130,592**	**123,499**

Emission Reduction Calculation of Electricity Generation:

$ER_{electricity} = (EL_{generation} - EL_{internal\ consumption}) * EF_{CM}$

$ER_{electricity}$ = Emission reduction from electricity generation, t
$EL_{generation}$ = Electricity generation from the generator in the year y, MWh
$EL_{internal\ consumption}$ = Electricity imported from the grid in the year y, MWh
EF_{CM} = Combined margin CO_2 emission factor of East China Power Grid in year *y,* 0.8847 tCO2e/MWh

	ER of Electricity generation (t CO_2e)
01/08/2009-31/08/2009	827
01/09/2009-30/09/2009	960
01/10/2009-31/10/2009	1,585
01/11/2009-30/11/2009	1,931
01/12/2009-31/12/2009	1,994
2009	**7,296**

01/01/2010-31/01/2010	1,529
01/02/2010-28/02/2010	1,863
01/03/2010-31/03/2010	1,864
01/04/2010-30/04/2010	1,941
01/05/2010-31/05/2010	1,980
01/06/2010-30/06/2010	1,844
01/07/2010-31/07/2010	2,011
2010	**13,032**
Total	**20,328**

Operational hours of the energy plant:

	Unit	2009	2010	01/08/2009-31/07/2010
Generator I	h	3,101	4,821	7,922
Generator II	h	2,470	4,526	6,996
Generator III	h	3,511	4,837	8,348

The situation of laws and regulations about waste management system in China are the same as the one when the project was validated and registered.

Sustainable development related parameters:

Air quality (AQ_y):
It refers to negative air quality effects (emissions other than GHG) that are prevented by processing units. For this project, the monitored pollutant is NOx.

The waste gas meets the requirement of national standard “GB 13271-2001”. It has been monitored by Centre Testing International (Suzhou) Limited, which is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The result is as follows.

	Value (mg/m3)	Monitored Date	Result
Requirement	< 400		
Generator I	360	29/08/2010	Measured values meet requirement

	Value (mg/m3)	Monitored Date	Result
Requirement	< 400		
Generator II	375	29/08/2010	Measured values meet requirement

	Value (mg/m3)	Monitored Date	Result
Requirement	< 400		

Generator III	329	29/08/2010	Measured values meet requirement

Water Quality (WQ_y):

It refers to negative water quality effects that are prevented by treatment units from a nearby specific leachate treatment plant.

All leachate generated during this monitoring period were treated in Suzhou Everbright leachate treatment plant.

According to the Underground Water Environmental Impact Assessment Report (SUH10070261601), the wastewater is treated in the nearby treatment plant. It has been also monitored by Centre Testing International (Shenzhen) Corporation Shanghai Branch. The underground water is qualified.

The underground water quality meets the requirement of national standard "GB 14848-93" and "GB18918-2002". It has been monitored by Centre Testing International (Shenzhen) Corporation Shanghai Branch. The result is as follows.

Monitored Parameter	Monitored Value	Required Value	Result	Score
pH	6.63	6.5~8.5	Class I	0
Chroma	1(mg/L)	=<5(mg/L)	Class I	0
COD	6.82(mg/L)	50(mg/L)	Class I	-
BOD5	2.49(mg/L)	10(mg/L)	Class I	-
LAS	<0.05(mg/L)	=<0.1(mg/L)	Class II	1
Total Hardness (CaCO3)	99.6(mg/L)	=<150(mg/L)	Class I	0
NH4	0.465(mg/L)	=<0.5(mg/L)	Class IV	6
Nitrate(N)	0.233(mg/L)	=<2.0(mg/L)	Class I	0
Nitrite(N)	0(mg/L)	=<0.001(mg/L)	Class I	0
Volatile Phenol	2.64×10^-3(mg/L)	=<0.01(mg/L)	Class IV	6
CN	<0.002(mg/L)	=<0.01(mg/L)	Class II	1
KMnO4	0.56(mg/L)	=<1.0(mg/L)	Class I	0
Sulphate	2.00(mg/L)	=<50(mg/L)	Class I	0
Cl	4.85(mg/L)	=<50(mg/L)	Class I	0
As	<0.001(mg/L)	=<0.005(mg/L)	Class I	0
Hg	<0.0001(mg/L)	=<0.0005(mg/L)	Class II	1
Cd	<0.004(mg/L)	=<0.01(mg/L)	Class III	3
Cr6+	<0.004(mg/L)	=<0.005(mg/L)	Class I	0
Fe	0.164(mg/L)	=<0.2(mg/L)	Class II	1
Mn	0.318(mg/L)	=<1(mg/L)	Class IV	6
Pb	<0.0025(mg/L)	=<0.005(mg/L)	Class I	0
Total Coli-group	0(unit/L)	=<100(unit/L)	Class I	0

The final score is 4.24, which belong to Class III. Therefore the underground water can be used as drinking, industrial and agriculture.

