

Monitoring Report

Gold Standard Version 1

Suzhou Qizi Mountain Landfill Gas Recovery Project (GS 397)

The 1st monitoring period: 22/04/2007- 31/07/2009

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

The 3rd monitoring period: 01/08/2010- 31/12/2011

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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. The first monitoring period is from 22/04/2007 to 31/07/2009. The second monitoring period is from 01/08/2009 to 31/07/2010. ER during both periods was verified and certified.

Further background information on the project activity can be found in the Project Design Document (PDD) Version 2.0 on 08/12/2008, 1st Monitoring Report, 2nd 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 Reports of 1st and 2nd Verification and associated documents are available upon request. The revised monitoring plan was approved by Gold Standard on 07/01/2010.

3. Monitoring Background

Generator #3 and #4 started construction in November 2005 and started operation on 01/01/2007, Generator #5 started construction in August 2007 and started operation in September 2008, and Generator #6 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.

The downtimes of Generator #3 was from 02/08/2010 to 05/08/2010 and from 25/11/2011 to 31/12/2011. The downtimes of Generator #5 was from 08/10/2011 to 15/10/2011. Generator #4 was operated continuously. There is no other special event besides downtimes of generators.

4. Monitoring Results

4.1. Monitoring period

This is the third monitoring report of this project activity. It covers the period from 01/08/2010 to 31/12/2011 (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:

The Approved Revised Monitoring Plan Approach:

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

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

ER_{CH4}	= Emission reduction from methane avoidance, tCO ₂ e
$LFG_{electricity,y}$	= 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 ₂ e/tCH ₄
P_0	= Pressure under standard condition, 101.3 kPa
T_1	= Temperature of collected landfill gas, degree Celsius

Emission Reduction Calculation of Electricity Generation:

$$ER_{electricity} = (EL_{generation} - EL_{Internal_consumption}) \times EF_{CM}$$

$ER_{electricity}$	= 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 tCO ₂ e/MWh

Total Emission Reduction:

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

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 01/08/2010 to 31/12/2011.

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. 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 **153,709 tCO₂e**.

4.5. Monitoring Parameters

Emission reduction related parameters:

Phase I

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 and M2)	MWh	Continuously measured Recorded every hour	Low	This electricity is measured by two DSSD331-3-TH electricity meters 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 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 and 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 calibration standard is JJG307-2006.

EL LFG	Net amount of electricity generated using LFG	$EL_{LFG} = EL_{\text{generation}} - EL_{\text{internal consumption}}$	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
LFG _{electricity,y}	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure	Flow meter	m ³	Continuously measured Recorded every hour	Low	This amount of landfill gas is measured by the CD2A02A1AB1H2 flow meter. Those instruments are considered as critical instruments in the QA/QC procedure.	F1: -Type: CD2A02A1-AB1H2 -Serial No.: 01965563 The calibration standard of F1 is JJG882-2004. The calibration standard of F2 is JJG198-1994.
w _{CH4}	Methane fraction in the landfill gas	Methane Analyzer	m ³ CH ₄ / m ³ LFG	Recorded and measured 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.: GM08018 The calibration standard is JJG693-2004.
T	Temperature of the landfill gas	Temperature meter	°C	Continuously measured Recorded every hour	Low	This temperature is measured by four temperature 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 T1: -Type: WSS-311 -Serial No.: 3 New T1: -Type: WSS-311 -Serial No.: 05-03 Old T2:

						ure. The meter of T1 was replaced on 09/05/2011. The meter of T2 was replaced on 19/07/2011.	-Type: WSS-311 -Serial No.: 4 New T2: -Type: WSS-311 -Serial No.: 1107301
P	Pressure of the landfill gas	Pressure meter	Pa	Continuously measured 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: P1: -Type: YE-100 -Serial No.: 09.4.13.163 P2: -Type: YE-100 -Serial No.: 10.3.2.254
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.

Phase II :

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 (M3)	MWh	Continuously measured Recorded every hour	Low	This electricity is measured by one DSSD331-MB3 electricity meter for each generator. The electricity from coming generator IV will be measured by a separate meter, which	Unit 3 (M3): -Type: DSSD331-MB3 -Serial No.: 101997920 The calibration standard is JJG307-2006.

