MONITORING REPORT
Version 01 , June 7, 2010

Title project activity: Shenyang Laohuchong LFG Power Generation Project
Reference number: 1906
First monitoring period: 25 December 2008 – 31 March 2010 (included)

CONTENTS

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SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

1. The purpose of the project capturing and burning biogas, generating electricity, at the Shenyang Laohuchong Municipal Solid Waste Landfill.
   The greenhouse gas emissions reduction is realized through the destruction of methane contained in the biogas arising from the landfill which is fed into both electricity generation system and high temperature flare, and by avoiding consumptions of fossil fuel which should have been used to generated electricity (according to the local Grid Emission Factor) substituted by the electricity generated in the biogas plant (renewable source) during a crediting period of 10 years.
2. The process includes LFG collecting, pre-treatment, power generation and flare combustion systems, the power plant is connected to local grid (North East Electric Power Grid) through transformer substation system. The whole process is managed by an electrical control system which is provided with a PLC (Programmable Logical Controller). All measured process signals are processed by the PLC to output signals for the gas-coolers, blower and flares.
3. The project is designed to have at its final stage an installed power of 3 MW (6 × 0.5 MW LFG power generators) and two flares of 2,000Nm3/h. During this monitoring period, only three power generators with a capacity of 1.5MW and one flare are mounted and operating. The starting date of construction was on Jul.1, 2007, the LFG flaring system was put into operation since October 18, 2007 and the operation of the LFG power generation system started on March 4, 2008.
4. Total emission reductions achieved in this monitoring period is 75,074 ton CO_2eq

A.2. Project Participants

The participants involved in this project are listed in the following table:

Name of Party Involved ((host) indicates an host Party)	Private and/or public entity(ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant
China (host)	Shenyang Laohuchong Municipal Solid Waste Management Co. Ltd. (Public Entity)	No
Italy	Asja Ambiente Italia S.p.A. (Private Entity) (Buyer of CERs)	No

A.3. Location of the project activity:

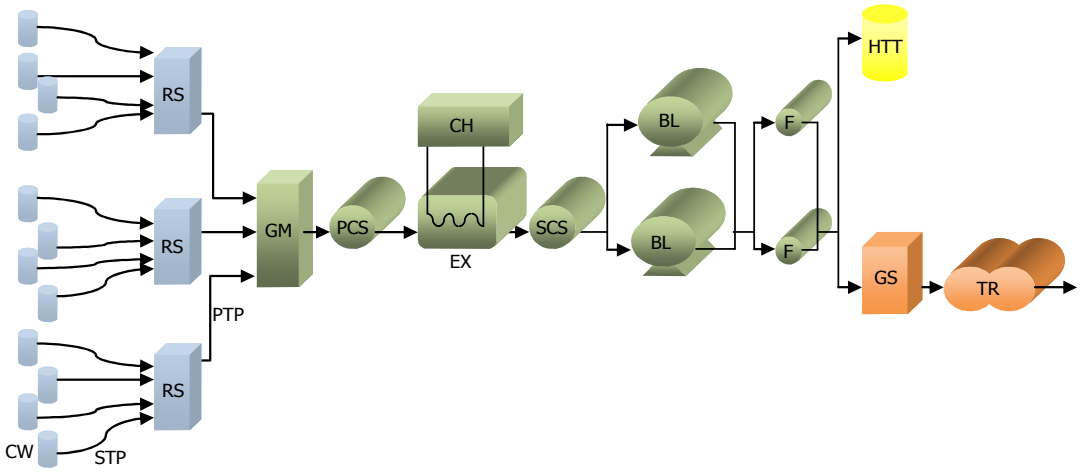
This project is located in Tashan Farm, Chenxiang Town, Su Jiatun District, Shenyang, Liaoning, People's Republic of China, with the GPS coordinates of 41°33' N and 123°34 E.

A.4. Technical description of the project

The whole general layout includes landfill gas collecting, pre-treatment, power generation and flare combustion systems. The following sections are recognized:

1. biogas collection and conveying section
2. biogas suction, treatment and analysis section
3. enclosed high-temperature flare biogas combustion
4. electricity generation, transformation and distribution section

These sections are schematically showed in the pictures below:



Collection Section	Suction and Control Section	Electricity generation and Torch Section

Collection Section	Suction and Control Section	Electricity generation and Torch Section
CW: Capture Well	**GM**: General Intake Manifold	**GS**: Generation Set
STP: Biogas Secondary Transport Pipelines	**PCS**: Primary Condensate Separator	**HTT**: High Temperature Torch
RS: Regulation Substation	**EX**: Pipe bundle Heat Exchanger	**TR**: Transformer
PTP: Biogas Primary Transport Pipelines	**SCS**: Secondary Condensate Separator	
	CH: Chiller	
	F: Dry filter	
	BL: Blower	

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

Approved monitoring methodology and tools applied to this projects:

ACM0001 - Version 6: "Consolidated baseline methodology for landfill gas project activity"
ACM0002 - Version 6: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

Tool for the demonstration and assessment of additionality - Version 4
Tool to determine project emissions from flaring gases containing methane

A.6. Registration date of the project activity:

