MONITORING REPORT FORM (CDM-MR)
Version 01 - in effect as of: 28/09/2010

CONTENTS

MONITORING REPORT
Version 01, 25/02/2011

Daegu Bangcheon-Ri Landfill Gas CDM Project
reference number 0851
3rd monitoring period, 01/04/2009 - 31/03/2010

SECTION A. General description of the project activity

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

>>
Daegu Bangcheon-Ri Landfill site is located in 421, Bangcheon-Ri, Dasa-Eup, Dalsung-Gun, Daegu, Korea. The site is 596,760m^2 and has been filled up with over 14,700,000 tons of Municipal Solid Wastes(MSW) from Daegu City since 1990.

Before operation of CDM project, the treatment of landfill gas from Daegu Bangcheon-Ri Landfill site had been managed the 'simple on-site treatment' to prevent odour, air pollution and fire. The landfill gas is composed of methane(CH_4), which is one of major greenhouse gases and has 21 times higher global warning potential(GWP) compare to carbon dioxide(CO_2). Therefore, Daegu Bangcheon-Ri Landfill gas CDM Project is designed to minimize methane(CH_4) emission by capturing of LFG and utilizing it.

Daegu Bangcheon-Ri Landfill gas CDM Project is the project which captures and refines LFG and then refined LFG is supplied to the boiler of Korea District Heating Corp.(KDHC) to produce thermal energy and the power plant of landfill site to produce electricity.

For capturing, refining and utilizing methane which may be released to atmosphere, vertical collection gas pipes, refinery facility and storage tank were installed. The installation of facility was completed in 30th Sep 2006 and operated in 10th Oct 2006.

Finally, this is the 3rd monitoring period covering 1 year (from 01/04/2009 to 31/03/2010) and monitored emission reduction is 297,020 tCO2e.

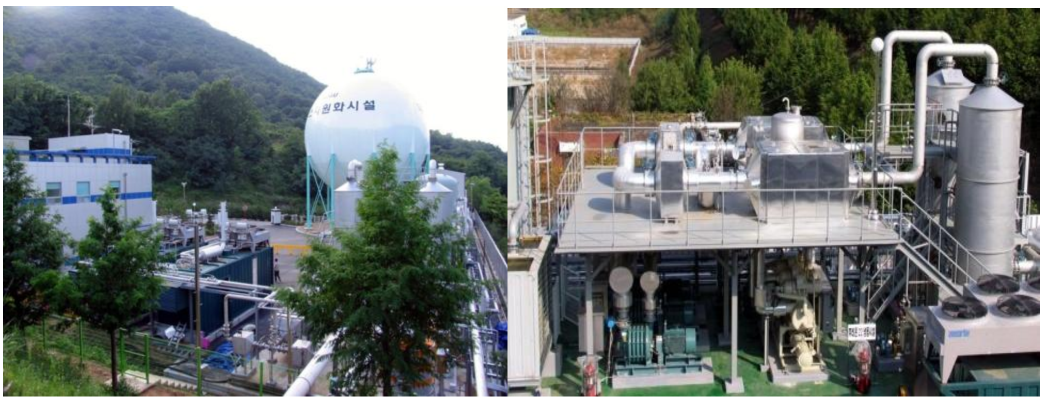

Figure 1. Landscape of Daegu Bancheon-Ri Landfill gas CDM project

A.2.	**Project Participants**

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Daegu Metropolitan City(project developer)

- Involved party: Republic of Korea(host country)

Taegu Energy & Environment Co., Ltd.(project executer)

- Involved party: Republic of Korea(host country)

Korea District Heating Corp.

- Involved party: Republic of Korea(host country)

Ecoeye Co., Ltd.(project consultant)

- Involved party: Republic of Korea(host country)

A.3.	**Location of the project activity:**

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421, Bangcheon-Ri, Dasa-Eup, Dalsung-Gun, Daegu Metropolitan City, Republic of Korea
The east longitude 123 °26 ´, the north latitude 35 °52 ´