Other Pollutant:

It refers to noise impacts that are prevented by several approaches.

The noise during the construction period has local and temporary characteristic. It disappeared when the construction work was completed. During daily operation, the generators have been equipped with a shell to reduce noise. The noise meets the requirement of national standard GB 12348-2008 and GB/T14366-1993. It has been monitored by Centre Testing International (Suzhou) Limited, which is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The result is as follows.

Plant Boundary:

Test Location	Result
	Day
	Test Date: 29/08/2010
	Value
Requirment	< 65 dB(A)
1 meter away from plant eastern boundary	56.7 dB(A)
1 meter away from plant southern boundary	55.3 dB(A)
1 meter away from plant western boundary	52.1 dB(A)
1 meter away from plant northern boundary	52.9 dB(A)

Test Location	Result
	Night
	Test Date: 29/08/2010
	Value
Requirment	< 55 dB(A)
1 meter away from plant eastern boundary	52.7 dB(A)
1 meter away from plant southern boundary	51.2 dB(A)
1 meter away from plant western boundary	47.4 dB(A)
1 meter away from plant northern boundary	47.1 dB(A)

In Plant

Test Location	Result
	Test Date: 29/08/2010
	Value
Requirement	< 85 dB(A)
Control Room	73.4 dB(A)

Quality of Employment:

It includes job quality, fulfillment of labour standards.

The training programme contributes to the quality of employment as employees gain knowledge about monitoring equipments, operation of imported gas engine and computer operations, environment and safety. The content of training program includes Basic Knowledge of Environment and Safety; Case Study and Assessment on Plant Accidents; Study on ERP system; Theory of Gas Engine and Maintenance and Safe Operation of LFG Pre-treatment System. The list of training courses, which were held for employees during this monitoring period, is as follows.

	Date	Number of Participants	Content	Speaker
1	04/09/2009	12 (workers, engineers and administrators)	Basic Knowledge of Environment and Safety	SONG Xiaoguang, General Manager from Dow Corning Environment Consultancy Company.
2	11/09/2009	9 (workers and administrators)	Case Study and Assessment on Plant Accidents	Education Center of Jiangsu Province Safety Supervision Department.
3	16/04/2010	7 (workers and project manager)	Safety and Environment Management	Administor from project company
4	21/05/2010	7 (workers and project manager)	Study on ERP system	
5	30/07/2010	7 (workers and project manager)	Theory of Gas Engine	Senior Engineer from project company

Livelihood of the poor:

Payroll of employees is used for monitoring this parameter.

Six local workers are responsible for daily operation of the project activity. There are 9 other people (of which 5 are local), who are also responsible for other tasks, such as accounting and general management. There is another worker, who is a deaf person and responsible for taking care all LFG wells. The table below shows all information of the people, who are engaged in this project.

The incomes of the employees are significant for their families. In addition, they all have received social insurances.

	Name	Gender	Local	Title/Responsibility	Full time work on this project
1	ZHANG Jin	Male	Yes	Operator	Yes
2	MAO Xueting	Male	Yes	Operator	Yes
3	WANG Hua	Male	Yes	Operator	Yes
4	ZHOU Chunxi	Male	Yes	Operator	Yes
5	LIU Zhaofeng	Male	Yes	Operator	Yes

6	DING Youjiu	Male	Yes	Operator	Yes
7	ZHANG Hanqing	Male	Yes	Worker	Yes
8	PAN Yongjin	Male	Yes	Project manager	No
9	CHU Yu-zhong	Male	No	Vice Project manager	Yes
10	LIU Lu	Female	No	Assistant project manager of carbon trade	No
11	CHEN Yang	Male	No	Project manager of carbon trade	No
12	ZHANG Yunyue	Male	No	General manager of carbon trade	No
13	MA Liya	Female	Yes	Office worker responsible for file management	No
14	HUA Chungang	Female	Yes	Accountant	No
15	SUN Xiandong	Male	No	Senior engineer	No
16	CAI Shu-guang	Male	Yes	General manager	No

Human and institutional capacity:

Training documentation and invoices are used to monitor this parameter.