						has not been installed. Those instruments are considered as critical instruments in the QA/QC procedure.	
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 and 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 calibration standard is JJG307-2006.
EL LFG	Net amount of electricity generated using LFG	$EL_{LFG} = EL_{generation} - EL_{internal\ consumption}$	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
LFG electricity.y	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure	Flow meter	m ³	Continuously measured Recorded every hour	Low	This amount of landfill gas is measured by 454FT-12-MT DN200 flow meter. Those instruments are considered as critical instruments in the QA/QC procedure.	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.
w_{CH_4}	Methane fraction in the landfill gas	Methane Analyzer	$m^3 CH_4 / m^3 LFG$	Recorded and measured 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.: GM08018 The calibration standard is JJG693-2004.
T	Temperature of the landfill gas	Temperature meter	$^{\circ}C$	Continuously measured Recorded every hour	Low	This temperature is measured by four temperature 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. The meter of T3 was replaced on 09/05/2011. The meter of T4 was replaced on 19/07/2011.	2nd Phase: Old T3: -Type: WSS-311 -Serial No.: 1 New T3: -Type: WSS-311 -Serial No.: 05-04 Old T4: -Type: WSS-311 -Serial No.: 2 New T4: -Type: WSS-311 -Serial No.: 1107307 The calibration standard is JJG226-2001
P	Pressure of the landfill gas	Pressure meter	Pa	Continuously measured 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	2nd Phase: P3: -Type: YE-100 -Serial No.: 09.4.13.158 P4: -Type:

						instruments are considered as critical instruments in the QA/QC procedure.	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 (emissions other than GHG) that are prevented by processing units.	Report of Environment Protection for Check & Accept from Local Environment Protection Agency/The Environmental Impact Report	Processing units are maintained periodically according to relevant national standards. Jiangsu Suhuan Project Quality Detection Co., Ltd. published a report on 08/02/2012	Air quality has been monitored by Jiangsu Suhuan Project Quality Detection Co., Ltd. The air quality is in compliance with relevant national standard GB 13271-2001	Jiangsu Suhuan Project Quality Detection Co., Ltd. is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 20111009790 and valid until 07/05/2014. Report Serie: - SH2012G0007 The test 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. Jiangsu Suhuan Project Quality Detection Co., Ltd. published a report on 18/01/2012	Water quality has been monitored by Jiangsu Suhuan Project Quality Detection Co., Ltd. The water quality is in compliance with national stan-	Jiangsu Suhuan Project Quality Detection Co., Ltd. is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 20111009790 and valid until 07/05/2014.

				standard GB 14848-93 and GB18918-2002.	Report Serie: - SH2012W0008 The test 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, several measures are implemented, 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, 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. Jiangsu Suhuan Project Quality Detection Co., Ltd. published a report on 18/01/2012	Noise quality has been monitored by Jiangsu Suhuan Project Quality Detection Co., Ltd. Noise quality is in compliance with relevant national standard GB 12348-2008 and GBZ 2.2-2007.	Jiangsu Suhuan Project Quality Detection Co., Ltd. is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The SN of Authorization Certificate is 20111009790 and valid until 07/05/2014. Report Serie: - SH2012N000501 - SH2012N000502 The test reports and accreditation certificate have been obtained and supplied to the assessment team.
Employment	Job quality, fulfillment of labour standards.	Documents of training program	Project company is certified as A class entity in term of fulfillment of labour standards by local labour authority.	Documents of training program are provided to DOE. The content of training program including: How to develop a learning team, Delicacy Management of Production, Study on ERP system, Case Study and Assessment on	Project workers and administrators in the plant also have the chance to learn new knowledge of sophisticated monitoring equipments, computer operations, environment and safety.

				Plant Accidents, Maintenance of LFG collecting system and Maintenance and Safe Operation of LFG Pre-treatment System.	
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 or local people	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.	Training evidences of students have been provided as evidence for contribution in employment of local people.	Training evidences are monitored.
Empty	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.
$R_{LFG, y}$	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.
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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 01/08/2010 to 31/12/2011.

Emission Reduction Calculation of Methane Avoidance:

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

$$ER_{CH_4} = \frac{LFG_{electricity,y} \times W_{CH_4} \times P_1 \times T_0 \times \rho_0 \times GWP_{CH_4}}{P_0 \times T_1}$$

ER_{CH_4}	= Emission reduction from methane avoidance, tCO ₂ e
$LFG_{electricity,y}$	= Amount of landfill gas combusted in power plant, m ³
W_{CH_4}	= 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_{CH_4}	= Global warming potential of methane, 21 tCO ₂ e/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:

$$ER_{electricity} = (EL_{generation} - EL_{Internal_consumption}) \times EF_{CM}$$

$ER_{electricity}$	= Emission reduction from electricity generation, tCO ₂ e
$EL_{generation}$	= 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 tCO ₂ e/MWh

Total Emission Reduction:

$$ER_{total} = ER_{CH_4} + ER_{electricity}$$

4.7. QA/QC procedure and Calibration for monitored parameters

QA/QC procedure

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. M11 and M12 are the electricity generation meters for the incineration project. M7, M8, M9 and M10 are the gateway meters for this project and incineration project. Please see Fig. 1 for the simplified diagram of electric layout.