This project was registered on Dec.25,2008.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The Crediting period of this project activity is 25 December 2008 - 24 December 2018 (Fixed).
The start date of the crediting period has been changed from Jan 1st, 09 into December 25, 2008 and it has been accepted by the Board

A.8. Name of responsible person(s)/entity(ies)

The monitoring report is completed in June 2010, and person responsible for completing the monitoring report :

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Cui jianshuang, Diao Xianlan
Asja Renewable(shenyang) Co.,Ltd
Address: Shenyang LN, P.R.China
Tel:+86 24.23 987210
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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

The LFG flaring system was put into operation since October 18, 2007 and the operation of the LFG power generation system started on March 4, 2008. Since then, the plant has always been working properly. Only one time, due to a malfunction of the engines, electricity production was shut off : from Feb 10, 2009 to Mar 14, 2009. The maintenance of the engines is, as per the contract, up to the manufacturer. As soon as the manufacturer solved the problem, the production started again normally. In the meantime, the captured gas was flared.
During the last winter, from October 2009 to December 2009, 35 new wells were drilled.

There were no events or situations occurred during the monitoring period, which impacted the applicability of the methodology.

B.2. Revision of the monitoring plan

None

B.3. Request for deviation applied to this monitoring period

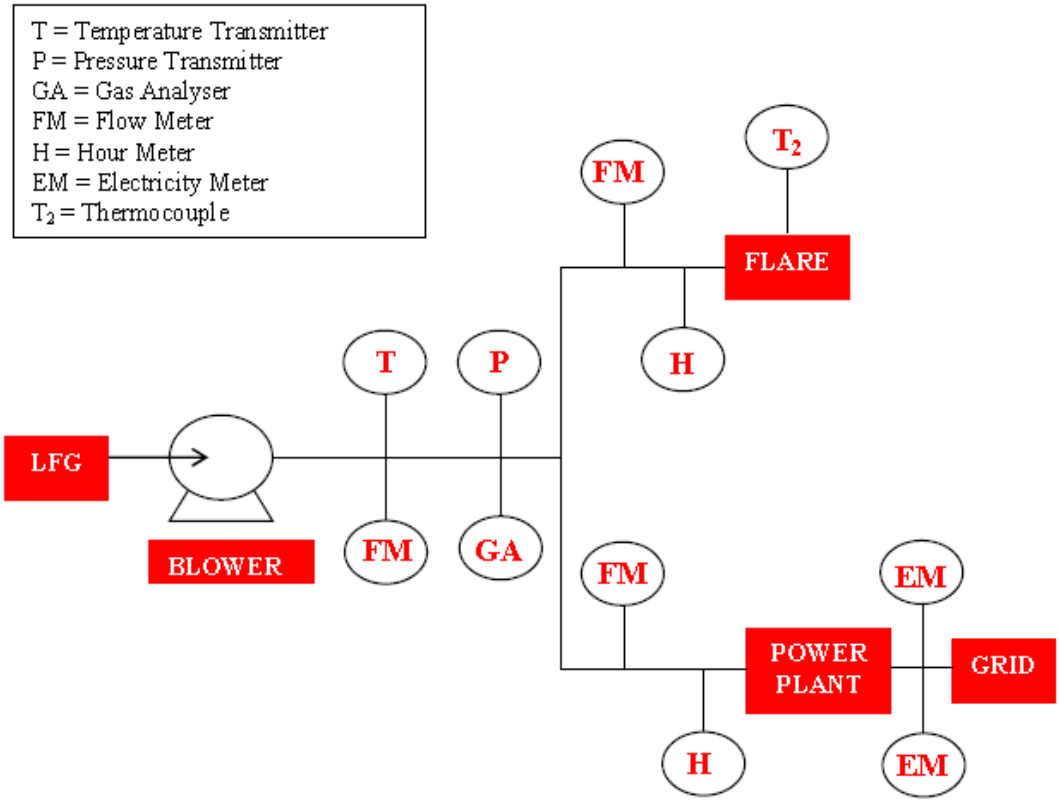
None

B.4. Notification or request of approval of changes

Not applicable

SECTION C. Description of the monitoring system

In order to determine the quantity of ERs generated during the project activity, the equipment shown in the following scheme (PDD Monitoring Plan) is installed.



The equipment of the analysing station and also the system equipments of the entire plant is connected through a Programmable Logic Controller (PLC) that let the operator quickly check the unit main variables through a user-friendly interface.

The system collects on a continuous basis the signals from the instruments equipping the main biogas lines, the suction station, the pressurised line going to the burning section and the generating sets.

Monitoring operating parameters on a continuous basis ensures the optimal management of the plant and the correct operation of the various devices installed (valves, blowers, etc.).

THE MONITORED DATA

According to the Monitoring Plan, the PLC system is designed to ensure the monitoring of the following main parameters:

- Landfill gas collected from project wells in the main line, LFG_{total}
- Landfill gas flow into flare, LFG_{flare}
- Landfill gas flow into power plant, $LFG_{electricity}$
- Methane and oxygen content in the landfill gas
- Temperature of flaring exhaust gas
- Operation of the energy plant and flare

Other operating parameter necessary to calculate the amount of ERs generated, manually recorded in specific forms (and confirmed by the official bills), are:

- Electricity imported from the power grid.
- Electricity exported to the power grid.