The content of training program includes the advanced experiences on the operation and administration of landfill site and LFG electricity generation; Plan of Urban Sanitary. They were organized and financed by the project company for external people such as officials from the city government, financial institutions and environment protection agency. The speakers are experts or professors in the relevant fields. The trained local officials also had the opportunity to exchange their experiences with representatives from Australia and New Zealand. Those programs help them to fully understand and support green technologies and projects in Suzhou city, contributing to further replication of clean technology and renewable energy initiatives in the region. The list of some training activities is as follows.

	Date	Amount of Participants	Content
1	12/2009	6 (2 female)	advanced experiences on the operation and administration of landfill site and LFG electricity generation; Plan of Urban Sani-

			tary.

In addition, Project Company also provides visiting opportunity to local students, in order to teach them in a practical way about environment protection and sustainable development. On 20/07/2010, there are 15 high school students visited this project and took a training course onsite with project operators.

Quantity of Employment (Emp_y)

Number of people engaged are monitored.

Payroll of the employees is used to monitor this parameter. According to payroll information six workers are employed by the project activity and responsible for the operation. Besides these workers, there are more people, who are responsible for administration, accounting, regular maintenance or cleaning services in this project.

GS eligibility criteria / 65% threshold ($R_{LFG, y}$)

It is the ratio between the LFG collected and the LFG used for power generation within the engines on average each year.

As per monitoring plan, the latest LFG project layout could show that $R_{LFG, y}$ meets the requirements of the Gold Standard. This is because there is no other pipeline connected to the project site and no landfill gas was used for any other purpose than electricity generation or sent to the atmosphere directly. There is no flaring system in this project. Therefore close to 100% of the biogas is used for electricity production, which means that the threshold of 65% ratio is met. This parameter is subject to verification and confirmation by the DOE during site visit and in the verification report.

Summary of Results

Emission reduction:

The total emission reduction calculated through the approved revised monitoring plan approach for this monitoring period are summarized as following.

	01/08/2009-31/12/2009	01/01/2010-31/07/2010	01/08/2009-31/07/2010
EL $_{generation}$ (MWh)	8,709	15,486	24,195
EL $_{internal\ consumption}$ (MWh)	463	755	1,218
EL $_{LFG}$ (MWh)	8,246	14,731	22,977
ER by EL $_{LFG}$ (tCO2e)	**7,296**	**13,032**	**20,328**
ER by Methane (tCO2e)	**48,889**	**74,610**	**123,499**
Total ER (tCO2e)	**56,185**	**87,642**	**143,827**

Operational hours of the energy plant:

	Unit	01/08/2009-31/12/2009	01/01/2010-31/07/2010	01/08/2009-31/07/2010
Generator I	h	**3,101**	**4,821**	**7,922**
Generator II	h	**2,470**	**4,526**	**6,996**
Generator III	h	**3,511**	**4,837**	**8,348**

Sustainable development: All the parameters meet the requirements from Gold Standard.

6. Comparison of actual emission reductions with estimates in the registered GS-PDD

6.1 Emission reduction comparison for project

	2009	Comment
PDD	110,686 t	
1st MR	54,783 t	
2nd MR	56,185 t	
1st + 2nd MR	110,968 t	
Difference	282 t	
Percentage	0.25%	The difference is very small

	2010	Monthly Average
PDD	126,738 t	10,561.5
2nd MR	87,642 t	12,520.2
Difference	-	1,958.7
Percentage		18.54% Increased

6.2 Comparison Net Electricity Generation in PDD and MR for this monitoring period

	#3 and 4# Generator	5# and 6# Generator	If 3#, 4# and 5# Generator Only
PDD	15,840 MWh	17,120 MWh	24,400 MWh[5]
MR			22,977 MWh
Difference			1,423 MWh
Percentage			5.83% Decreased

The analysis above shows that in 2009 the emission reduction level is in line with the estimated value. In 2010 (from 01/01/2010 to 31/07/2010) the emission reduction is 18.54% higher than expected. However, it should be noted that during the same period of time (01/01/2010 to 31/07/2010), the net electricity generation level is within a reasonable range of the designed level. The emission reduction higher than the expected level in 2010 is due to the reason below:

Calculate the efficiency of generators

$$\eta = \frac{EL_{generation}}{CH4_{consumption}}$$

[5] 15,840 +17,120/2=24,400 MWh

η = Electrical Efficiency of generators, %

$EL_{generation}$ = Electricity generation from the generator in the year y, MJ, 1kWh=3.6MJ

$CH4_{consumption}$ = Consumed CH4, MJ

$$CH4_{consumption} = \frac{ER_{CH4}}{GWP_{CH4}} \times 1000 \times NCV_{CH4}$$

$CH4_{consumption}$ = Consumed CH4, MJ

ER_{CH4} = Emission reduction from methane avoidance, t

NCV_{CH4} = Net calorific value per mass of methane, 48. 00 MJ/kg[6]

GWP_{CH4} = Global warming potential of methane, 21 $tCO_2e/tCH4$

	01/08/2009-31/12/2009	01/01/2010-31/07/2010	01/08/2009-31/07/2010
EL $_{generation}$ (MWh)	8,709	15,486	24,195
EL $_{generation}$ (MJ)	31,352,400	55,749,600	87,102,000
ER by Methane (tCO2e)	48,889	74,610	123,500
CH4 consumption (MJ)	111,746,286	170,537,143	282,285,714
Estimated Efficiency	28.06%	32.69%	30.86%

The designed efficiency of the project's generators is 38.50%. The figures above show the project's actual performance is below designed level as described in the PDD.

The performance of the project is further cross-checked with CDM projects' of the same type.

Comparison of other three registered CDM projects:

No. 0071 Nanjing Tianjingwa Landfill Gas to Electricity Project

	30/05/2006-19/10/2006	20/10/2006-29/10/2007	30/10/2007-29/06/2008
EL $_{generation}$ (MWh)	3,052	9,005	5,470
EL $_{generation}$ (MJ)	10,987,200	32,418,000	19,692,000
ER by Methane (tCO2e)	12,956	42,180	23,950

[6] For natural gas as per IPCC
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (page 1.18)

CH4 consumption (MJ)	29,613,714	96,411,429	54,742,857
Estimated Efficiency	37.10%	33.62%	35.97%

No. 0887 Shenzhen Xiaping Landfill Gas Collection and Utilization Project

	01/07/2007-01/09/2007	02/09/2007-01/01/2008	02/01/2008-31/01/2009
$EL_{generation}$ (MWh)	3,183	18,841	5,714
$EL_{generation}$ (MJ)	11,458,584	67,826,304	20,570,688
ER by Methane (tCO2e)	16,200	86,784	27,929
CH4 consumption (MJ)	37,029,600	198,363,840	63,838,080
Estimated Efficiency	30.94%	34.19%	32.22%

No. 0933 Jinan Landfill Gas to Energy Project

	13/05/2007-30/09/2007
$EL_{generation}$ (MWh)	1,603
$EL_{generation}$ (MJ)	5,770,800
ER by Methane (tCO2e)	10,815
CH4 consumption (MJ)	24,720,000
Estimated Efficiency	23.34%

Published data shows performance of the CDM landfill gas projects ranges from 23.34% to 37.10% efficiency. Compared with other projects, 30.86% of efficiency (01/08/2009 – 31/07/2010) and 32.69% (01/01/2010-31/07/2010) are within reasonable range.

Considering the above, the difference in actual and estimated emission reductions in the first seven months of 2010 is justified. The project has been operated to perform the designed level of electricity output.

6.3 Response to GS' comments regarding to the clarification of Suzhou Qizi Mountain Landfill Gas Recovery Project, China (GS397)

GS comment:
PP and DOE shall ensure that the reported increase in the ERs count over the monitoring period 01/08/2009 - 31/07/2010 is based on credible monitoring and the variation in the average methane fraction in captured landfill gas is explicable and within reasonable range. Therefore, PP and DOE are requested to address following points in the Monitoring Report and Verification Report:

Comment 1:
The GS has noted that the average methane fraction over the period 01/08/2009- 31/07/2010 is in the range of 64.4% - 68.7%. However the methane fraction during previous period was reported as 55.8% (2007), 53.4% (2008) and 50.7% (2009). The PP shall further justify the increase in the monitored methane fraction. The DOE shall confirm that the methane fraction over the period 01/08/2009- 31/07/2010 is at reasonable level.