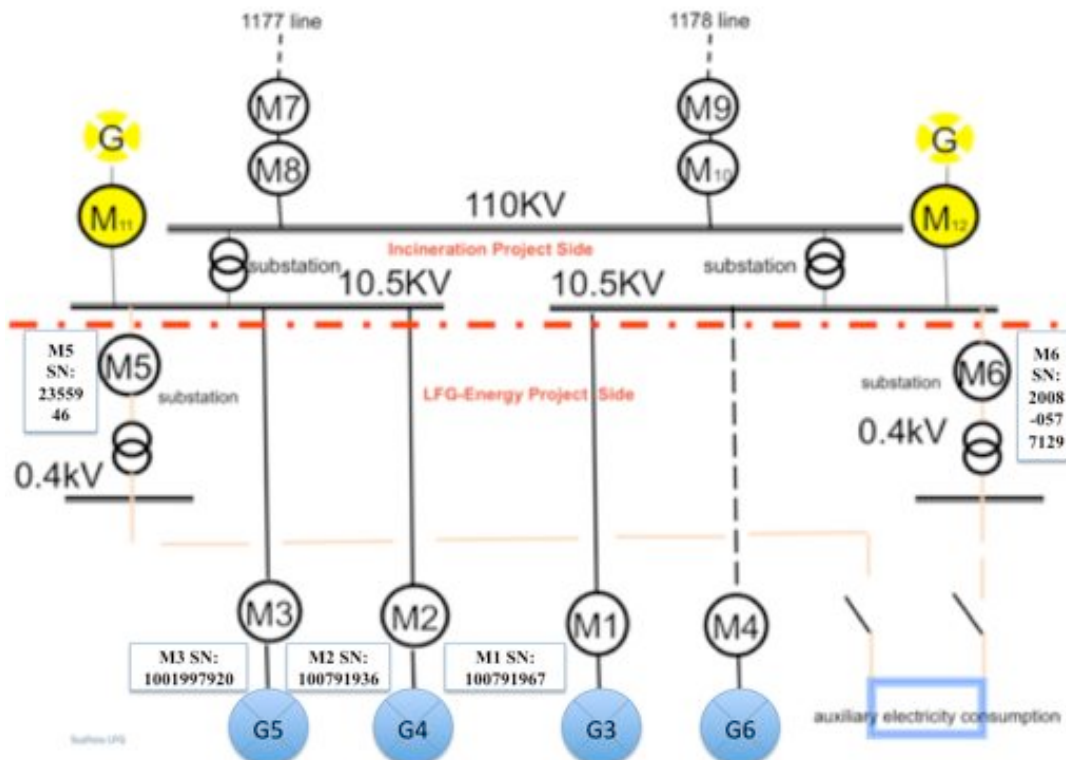


Fig. 1 Simplified Diagram of the Electric Layout

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 cross-check, 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.

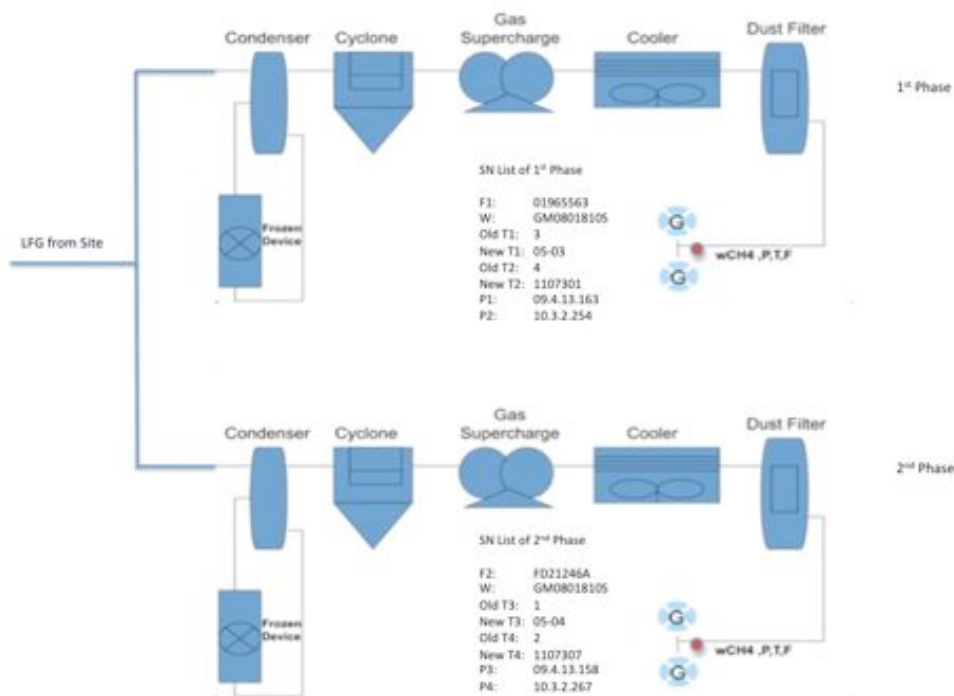


Fig. 2, the simplified diagram of pre-processing treatment layout for the period from 01/08/2009 to 31/07/2010.