Besides, the local and national regulatory framework is also monitored.

Landfill gas flow, temperature and pressure

Landfill gas flow is measured by means of flow meters. Three flow meters are installed, one to measure the LFG flow into the flare, another one for the LFG flowing into the engines and another one in order to measure the total landfill gas collected from project wells. For reporting purposes, these parameters are required to be normalized to 0°C and 1.01325bar. In order to normalize the volume measured by the flow meter to a standard temperature and pressure, a temperature transmitter and a pressure transmitter are used. These transmitters are integrated in each of the three flow meters, so that the value read on the display and the signal sent to the PLC are already normalized.

Temperature of the flare

N-type thermocouple is installed in the flare at 80% of its height and it is directly connected to the PLC.

Methane content in the landfill gas

Methane content in the landfill gas is measured by a gas analyzer with an infrared ray system analysis, with a scale range of 0-100 %Vol. The analyzer is directly connected to the PLC.

Operation of the energy plant and flares

The PLC counts the working hours of both the generating set and the flare.

Electricity imported and exported by power grid

Electricity imported and exported by power grid is measured by sealed energy meters. Since electricity meters belong and are managed by the Power Supply Co., the amount of electricity is proven by official electricity bills.

Local and national regulatory framework

As stated on the Operation Manual available on-site, the local and national regulatory framework (related to the project) is monitored on an annual basis in order to verify that the project complies with the local and national regulation.

Emissions from flaring

The project proposed has adopted the default value for the flare efficiency for the enclosed flares of 90% according to the "*tool to determine project emissions from flaring gases containing methane*" and to the manufacturer's specifications.

DATA MANAGEMENT SYSTEM (from the instruments to the monitoring sheets)

The PLC receives continuously the signals from all the monitoring instruments and shows the values on its touch-screen. This means that all the parameters are continuously monitored and available on-site. The PLC is directly connected to a Factory Data Storage system, hereinafter referred to as FDS. The PLC sends to the FDS all the monitored values. This industrial software for management of operating data, FDS, records every 5 minutes the values of all the monitored parameters and archives these values in a safe database. The database is accessible only through the FDS interface that allows only to read and to download the recorded data. This is to avoid any accidental loss or modification of the recorded data .
In summary, the signals flow from the instruments into a safe database in a complete automatic way, with no manual operations:

Instruments → PLC → FDS

Moreover, FDS automatically puts the monitored data onto a spreadsheet created by Asja.biz for the calculation of the Emissions Reduction and makes available all the needed reports with the daily and monthly amount of CERs. This spreadsheet for the CERs calculation follows the formula as per the methodological "tool to determine project emissions from flaring gases containing methane" and it is available for the DOE. The monitored data and the calculated CERs are aggregated hourly, monthly and yearly in a standard format for reporting purposes (see the attached Monitoring sheet).

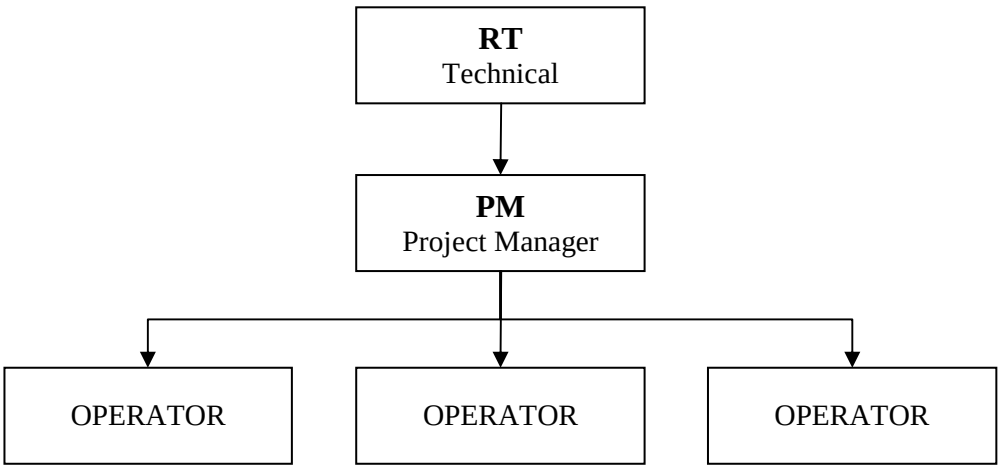
Instruments → PLC → FDS → Calculation Spreadsheet → Monitoring sheets

All these operations are completely automatic and safe, and a declaration of the FDS company is available.

Besides the FDS database, a document control system has been implemented to ensure that the monitored data and all the necessary documents (such as operation manual, drawings, maintenance and calibration instructions, etc.) are available and stored in a proper manner. Monitored data and Monitoring Sheets (both downloaded from FDS) are copied to magnetic media every 6 months (at least) and stored in appropriate archives. All data, including calibration records and Monitoring Reports, will be kept until 2 years after the crediting period.