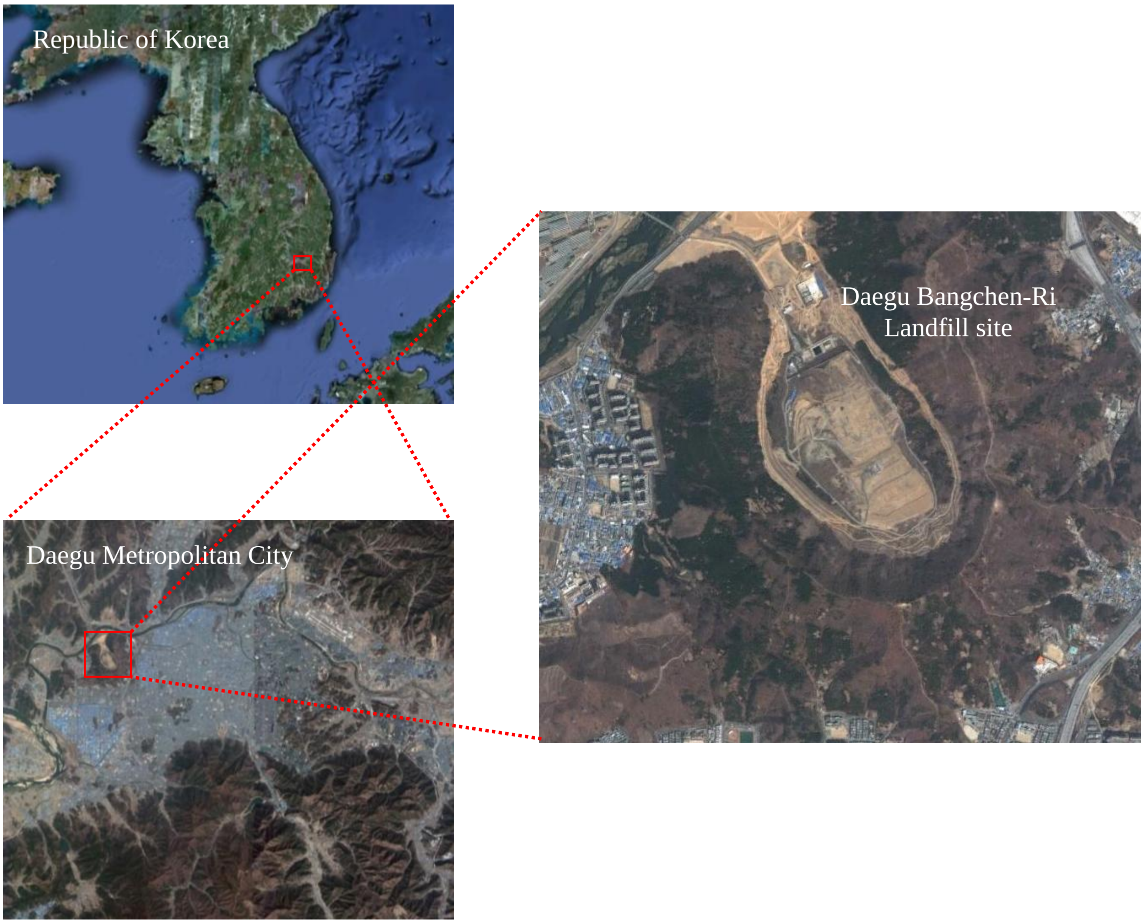

Figure 2. Location of Daegu Bangcheon-Ri Landfill site

A.4. Technical description of the project

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LFG capturing system

In order to capture LFG, vertical capturing pipes are under construction. Type of LFG capturing system was decided considering characteristic of a step-by-step filling operation. Also, this decision was for maintaining stable and optimum capturing efficiency. Comparing to horizontal capturing system, vertical capturing system has higher capturing efficiency and is easier to maintain and repair the system for each pipe.

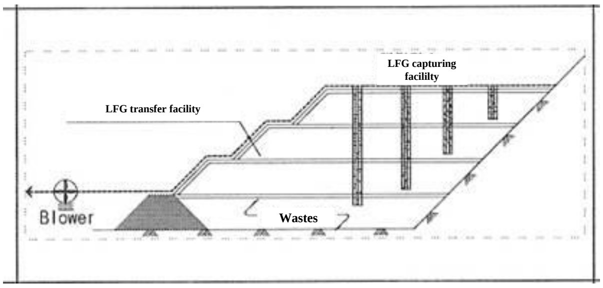

Figure 3. Vertical LFG capturing equipment installation concept

LFG utilization system

LFG utilization system mainly consists of 4 parts, blower, refinery facility, generation facility and gas storage.