According 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;
- 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	11/08/2009 10/08/2010 02/06/2011	10/08/2010 09/08/2011 01/06/2012	0.5S	Suzhou Power Supply Measurement Management Centre	N/A
	Unit 2 (M2): 100791936	11/08/2009 10/08/2010 02/06/2011	10/08/2010 09/08/2011 01/06/2012	0.5S	The SN of Authorization Certificate:	N/A
	Unit 3 (M3): 101997920	11/08/2009 10/08/2010	10/08/2010 09/08/2011	0.5S	-(2009) Sheng, Liang-	N/A

		02/06/2011	01/06/2012		biao, 354 Valid until 13/01/2013.	
EL internal consump- tion	M5: 2355946	04/06/2010 02/06/2011	03/06/2011 01/06/2012	2	Suzhou Insti- tute of Meas- urement and Testing Tech- nology The SN of Authorization Certificate: -(SU) Faji (2008) 1005 Valid until 29/06/2013.	N/A
	M6: 2008-0577129	04/06/2010 02/06/2011	03/06/2011 01/06/2012	2		
LFG ^{elec-} tricity,y	F1: 01965563	30/07/2010 27/05/2011	26/05/2012	0.5		N/A
	F2: FD21246A	29/06/2010 26/05/2011	25/05/2012	0.5		N/A
W _{CH4}	W: GM08018	16/06/2010 24/05/2011	15/06/2011 23/05/2012	0.5		N/A
T	Old T1: 3	22/04/2010	21/04/2011	1.5		N/A
	New T1: 05-03	05/05/2011	04/05/2012	1.5		
	Old T2: 4	22/04/2010	21/04/2011	2.0		

	New T2: 1107301	14/07/2011	13/07/2012	2.5		
	Old T3: 1	22/04/2010	21/04/2011	4.0		
	New T3: 05-04	05/05/2011	04/05/2012	1.5		
	Old T4: 2	22/04/2010	21/04/2011	1.5		
	New T4: 1107307	14/07/2011	13/07/2012	1.5		
P	P1: 09.4.13.163	14/03/2010 16/09/2010 18/03/2011 13/09/2011	13/09/2010 15/03/2011 17/09/2011 12/03/2012	2.5		N/A
	P2: 10.3.2.254	25/04/2010 23/10/2010 18/03/2011 13/09/2011	24/10/2011 22/04/2011 17/09/2011 12/03/2012	2.5		N/A

	P3: 09.4.13.158	14/03/2010 16/09/2010 18/03/2011 13/09/2011	13/09/2010 15/03/2011 17/09/2011 12/03/2012	2.5		N/A
	P4: 10.3.2.267	25/04/2010 23/10/2010 18/03/2011 13/09/2011	24/10/2010 22/04/2011 17/09/2011 12/03/2012	2.5		N/A

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:

Emission Reduction Calculation of Methane Avoidance:

$$ER_{CH_4} = \frac{LFG_{electricity,y} \times W_{CH_4} \times P_1 \times T_0 \times \rho_0 \times GWP_{CH_4}}{P_0 \times T_1}$$

ER_{CH_4}	= Emission reduction from methane avoidance, t
$LFG_{electricity,y}$	= Amount of landfill gas combusted in power plant, m ³
W_{CH_4}	= 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_{CH_4}	= Global warming potential of methane, 21 tCO ₂ e/tCH ₄
P_0	= Pressure under standard condition, 101.3 kPa
T_1	= Temperature of landfill gas, degree Celsius

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

(1) Calculate sample mean (μ)

$$\mu_{WCH_4,y} = \frac{\sum_{m=1}^{n_m} W_{CH_4,m,y}}{n_m}$$

$\mu_{WCH_4,y}$ = Mean of the fraction of methane in the landfill gas in year y (m³ CH₄/m³ LFG)

$W_{CH_4,m,y}$ = Monitored fraction of methane in the landfill gas in measurement m in year y , (m³ CH₄/m³ LFG)

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

(2) Calculate the sample standard deviation (σ)

$$\sigma_{WCH_4,y} = \sqrt{\frac{\sum_{m=1}^{n_m} (W_{CH_4,m,y} - \mu_{WCH_4,y})^2}{n_m - 1}}$$

$\sigma_{WCH_4,y}$ = Standard deviation of the fraction of methane in the landfill gas in year y (m³ CH₄/m³ 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^2 = 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.