MONITORING ORGANIZATION

The plant is run by operators and by a project manager (PM) in charge of the necessary activities and checks. A technical responsible (RT) carries out the required checks on the plant on a periodic basis. **The PM is responsible for the maintenance and calibration of all the monitoring instruments and, therefore, for the proper working of the monitoring system.**



To assure a correct monitoring, the staff is trained on the following subjects:

- General knowledge about the equipment used in the landfill
- Reading and recording data
- Calibration methodology
- Emergency situation

A manual in English and Chinese with all the procedures for a correct management of the plant is always available on-site. This manual for plant management has:

- Description of the main parts of the equipment
- Maintenance instructions
- Calibration procedures
- Useful phone numbers

EMERGENCY PREPAREDNESS

Management of data not logged

Management of flow data not logged because of a failure
To reduce the time during which flow values cannot be logged because of a failure, the flow counter will be replaced with a spare unit as quickly as possible. In any case, there will be a brief time interval during which the system works without flow signals being received. In order to determine the flow during this time interval, the average flow value over the last 7 days of normal operation before the failure is used.

Management of gas analyzer data not logged because of a failure
To reduce the time during which the methane percentage values in the biogas cannot be logged because of a failure, the analyzer will be replaced with a spare unit as quickly as possible. In any case, there will be time interval during which the system works without the signals being received. In order to determine the percentage values during this time window, the average value over the last 7 days of normal operation before the failure is used.

Management of flare temperature data not logged because of a failure
To reduce the time during which the flare temperature values cannot be logged because of a failure, the thermocouple will be replaced with a spare unit as quickly as possible. In any case, there will be a brief time interval during which the system works without the signals being received. In order to determine the temperature of the flare during this time window, the average value over the last 7 days of normal operation before the failure is used.

Possible failure: No electrical power
When there is no electrical power the blower of the degassing installation cannot operate, so no landfill gas stream is available. No special actions are possible to avoid this. Therefore, when a black out occurs, no CERs will be claimed.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_{2e}/tCH_4
Description:	Global Warming Potential value for methane
Source of data used:	Revised 1996 IPCC Guideline for National Greenhouse Gas Inventory
Value(s)	*21*
Indicate what the data are used for (Baseline/ project/ leakage emission calculations)	Used for baseline emission calculation
Additional comments:	

Data / Parameter:	ρCH4,n,h
Data unit:	tCH_4/m^3CH_4
Description:	Density of methane gas at normal conditions
Source of data used:	*Tool to determine project emissions from flaring gases containing methane*
Value(s)	*0.0007168*
Indicate what the data are used for(Baseline/project/leakage emission calculations)	Used for baseline emission calculation
Additional comments:	

Data / Parameter:	CEFelec,y
Data unit:	tCO2/MWh
Description:	The emission factor of northeast electric power grid
Source of data used:	*Data published by China DNA on http://cdm.ccchina.gov.cn*
Value(s)	*1.05176*
Indicate what the data are used for(Baseline/project/leakage emission calculations)	Used for both baseline and project emission calculations
Additional comments:	

Data / Parameter:	Local and national regulatory framework
Data unit:	
Description:	Law and regulations about waste management systems in China
Source of data used:	*Data published by China DNA*
Value(s)	

	Regulation reference	**Regulation**	**Impact**	**Date of application**
	GB16889-1997	"Standard for Pollution Control on the Landfill Site of Municipal Solid Waste"	Included in PDD	01-Jan-98
	GB16889-2008	"Standard for Pollution Control on the Landfill Site of Municipal Solid Waste"	No impact on parameters monitored during the current crediting period. The methodology requires the impacts of new regulations to be considered at the renewal of the crediting period. The project has a fixed crediting period of 10 years and will not be renewed. Furthermore, the regulation is an E-type regulation according Annex 3 of EB 22.	01-Jul-08
Indicate what the data are used for (Baseline/project/leakage emission calculations)	Used for baseline emission calculation			

D.2. Data and parameters monitored

Data / Parameter:	$LFG_{total,y}$
Data unit:	Nm^3
Description:	Total amount of landfill gas captured
Measured / Calculated / Default	*Measured*
Source of data:	*Flow meter*
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Calculations)	Used for baseline emission calculation.
Monitoring equipment (type, Accuracy class, serial number,	Flow meter Type: Annubar 485

calibration frequency, date of last calibration, validity)	Accuracy class: ±0.9% Serial number: 01726699 calibration frequency: Every year Date of last calibration: Sep.17,2009 by Liaoning Provincial Institute of Measurement Validity: From Sep.17, 2009 to Sep.16, 2010
Measuring/ Reading/ Recording frequency:	*The data is measured and read continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if applicable)	
QA/QC procedures applied:	*Data with low level of uncertainty. QA/QC procedures are planned for these data. Flow meter is subject to regular maintenance and testing regime to ensure accuracy.* *Once a year, the flow meter is sent to a certified institute for external calibration (certificates are available for DOE)*

Data / Parameter:	$LFG_{flare, y}$
Data unit:	Nm^3
Description:	Amount of landfill gas flared
Measured/ Calculated /Default:	Measured
Source of data:	*Flow meter*
Value(s) of monitored parameter :	
Indicate what the data are used for	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Flow meter Type: Annubar 285 Accuracy class: ±2% Serial number: 01746511 calibration frequency: Every year Date of last calibration: Sep.17,2009 by Liaoning Provincial Institute of Measurement Validity: From Sep.17, 2009 to Sep.16, 2010
Measuring/ Reading/ Recording frequency:	*The data is measured and read continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Data with low level of uncertainty. QA/QC procedures are planned for these data. Flow meter is subject to regular maintenance and testing regime to ensure accuracy.* *Once a year, the flow meter is sent to a certified institute for external calibration (certificates are available for DOE)*