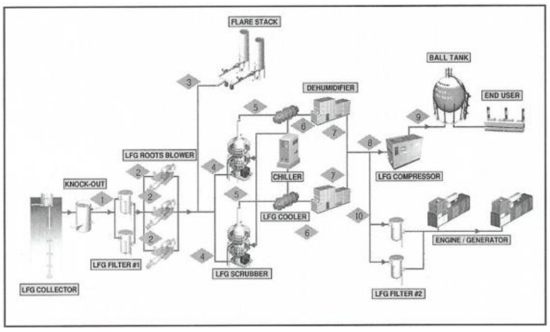

Figure 4. LFG utilization system flow chart

1) Blower

Blower delivers LFG capturing pressure and supplies LFG to utilization system. Blower type applied to this project, Roots Blower, is non-friction type, therefore it causes less noise. Additionally, this blower has less efficiency fluctuation when it is used for long time.

Figure 5. Roots Blower

- capacity : 75 Nm3/min for 1unit (3units will be installed. 2units for operation and 1unit for in case
- inlet pressure : -1,253 mmAqG, outlet pressure : +3,892 mmAqG
- noise : less than 90dB (at intervals of a 1 meter)

2) Filter

Filter separates and removes particles flowed into the pipe with LFG.

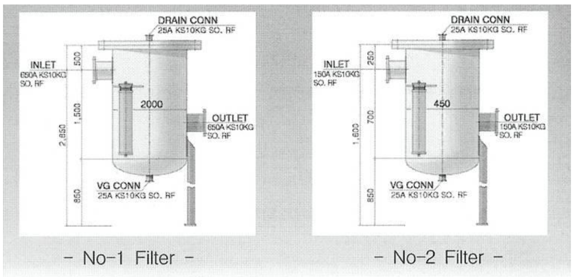

Figure 6. Filter

- No-1 Filter (before a blower): smaller than 5μm-particles are able to pass.
- No-2 Filter (before gas engine): smaller than 3 μm-particles are able to pass.

3) Scrubber

Scrubber removes acid gas (H2S, NH3 etc.) of LFG using solubility, so that the problem of erosion of the facility and pollutant emission can be reduced.

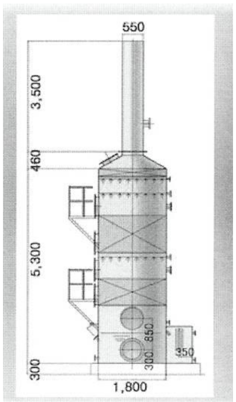

Figure 7. Scrubber

- capacity : 75 Nm3/min * 2sets
- type : Packed Tower Scrubber (attach Demister)
- inlet density : H2S – 50 → 5 ppm (removal efficiency 90%)
  NH3 – 60 → 5 ppm (removal efficiency 91.7%)

4) Cooler

Cooler removes moisture from LFG, so that caloric value of the gas is rising and trouble cause of the facility can be excluded.

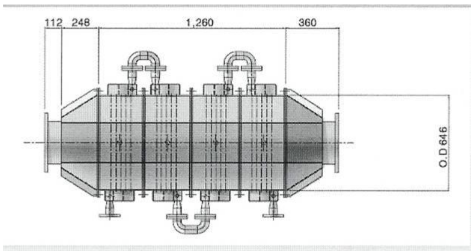

Figure 8. Cooler

- capacity : 75 Nm3/min * 2sets
- type : Pin Tube Cooler
- inlet/outlet condition : temperature – 25.5℃→ 5℃, Moisture content – 4% → 0.65%
- cooling medium : Chilled Water

5) Chiller
Chiller produces chilled water and supplies it to Cooler Tube Side.

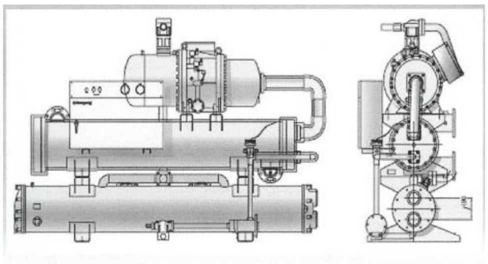

Figure 9. Chiller

- circulation flow : 55m3/hr
- thermal capacity : 85RT
- inlet/outlet temperature : 8/3℃

6) Gas Engine
Gas Engine generates electricity and generated electricity is for internal use.