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

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

Therefore,

Phase 1	Lower Bound of W	Higher Bound of W
01/08/2010-31/12/2010	48.25%	48.26%
01/01/2011-31/12/2011	55.48%	55.49%

Phase 2	Lower Bound of W	Higher Bound of W
01/08/2010-31/12/2010	48.79%	48.80%
01/01/2011-31/12/2011	55.72%	55.74%

	LFG electricity (m^3)	ER of Methane avoidance with $W_{CH4,lb,y}$ (t CO ₂ e)
01/08/2010-31/08/2010	1,350,726	9,371
01/09/2010-30/09/2010	1,031,267	7,139
01/10/2010-31/10/2010	786,721	5,570
01/11/2010-30/11/2010	1,140,175	8,286
01/12/2010-31/12/2010	1,217,284	7,796
2010 (01/08/2010-31/12/2010)	5,526,173	38,162
01/01/2011-31/01/2011	954,637	8,375
01/02/2011-28/02/2011	851,694	7,370
01/03/2011-31/03/2011	692,355	5,909
01/04/2011-30/04/2011	675,069	5,646
01/05/2011-31/05/2011	554,357	4,557
01/06/2011-30/06/2011	954,024	7,798
01/07/2011-31/07/2011	683,984	5,464

² 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>

2011 (01/01/2011-31/07/2011)	5,366,120	45,119
01/08/2011-31/08/2011	957,613	7,789
01/09/2011-30/09/2011	799,722	6,485
01/10/2011-31/10/2011	1,251,318	10,536
01/11/2011-30/11/2011	1,332,193	11,020
01/12/2011-31/12/2011	820,466	5,939
2011 (01/08/2011-31/12/2011)	5,161,312	41,769
Total	16,053,605	125,050

Emission Reduction Calculation of Electricity Generation:

Monitoring data of Electricity:

	EL _{generation} (MWh)	EL _{internal consumption} (MWh)	EL _{LFG} (MWh)
01/08/2010-31/08/2010	2,344	137	2,207
01/09/2010-30/09/2010	2,299	128	2,171
01/10/2010-31/10/2010	2,287	119	2,168
01/11/2010-30/11/2010	1,932	109	1,823
01/12/2010-31/12/2010	1,800	94	1,706
2010 (01/08/2010-31/12/2010)	10,662	588	10,075
01/01/2011-31/01/2011	1,725	88	1,637
01/02/2011-28/02/2011	1,531	80	1,452
01/03/2011-31/03/2011	1,901	92	1,809
01/04/2011-30/04/2011	2,157	101	2,056
01/05/2011-31/05/2011	2,256	117	2,139
01/06/2011-30/06/2011	2,202	121	2,081
01/07/2011-31/07/2011	2,196	133	2,064
2011 (01/01/2011-31/07/2011)	13,968	731	13,237
01/08/2011-31/08/2011	2,077	119	1,958
01/09/2011-30/09/2011	2,040	118	1,921
01/10/2011-31/10/2011	2,028	112	1,916
01/11/2011-30/11/2011	1,989	150	1,839
01/12/2011-31/12/2011	1,533	77	1,456
2011 (01/08/2011-31/12/2011)	9,666	576	9,090
Total	34,296	1,895	32,402

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

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

$ER_{\text{electricity}}$ = Emission reduction from electricity generation, tCO₂e
 $EL_{\text{generation}}$ = Electricity generation from the generator in the year y, MWh
 $EL_{\text{internal consumption}}$ = Electricity imported from the grid in the year y, MWh
 EF_{CM} = Combined margin CO₂ emission factor of East China Power Grid in year y, 0.8847 tCO₂e/MWh

	ER of Electricity generation (t CO ₂ e)
01/08/2010-31/08/2010	1,952
01/09/2010-30/09/2010	1,920
01/10/2010-31/10/2010	1,917
01/11/2010-30/11/2010	1,612
01/12/2010-31/12/2010	1,509
2010 (01/08/2010-31/12/2010)	8,910
01/01/2011-31/01/2011	1,448
01/02/2011-28/02/2011	1,284
01/03/2011-31/03/2011	1,600
01/04/2011-30/04/2011	1,819
01/05/2011-31/05/2011	1,892
01/06/2011-30/06/2011	1,840
01/07/2011-31/07/2011	1,825
2011 (01/01/2011-31/07/2011)	11,709
01/08/2011-31/08/2011	1,732
01/09/2011-30/09/2011	1,699
01/10/2011-31/10/2011	1,695
01/11/2011-30/11/2011	1,627
01/12/2011-31/12/2011	1,287
2011 (01/08/2011-31/12/2011)	8,040
Total	28,659

Operational hours of the energy plant:

	Unit	2010 (01/08/2010-31/12/2010)	2011 (01/01/2011-31/07/2011)	2011 (01/08/2011-31/12/2011)	01/08/2010-31/12/2011
Generator #3	h	3,548	4,950	2,665	11,163
Generator #4	h	3,627	4,980	3,649	12,256
Generator #5	h	3,647	4,918	3,377	11,942

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 NO_x.