Data / Parameter:	$LFG_{electricity, y}$
Data unit:	Nm^3
Description:	*Amount of landfill gas combusted in power plant*
Measured/ Calculated /Default:	Measured
Source of data:	*Flow meter*
Value(s) of monitored parameter :	
Indicate what the data are used for	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Flow meter Type: Annubar 285 Accuracy class: ±2% Serial number: 01746510 calibration frequency: Every year Date of last calibration: Sep.17,2009 by Liaoning Provincial Institute of Measurement Validity: From Sep.17, 2009 to Sep.16, 2010
Measuring/ Reading/ Recording frequency:	*The data is measured and read continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Data with low level of uncertainty. QA/QC procedures are planned for these data. Flow meter is subject to regular maintenance and testing regime to ensure accuracy.* *Once a year, the flow meter is sent to a certified institute for external calibration (certificates are available for DOE)*

Data / Parameter:	$W_{CH4,y}$ or $fv_{CH4,RG,h}$
Data unit:	m^3CH_4/ m^3LFG
Description:	*Methane fraction in the landfill gas*
Measured/ Calculated /Default:	Measured
Source of data:	*Gas analyzer*
Value(s) of monitored parameter：	
Indicate what the data are used for	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Gas Analyzer Type: XGF-4043 Accuracy class: ±2% Serial number: 0708404 calibration frequency: Every year Date of last calibration: Sep.18,2009 by Liaoning Provincial Institute of Measurement Validity: From Sep.18, 2009 to Sep.17, 2010
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Data with low level of uncertainty. QA/QC procedures are planned for these data. Analyzer is subject to regular maintenance and testing regime to ensure accuracy.* *Once a month an internal calibration is carried out by using a certified sample gas.* *Once a year an external calibration is carried out by an authorized institute.*

Data / Parameter:	EL_{LFG}
Data unit:	*kWh*
Description:	*Net amount of electricity generated using landfill gas*
Measured/ Calculated /Default:	Measured
Source of data:	*Electricity meter*
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of	Electricity meter Type: DSSD331-3 Accuracy class: 0.5s

last calibration, validity)	Serial number: 8007472 calibration frequency: Every 3 years Date of last calibration: Oct.12,2008 by Power Metrology Institute of Liaoning Electric Power Co., Ltd. Shenyang Power Supply Company Validity: From Oct.12, 2008 to Oct.11, 2013
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, aggregated and recorded monthly and yearly, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*According to Chinese relevant regulations, the electricity metering equipment has been properly configured by the grid company. The meters are calibrated by the grid company according to relevant National electricity measurement standards. Electricity metering equipment is checked and sealed by National Authority Measurement Department.*

Data / Parameter:	EL_{PR}
Data unit:	*kWh*
Description:	*Total amount of electricity consumed*
Measured/ Calculated /Default:	Measured
Source of data:	*Electricity meter*
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	*Used for Project emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Electricity meter Type: DTSD482 Accuracy class: 1 Serial number: 0103200014423 calibration frequency: Every 3 years Date of last calibration: Feb.19,2009 by Su Jiatun Agro electricity Bureau Calibration and Testing Center Validity: From Feb.19, 2009 to Feb.18, 2014
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every month (according to the official bills), and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*According to Chinese relevant regulations, the electricity metering equipment has been properly configured by the grid company. The meters are calibrated by the grid company according to relevant National electricity measurement standards. Electricity metering*

	equipment is checked and sealed by National Authority Measurement Department.

Data / Parameter:	EL_{PR}
Data unit:	*kWh*
Description:	*Total amount of electricity consumed*
Measured/ Calculated /Default:	Measured
Source of data:	*Electricity meter*
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	*Used for Project emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Electricity meter Type: DTS51 Accuracy class: 1 Serial number: 0103200019480 calibration frequency: Every 3 years Date of last calibration: Jan.5,2009 by Su Jiatun Agro electricity Bureau Calibration and Testing Center Validity: From Jan.5, 2009 to Jan.4, 2014
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every month (according to the official bills), and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*According to Chinese relevant regulations, the electricity metering equipment has been properly configured by the grid company. The meters are calibrated by the grid company according to relevant National electricity measurement standards. Electricity metering equipment is checked and sealed by National Authority Measurement Department.*

Data / Parameter:	T_{flare}
Data unit:	*°C*
Description:	*Temperature in Exhaust gas of enclosed flare*
Measured/ Calculated /Default:	Measured
Source of data:	*N-type Thermocouple*
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission	*Used for baseline emission calculation.*

Calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Thermocouple Type: WRMK-331 calibration frequency: Replaced every year Date of last calibration: It was replaced on May 02, 2009 by a new one with the Manufacturing date of April, 2009.
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Thermocouple is replaced by a new one every year to ensure accuracy.*

Data / Parameter:	EWH
Data unit:	*h*
Description:	*Engine working hours of power plant*
Measured/ Calculated /Default:	measured
Source of data:	*Hour meter of the PLC (Programmable Logic Controller)*
Value(s) of monitored parameter：	*10547*
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	PLC, Programmable Logic Controller Type: Siemens S7-300
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Equipment is maintained in line with manufacturer recommendations to assure high quality output.*