PP Response:

Methane fraction is normally variable over the implementation period. During this monitoring period, it reached a relative peak; however, it is still reasonable. See the article[7], two environmental experts tested the methane faction of LFG from a landfill site located in Nanjing city, where is very close to Suzhou city in the same province. The result is that the methane faction is higher than 60% from that landfill site. Therefore, with quite similar environmental conditions, it is possible that methane faction of this project is higher than 60% sometimes.

Comment 2:
The average efficiency of the generator set(s) is (are) estimated to be 32.7% over the period 01/01/2010- 31/07/2010, 4.6% higher than the average level over the period 01/08/2009- 31/12/2009. The PP shall discuss the possible factors those may be accountable for the variation in generator set efficiency. The DOE shall confirm that the efficiency and its variation are at reasonable level with reference to comparable CDM or VER LFG projects from China.

PP Response:

See the above result, three CDM registered projects have been compared with. Published data shows performance of the CDM landfill gas projects ranges from 23.34% to 37.10% efficiency. Compared with other projects, 30.86% of efficiency (01/08/2009 – 31/07/2010) and 32.69% (01/01/2010-31/07/2010) are within reason able range.

6.4 Indirected Approach of Emission Reduction from Methane Aovidance

However, PP decides to apply an indirect approach, which has been approved by GS and applied during the first monitoring period. The emission Reduction Calculation of Methane Avoidance is as below:

- Based on the electricity generation

$$ER_{CH4} = \frac{EL_{generation}}{\eta \times NCV_{CH4} \times 1000} \times GWP_{CH4}$$

ER_{CH4} = Emission reduction from methane avoidance, t

[7] "Field Trial of LFG Collection and Engineering Design Parameters"/HUANG Zheng-hua, ZENG Su/Department of Environmental Enginering of Southeast University, Nangjing 210096, P.R.China.

$EL_{generation}$ = Electricity generation from the generator in the year y, MJ, 1kWh=3.6MJ

η = Electrical Efficiency of generators, all of three generators is the same model, 38.5%

NCV_{CH4} = Net calorific value per mass of methane, 48. 00 MJ/kg

GWP_{CH4} = Global warming potential of methane, 21 $tCO_2e/tCH4$

	EL $_{generation}$ (MWh)	ER of Methane avoidance (t CO_2e)
01/08/2009-31/08/2009	1,008	4,124
01/09/2009-30/09/2009	1,161	4,748
01/10/2009-31/10/2009	1,896	7,756
01/11/2009-30/11/2009	2,285	9,348
01/12/2009-31/12/2009	2,359	9,652
2009	**8,709**	**35,628**
01/01/2010-31/01/2010	1,810	7,404
01/02/2010-28/02/2010	2,203	9,012
01/03/2010-31/03/2010	2,204	9,015
01/04/2010-30/04/2010	2,299	9,404
01/05/2010-31/05/2010	2,358	9,646
01/06/2010-30/06/2010	2,203	9,013
01/07/2010-31/07/2010	2,409	9,857
2010	**15,486**	**63,350**
Total	**24,195**	**98,978**

7. Summary of Emission reductions calculation

Emission reduction:

The total emission reduction calculated through the indirect approach for this monitoring period are summarized as following.

	01/08/2009-31/12/2009	01/01/2010-31/07/2010	01/08/2009-31/07/2010
EL $_{generation}$ (MWh)	8,709	15,486	24,195
EL $_{internal\ consumption}$ (MWh)	463	755	1,218
EL $_{LFG}$ (MWh)	8,246	14,731	22,977
ER by EL $_{LFG}$ (tCO2e)	**7,296**	**13,032**	**20,328**
ER by Methane (tCO2e)	**35,628**	**63,350**	**98,978**
Total ER (tCO2e)	**42,924**	**76,382**	**119,306**

During the monitoring period, the emission reductions amounted to 119,306 tCO_2e.
Comparison updated ER in PDD and MR

	2009	Comment
PDD	110,686 t	N/A
1st MR	54,783 t	
2nd MR	42,924 t	
1st + 2nd MR	97,707 t	
Difference	-12,979 t	
Percentage	-11.73%	

	2010	Monthly Average
PDD	126,738 t	10,561.5
2nd MR	76,382 t	10,911.7
Difference	-	350.2
Percentage		3.3% Increased, the is reasonable and accept-able

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History of the document

Version	Date	Nature of revision
3	07/09/2011	Responses according to GS and DOE's comments
2	25/10/2010	Revision according to DOE's findings
1	23/09/2010	Following the requirements of the verification