The waste gas meets the requirement of national standard “GB 13271-2001”. It has been monitored by Jiangsu Suhuan Project Quality Detection Co., Ltd., which is an authorized and independent third party accredited by Provincial Administration of Quality and Technology Supervision. The result is as follows.

	Value (mg/m ³)	Monitored Date	Result
Requirement	< 400		
Generator #3	341	28/01/2012	Measured values meet requirement

	Value (mg/m ³)	Monitored Date	Result
Requirement	< 400		
Generator #4	361	28/01/2012	Measured values meet requirement

	Value (mg/m ³)	Monitored Date	Result
Requirement	< 400		
Generator #5	324	28/01/2012	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 Jiangsu Suhuan Project Quality Detection Co., Ltd.. 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 Jiangsu Suhuan Project Quality Detection Co., Ltd.. The result is as follows.

Monitored Parameter	Monitored Value	Required Value	Result	Score
pH	7.16	6.5~8.5	Class I	0

Chroma	5(mg/L)	=<5(mg/L)	Class I	0
COD	9.61(mg/L)	50(mg/L)	Class I	-
BOD5	4.01(mg/L)	10(mg/L)	Class I	-
LAS	0(mg/L)	=<0.1(mg/L)	Class I	0
Total Hardness (CaCO ₃)	83.82(mg/L)	=<150(mg/L)	Class I	0
NH ₄	0.79(mg/L)	>0.5(mg/L)	Class V	10
Nitrate(N)	1.27(mg/L)	=<2.0(mg/L)	Class I	0
Nitrite(N)	0(mg/L)	=<0.001(mg/L)	Class I	0
Volatile Phenol	0(mg/L)	=<0.01(mg/L)	Class I	0
CN	0(mg/L)	=<0.01(mg/L)	Class I	0
KMnO ₄	1.22(mg/L)	=<2.0(mg/L)	Class I	1
Sulphate	8(mg/L)	=<50(mg/L)	Class I	0
Cl	11.37(mg/L)	=<50(mg/L)	Class I	0
As	0(mg/L)	=<0.005(mg/L)	Class I	0
Hg	0(mg/L)	=<0.0005(mg/L)	Class I	0
Cd	0(mg/L)	=<0.01(mg/L)	Class I	0
Cr ₆₊	0(mg/L)	=<0.005(mg/L)	Class I	0
Fe	0.05(mg/L)	=<0.1(mg/L)	Class I	0
Mn	0.52(mg/L)	=<1(mg/L)	Class IV	6
Pb	0(mg/L)	=<0.005(mg/L)	Class I	0
Total Coli-group	50(unit/L)	=<100(unit/L)	Class I	0

The final score is 7.096, which belong to Class IV. Therefore the underground water can be used as industrial and agriculture, after proper treatment, it can be used for drinking.

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 GBZ 2.2-2007. It has been monitored by Centre Testing International (Suzhou) Limited, which is an authorized and independent third party accredited by State Environmental Measure Authorization. The result is as follows.

Plant Boundary:

Test Location	Result
	Day
	Test Date: 06/01/2012
	Value
Requirment	< 65 dB(A)
1 meter away from plant eastern boundary	57.2 dB(A)
1 meter away from plant southern boundary	57.7 dB(A)
1 meter away from plant western boundary	55.8 dB(A)

1 meter away from plant northern boundary	56.1 dB(A)
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Test Location	Result
	Night
	Test Date: 06/01/2012
	Value
Requirment	< 55 dB(A)
1 meter away from plant eastern boundary	53.6 dB(A)
1 meter away from plant southern boundary	53.2 dB(A)
1 meter away from plant western boundary	50.4 dB(A)
1 meter away from plant northern boundary	49.8 dB(A)

In Plant

Test Location	Result
	Test Date: 06/01/2012
	Value
Requirment	< 85 dB(A)
Control Room	62.2 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 including: How to develop a learning team, Delicacy Management of Production, Study on ERP system, Case Study and Assessment on Plant Accidents, Maintenance of LFG collecting system 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
1	20/08/2010	7 (workers and project manager)	Maintenance and Safe Operation of LFG Pre-treatment System
2	25/03/2011	6 (workers and project manager)	How to develop a learning team
3	08/04/2011	6 (workers and project manager)	Delicacy Management of Production
4	13/05/2011	6 (workers and project manager)	Study on ERP system

5	15/07/2011	7 (workers and project manager)	Case Study and Assessment on Plant Accidents
6	21/10/2011	7 (workers and project manager)	Maintenance of LFG collecting system

Livelihood of the poor:

Payroll of employees is used for monitoring this parameter.

Seven local workers are responsible for daily operation of the project activity. There are 7 other people (of which 3 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.