Data / Parameter:	FWH
Data unit:	*h*
Description:	*Flare working hours*
Measured/ Calculated /Default:	Measured
Source of data:	*Hour meter of the PLC (Programmable Logic Controller)*
Value(s) of monitored	*4265*

parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	PLC, Programmable Logic Controller Type: Siemens S7-300
Measuring/ Reading/ Recording frequency:	*The data is measured continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Equipment is maintained in line with manufacturer recommendations to assure high quality output.*

Data / Parameter:	PE_{flare}
Data unit:	tCO_2
Description:	*Emission caused by methane not being destroyed in the course of flaring*
Measured/ Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	
Calculation method (if Applicable):	*As per thje methodological "Tool to determine project emission from flaring gases containing methane"*
QA/QC procedures applied:	

Data / Parameter:	$FV_{RG,h}$
Data unit:	m^3/h
Description:	Volumetric flow rate of the residual gas in dry basis at normal

	conditions in the hour h
Measured/ Calculated /Default:	Measured
Source of data:	*Flow meter*
Value(s) of monitored parameter：	
Indicate what the data are used for (Baseline/ Project/ Leakage emission Calculations)	*Used for baseline emission calculation.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Flow meter Type: Annubar 285 Accuracy class: ±2% Serial number: 01746511 calibration frequency: Every year Date of last calibration: Sep.17,2009 by Liaoning Provincial Institute of Measurement Validity: From Sep.17, 2009 to Sep.16, 2010
Measuring/ Reading/ Recording frequency:	*The data is measured and read continuously, recorded every 5 minutes, and archived electronically during the crediting period and two years after.*
Calculation method (if Applicable):	
QA/QC procedures applied:	*Data with low level of uncertainty. QA/QC procedures are planned for these data. Flow meter is subject to regular maintenance and testing regime to ensure accuracy.* *Once a year, the flow meter is sent to a certified institute for external calibration (certificates are available for DOE)*

Other Flare Operation Parameters:
As per the manufacturer's specifications, there is no other operating conditions of the flare that needs to be monitored.

SECTION E. Emission reductions calculation

The greenhouse gas emission reduction achieved by the project activity during a given year "y" (ER_y) is calculated by using the formulas as given in method ACM0001:

$$ER_y = (MD_{project,y} - MD_{reg,y})*GWP_{CH4} + EL_{LFG,y}*CEF_{elec,B,y} - EL_{PR,y}*CEF_{elec,PR,y} + ET_{LFG.y}*CEF_{ther,BL,y} - ET_{PR,y}*CEF_{ther,PR,y}$$

Where:

ER_y	= Emissions reduction, in tonnes of CO_2 equivalents (tCO_{2e})
$MD_{project,y}$	= Amount of methane that would have been destroyed/combusted during the year, in tonnes of methane (tCH_4)
$MD_{reg,y}$	= Amount of methane that would have been destroyed/combusted during the year in the absence of the project, in tonnes of methane (tCH_4)
GWP_{CH4}	= Global Warming Potential of methane (tCO_{2e}/tCH_4)
$EL_{LFG,y}$	= Net quantity of electricity produced using LFG, exported which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year y, in megawatt hours (MWh)
$CEF_{elec,B,y}$	= CO_2 emissions intensity of the baseline source of electricity displaced (tCO_{2e}/MWh)
$EL_{PR,y}$	= Amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh)
$CEF_{elec,PR,y}$	= Carbon emissions factor for electricity generation in the project activity (tCO_{2e}/TJ)
$ET_{LFG.y}$	= Quantity of thermal energy produced utilizing the landfill gas, which in the absence of the project activity would have been produced from onsite/offsite fossil fuel fired boiler, during the year y (TJ/y)
$CEF_{ther,BL,y}$	= CO_2 emissions intensity of the fuel used by boiler to generate thermal energy which is displaced by LFG based thermal energy generation (tCO_{2e}/TJ)
$ET_{PR,y}$	= fossil fuel consumption on site during project activity in year y (tonne)
$CEF_{ther,PR,y}$	= CO_2 emissions factor of the fossil fuel used by boiler to generate thermal energy in the project activity during year y.

E.1. Baseline emissions calculation

According to the applicable methodologies, the baseline emission (BE_y), achieved by the project activity for this monitoring period are calculated as follows:

$$\mathbf{BEy = (MD_{project,y} - MD_{reg,y})*GWP_{CH4} + EL_{LFG,y}*CEF_{elec,BL,y} + ET_{LFG.y}*CEF_{ther,BL,y}}$$

Where:

- ER_y = Emissions reduction, in tons of tCO_2 equivalent (tCO_{2eq})
- $MD_{project,y}$ = Amount of methane that would have been destroyed/combusted during the year, in tons of methane (tCH_4)

- $MD_{reg,y}$ = Amount of methane that would have been destroyed/combusted during the year in the absence of the project, in tons of methane (tCH4)
- GWP_{CH4} = Global Warming Potential of methane (tCO2eq/tCH4)
- $EL_{LFG,y}$ = Net quantity of electricity produced using LFG exported which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year y, in megawatt hours(MWh)
- $CEF_{elec,BL,y}$ = CO2 emissions intensity of the baseline source of electricity displaced (tCO2eq/MWh)
- EL_{PR} = Amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh)
- $ET_{LFG.y}$ = Quantity of thermal energy produced utilizing the landfill gas, which in the absence of the project activity would have been produced from onsite/offsite fossil fuel fired boiler, during the year y (TJ/y)
- $CEF_{ther,BL,y}$= CO_2 emissions intensity of the fuel used by boiler to generate thermal energy which is displaced by LFG based thermal energy generation (tCO_{2e}/TJ)
- $ET_{PR,y}$ = fossil fuel consumption on site during project activity in year y (ton)
- $CEF_{ther,PR,y}$= CO_2 emissions factor of the fossil fuel used by boiler to generate thermal energy in the project activity during year y.

The project does not consume or produce thermal energy, therefore:

$ET_{LFG,y} = 0$

Calculation of $MD_{project,y}$

Methane destroyed by the project activity ($MD_{project,y}$) during each monitoring period is determined as follows:

- the sum of the quantities fed into the flare ($LFG_{flare,y}$), to the power plant ($LFG_{electricity,y}$) is compared with the total LFG captured ($LFG_{total,y}$);
- the lower value of the two is then adopted as $MD_{project,y}$ for a conservative approach.

Calculations are then made according to the following formula:

$$MD_{project,y} = MD_{flare,y} + MD_{electricity,y}$$

$$MD_{flare,y} = (LFG_{flare,y} * w_{CH4,y} * D_{CH4,y}) - (PE_{flare,y} / GWP_{CH4})$$

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH4,y} * D_{CH4,y}$$

The methane fraction of the LFG during this monitoring period is measured continuously, and recorded every 5 minutes like all the other monitored parameters.

$PE_{flare,y}$ is the project emission from flaring of the residual gas stream determined following the procedure described in the "Tool to determine project emissions from flaring gases containing Methane".
In this project, the flare is enclosed and default value for the flare efficiency is adopted. The temperature of the exhaust gas of the flare is measured continuously. Therefore flare efficiency in the hour *h* is then*:*

- 90%, if the temperature of the flare's (T_{flare}) exhaust is above 500 ºC for more than 40 minutes during the hour *h* , and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*.
- 50%, if the temperature of the flare's (T_{flare}) exhaust is above 500 ºC for more than 40 minutes during the hour *h* , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*.
- 0%, if the temperature of the flare's (T_{flare}) exhaust is below 500 ºC more than 20 minutes during the hour *h*.

Flare efficiency calculated as above is than assigned to each hour of the monitoring period and used to calculate the Project Emissions. During the monitoring period the flare has been operated in compliance with manufacturer's specifications.

Monitoring Period Dec. 25, 2008 –Mar.31, 2010	**[tCO_2]**
$PE_{flare,y}$ （Dec. 25, 2008 –Dec.31, 2009）	776.94
$PE_{flare,y}$（Jan. 1, 2010 –Mar.31, 2010）	275.61
Total	1,052.55

When during the maintenance or calibration for flow meters or analyzer, any miscalculation or lost in the ERs occurs, the related failure form is filled in and the difference of ERs is added to the total claimed. In this monitoring period, as per the attached Failure Reports, the total lost ERs are 28 tCO_2(ERs of 2009 are 22 tCO_2, and ERs of the first quarter of 2010 are 6 tCO_2).

Therefore, according to the above quoted formula and to the spreadsheet and failure forms in annex, the result of $MD_{project,y}$ are the following:

Monitoring Period Dec. 25, 2008 –Mar.31, 2010	**[tCO_2]**
$MD_{project,y}$*GWP_{CH4}（Dec. 25, 2008 –Dec.31, 2009）	51,903
$MD_{project,y}$*GWP_{CH4}（Jan. 1, 2010 –Mar.31, 2010）	12,754
Total	64,657

Calculation of $MD_{reg,y}$

$$MD_{reg,y} = MD_{project,y} * AF$$

As per the registered PDD, there are no regulatory or contractual requirements that obligate to install a specific system for collection and destruction of LFG or to collect and destroy a specific percentage of the "generated" amount of biogas, the adjustment factor (AF) is then assumed to be "0" for this project. Hence,

Monitoring Period Dec. 25, 2008 – Mar.31, 2010	**[tCH_4]**
$MD_{reg,y}$ （ Dec. 25, 2008 –Dec.31, 2009 ）	0
$MD_{reg,y}$ （ Jan. 1, 2010 –Mar.31, 2010 ）	0
Total	0

Calculation of $MD_{electricity,y}$

Since electricity produced is connected to local grid (North East Electric Power Grid), the carbon emissions factor in North East Eclectic Power Grid is chosen for exported electricity:

$CEF_{elec,BL,y}$ = 1.05176 tCO_{2eq}/MWh

The net amount of electricity exported to China Northeast Electric Power Grid during this monitoring period is shown as follows:

Monitoring Period	$EL_{LFG,y}$ [MWh]	$CEF_{elec,BL,}$ [tCO_{2eq}/MWh]	$EL_{LFG,y}$*$CEF_{elec,BL,y}$ **[tCO_2]**
Dec. 25, 2008 –Dec.31, 2009	8,294.870	1.05176	8,724.21
Jan. 1, 2010 –Mar.31, 2010	1,950.000	1.05176	2,050.93

Evidences for $EL_{LFG,y}$ values are the available official bills.