The average monthly payment of the six operators was 5375.28 CNY CNY by the end of last monitoring period. The average monthly payment of the six operators was 7389.92 CNY by the end of this monitoring period. There is a significant increase on the payment of operator.

Mr. LIU Zhaofeng is one of the operators. His salary is the main income of his family. His wife is a housewife. His daughter studies in primary school. And his parents have retired with a little pension. The total income of his family has been increased to 8200 CNY per month.

	Name	Gender	Local	Title/Responsibility	Full time work on this project
1	ZHANG Jin	Male	Yes	Operator	Yes
2	WANG Shiyang	Male	Yes	Operator	Yes
3	WANG Hua	Male	Yes	Operator	Yes
4	ZHOU Chunxi	Male	Yes	Operator	Yes
5	FU Chunda	Male	Yes	Operator	Yes
6	MENG Li	Male	Yes	Operator	Yes
7	LIU Zhaofeng	Male	Yes	Project manager	Yes
8	LIU Lu	Female	No	Assistant project manager of carbon trade	No
9	CHEN Yang	Male	No	Project manager of carbon trade	No
10	ZHANG	Male	No	General manager	No

	Yunyue			of carbon trade	
11	MA Liya	Female	Yes	Office worker responsible for file management	No
12	HUA Chungang	Female	Yes	Accountant	No
13	SUN Xian-dong	Male	No	Senior engineer	No
14	CAI Shu-guang	Male	Yes	General manager	No

Human and institutional capacity:

Training documentation and photos are used to monitor this parameter.

Within this monitoring period, project company provides many onsite training and visit opportunities for the students. It is very helpful and meaningful to educate students on environment protection, waste treatment and sustainable development. The list of some training activities is as follows.

	Date	Amount of Participants	Content
1	23/02/2011	12	Site visit by the students from Suzhou Technology University



	Date	Amount of Participants	Content
2	30/03/2011	80	Site visit by the students from Suzhou Singapore Middle School



	Date	Amount of Participants	Content
3	27/05/2011	162	Site visit by the students from Huangtang Primary School



	Date	Amount of Participants	Content
4	14/06/2011	40	Site visit by the students from Suzhou Agriculture College



	Date	Amount of Participants	Content
5	07/07/2011	51	Site visit by the students from Wuxi Huangtutang Primary School



	Date	Amount of Participants	Content
6	19/12/2011	23	Site visit by the students from Suzhou Middle School



Quantity of Employment (Emp_y)

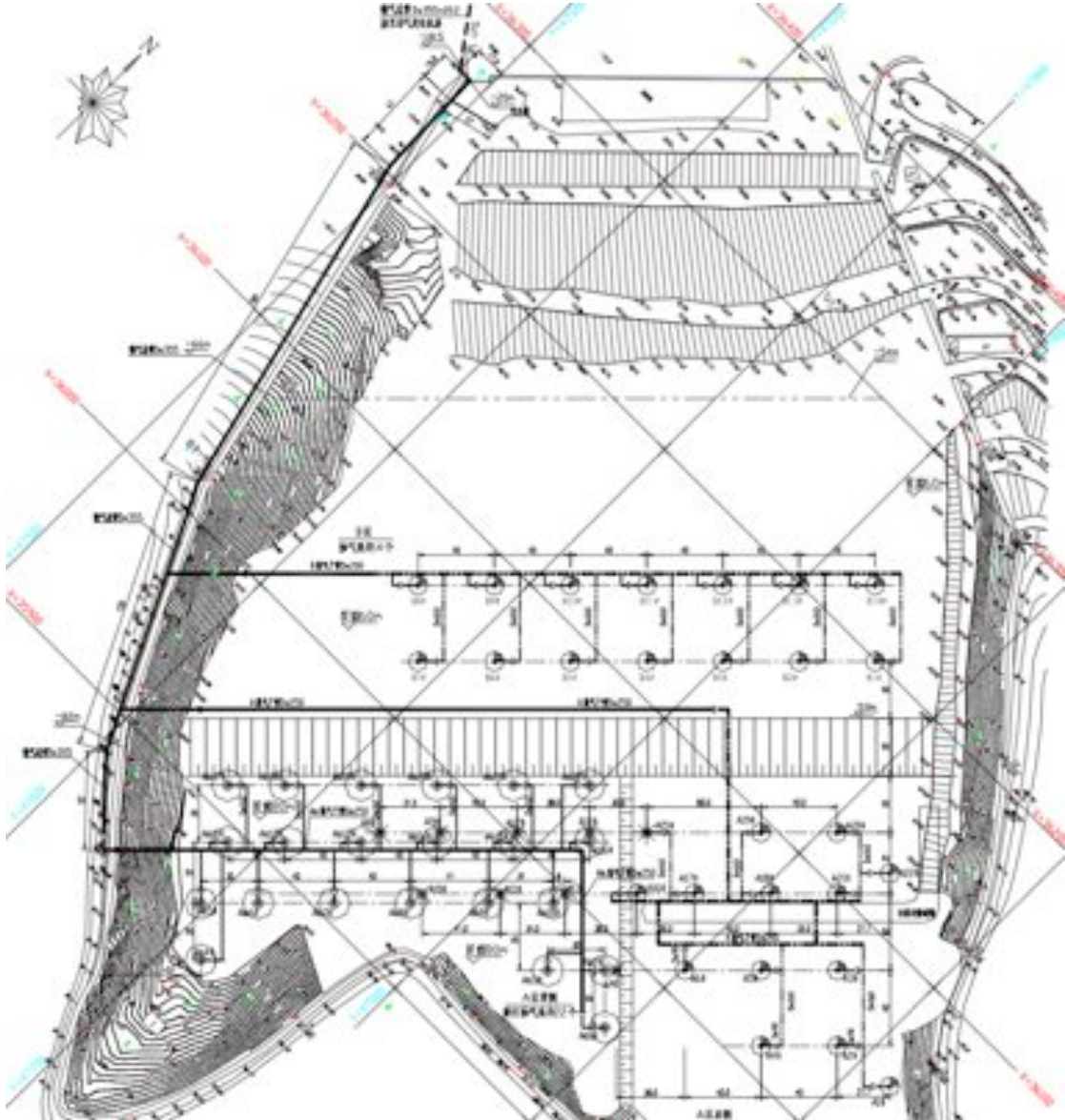
Number of people engaged are monitored.