E.2. Project emissions calculation

According to the applicable methodologies, the project emissions (PE_y), achieved by the project activity for this monitoring period are calculated as follows:

$$\mathbf{PE_y = EL_{PR} * CEF_{elec,PR,y} + ET_{PR,y} * CEF_{ther,PR,y}}$$

Where:

- PE_y =Project emissions reduction, in tons of tCO_2 equivalent (tCO_{2eq})
- $CEF_{elec,PR,y}$ = CO2 emissions intensity of the baseline source of electricity displaced (tCO2eq/MWh)
- EL_{PR} = Amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh)
- $ET_{PR,y}$ = fossil fuel consumption on site during project activity in year y (ton)
- $CEF_{ther,PR,y}$= CO_2 emissions factor of the fossil fuel used by boiler to generate thermal energy in the project activity during year y.

The project does not consume or produce thermal energy, therefore:

$ET_{PR,y} = 0$

The net amount of electricity imported from Northeast China Grid during this monitoring period is shown as follows, evidences for EL_{PRy} values are the available official bills.

Monitoring Period	$EL_{PR,y}$ [MWh]	$CEF_{elec,PR,}$ [tCO_{2eq}/MWh]	$EL_{LFG,y}$*$CEF_{elec,PR,y}$ **[tCO_2]**
Dec. 25, 2008 –Dec.31, 2009	290.627	1.05176	305.67
Jan. 1, 2010 –Mar.31, 2010	47.829	1.05176	50.3

E.3. Leakage calculation

According to the applicable methodologies and registered PDD, there is no leakage in this project.

E.4. Emission reductions calculation / table

Total baseline emissions:

$BE_y = (MD_{project,y} - MD_{reg,y})*GWP_{CH4} + EL_{LFG,y}*CEF_{elec,BL,y} + ET_{LFG.y}*CEF_{ther,BL,y}$

Monitoring Period	$MD_{project,y}$* GWP_{CH4} [tCO_2]	$MD_{reg,y}$ *GWP_{CH4} [tCO_2]	$EL_{LFG,y}$* $CEF_{elec,PR,y}$ [tCO_2]	$ET_{LFG.y}$* $CEF_{ther,BL,y}$ [tCO_2]	BE_y [tCO_2]
Dec. 25, 2008 –Dec.31, 2009	51,903	0	8,724.21	0	60,627
Jan. 1, 2010 –Mar.31, 2010	12,754	0	2,050.93	0	14,804
Total					75,431

Note: In a conservative discipline, the baseline emission amount is rounded down.

Total project emissions:

$PE_y = EL_{PR}*CEF_{elec,PR,y} + ET_{PR,y}*CEF_{ther,PR,y}$

Monitoring Period	$EL_{PR,y}$* $CEF_{pr,PR,y}$ [tCO_2]	$ET_{PR,y}$* $CEF_{ther,PR,y}$ [tCO_2]	PE_y [tCO_2]
Dec. 25, 2008 –Dec.31, 2009	305.67	0	306
Jan. 1, 2010 –Mar.31, 2010	50.3	0	51
Total			357

Note: In a conservative discipline, the project emissions is rounded up.

Total leakage:

There is no leakage in this project.

Total emission reductions:

$ER_y = BE_y - PE_y$

Monitoring Period	BE_y [tCO_2]	PE_y [tCO_2]	ER_y [tCO_2]
Dec. 25, 2008 –Dec.31, 2009	60,727	306	60,321
Jan. 1, 2010 –Mar.31, 2010	14,804	51	14,753
Total			75,074

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

According to PDD estimate CERs in year 2009 and 2010 should have been equal to 88,156 tCO_2 and 103,628 tCO_2 respectively. Referring to the present Monitoring Period this means, as the length of the monitoring period is about 12 months in 2009 and 3 months in 2010:

ER expected (Dec. 25, 2008 –Dec.31, 2009) = 88,156/365*372 = 89,846.7 tCO_2

ER expected (Jan. 1, 2010 –Mar.31, 2010) = 103,628/365*90 =25,552.1 tCO_2

Item	Values applied in ex-ante calculation of the registered CDM-PDD (tCO_2e)	Actual values reached during the monitoring period (tCO_2e)
Emission reductions (tCO_2e) Dec. 25, 2008 –Dec.31, 2009	89,846.7	60,321
Emission reductions (tCO_2e) Jan. 1, 2010 –Mar.31, 2010	25,552.1	14,753

E.6. Remarks on difference from estimated value in the PDD

Actual ERs hereby claimed are less than expected.

Annex 1. Additional monitoring information

I.Monitoring Sheets for Shenyang Laohuchong LFG Power Generation Project (25/12/2008 00:00—01/04/2010 00:00);

II. Spreadsheet for ER calculations;

III. Failure Reports (Feb.19,2009; Apr.30,2009; May.25,2009; Jun.16,2009; Sep.18,2009; Nov.4,2009; Dec.9,2009; Jan.8,2010; Feb.8,2010; Mar.8,2010)

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