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.

Layout of the Entire Collection Pipelines



PP continuously monitored the amount of the total collected LFG for two phases hourly over the entire monitoring period. The monitoring result has been presented in the monthly ER spreadsheets. 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.

In the second verification, there is a **FAR** raised by GS.

FAR The accepted method of calculating ER with EG and rated efficiency of the generators is sufficiently conservative, whereas the method is not ideal since the ER value is not based on directly monitored parameters of the LFG. In the next verification, the PP and DOE are requested to submit an ER calculation using credible monitored data in a manner specified in the registered PDD.

In this monitoring period all the data is monitored according to the registered PDD. The ER calculation is based on the validated method in the registered PDD.

Summary of Results

Emission reduction:

The total emission reduction for this monitoring period are summarized as following.

	01/08/2010-31/12/2010	01/01/2011-31/07/2011	01/08/2011-31/12/2011	01/08/2010-31/12/2011
EL generation (MWh)	10,662	13,968	9,666	34,296
EL internal consumption (MWh)	588	731	576	1,895
EL LFG (MWh)	10,075	13,237	9,090	32,402
ER by EL LFG (tCO₂e)	8,910	11,709	8,040	28,659
ER by Methane (tCO₂e)	38,162	45,119	41,769	125,050
Total ER (tCO₂e)	47,072	56,828	49,809	153,709

Operational hours of the energy plant:

	Unit	2010 (01/08/2010-31/12/2010)	2011 (01/01/2011-31/07/2011)	2011 (01/08/2011-31/12/2011)	01/08/2010-31/12/2011
Generator #3	h	3,548	4,950	2,665	11,163
Generator #4	h	3,627	4,980	3,649	12,256
Generator #5	h	3,647	4,918	3,377	11,942

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

During the monitoring period, the emission reductions amounted to 153,709 tCO₂e.
Comparison updated ER in PDD and MR

		Monthly Average
PDD (01/01/2010-31/12/2010)	126,738 t	10,562

3 rd MR (01/08/2010-31/12/2010)	47,072 t	9,414
Difference	-	1,147
Percentage		10.86% decreased, due to the conservative max error was applied. In addition, there are 22 days, out of 153 days, are lack of accurate data for ER by methane. This means 14.38% of ER by methane was not counted accordingly.

		Monthly Average
PDD (01/01/2011-31/12/2011)	131,490 t	10,958
3 rd MR (01/01/2011-31/12/2011)	106,637 t	8,886
Difference	-	1,907
Percentage		18.9 % decreased, due to the conservative max error was applied. In addition, there are 47 days, out of 365 days, are lack of accurate data for ER by methane. This means 12.88% of ER by methane was not counted accordingly.

History of the document

Version	Date	Nature of revision
Draft	19/12/2011	
1	15/02/2012	Submitted to DOE for Verification
2	31/03/2012	Revision according to DOE's findings
3	25/05/2012	Revision according to DOE's findings 2 nd Round
4	07/02/2013	Revision according to DOE's TR stage 1 st Round
5	27/02/2013	Revision according to DOE's TR stage 2 nd Round
6	12/03/2013	Revision according to DOE's TR stage 2 nd Round
7	23/05/2013	Revision according to GS' Comments