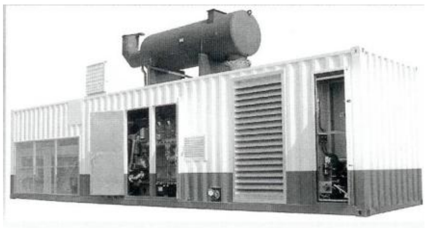

Figure 10. Gas Engine

- Output : 1,500kW (750kW x 2 sets, Container Type)
- Voltage : 3.3kV
- Rating Speed : 1,200 rpm
- required inlet LFG pressure : 0.3 ~ 0.35 kg/cm2G

7) Flare Stack

Flare Stack normally treats remnant LFG, and in case of emergency treats LFG so that odour effect can be minimized. The type of flare stack applied to this project is Candle Type. This type of flare stack is economically efficiency but influenced by climate and fire can be seen outside the stack.

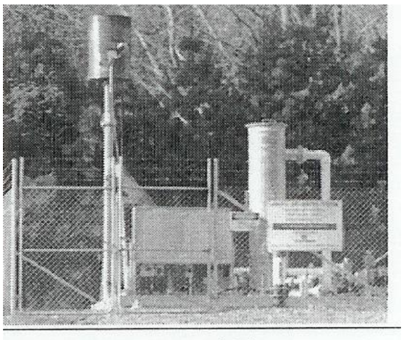

Figure 11. Flare Stack

8) Gas storage tank
Refined LFG is Medium Energy Content Gas. Produced Medium Energy Content Gas is stored in a gas storage tank and homogenized, so that LFG is supplied to users stably.

Figure 12. Gas storage tank

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

>>
"Consolidated baseline methodology for landfill gas project activities", ACM0001 version 05

A.6. Registration date of the project activity:

>>
19/08/2007

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

>>
The start date of this project is 19/08/2007 and crediting period chosen is 7 years(Renewable).

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

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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The information regarding the actual operation of the project activity in this monitoring period is as follows;

Date	Duration	Operation events
21/01/2010	162 hours	Due to compensator failure, LFG flow (FIQ-A) was not recorded. The compensator was replaced with new one on January 28.

Table 1. Operational events of equipment

Date	Duration	Operation events	Corrective actions on data
04/05/2009	1 hour	The electricity was not generated even though $LFG_{electricity}$ was supplied.	For conservativeness, the $LFG_{electricity}$ was corrected to 0 Nm^3.
08/05/2009	1 hour		
10/05/2009	2 hours		
13/05/2009	3 hours		
14/05/2009	6 hours		
16/05/2009	3 hours		
17/05/2009	8 hours		
18/05/2009	9 hours		
19/05/2009	7 hours		
20/05/2009	8 hours		
21/05/2009	3 hours		
22/05/2009	14 hours		
23/05/2009	8 hours		
24/05/2009	7 hours		
25/05/2009	2 hours		
26/05/2009	3 hours		
27/05/2009	4 hours		
19/06/2009	1 hour		
20/06/2009	1 hour		

01/07/2009	1 hour		
02/07/2009	1 hour		
03/07/2009	1 hour		
06/07/2009	1 hour		
07/07/2009	1 hour		
09/07/2009	1 hour		
13/07/2009	2 hours		
21/07/2009	1 hour		
22/07/2009	1 hour		
23/07/2009	1 hour		
25/08/2009	1 hour		
30/09/2009	2 hours		
30/12/2009	1 hour	Unreasonable measuring value of flow meter (FIQ-A) was recorded.	Most conservative value of 0 Nm^3 replaced unreasonable measuring value.
23/01/2010	1 hour	Unreasonable measuring value of flow meter (FIQ-A) was recorded.	Most conservative value of 0 Nm^3 replaced unreasonable measuring value.
23/01/2010	1 hour	Unreasonable measuring value of analyzer (AT-A) was recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
25/01/2010	2 hours	Unreasonable measuring values of analyzer (AT-A) were recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
26/01/2010	1 hour	Unreasonable measuring value of analyzer (AT-A) was recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
28/01/2010	1 hour	Unreasonable measuring value of flow meter (FIQ-A) was recorded.	Most conservative value of 0 Nm^3 replaced unreasonable measuring value.
28/01/2010	1 hour	Unreasonable measuring value of analyzer (AT-A) was recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
29/01/2010	2 hours	Unreasonable measuring values of analyzer (AT-A) were recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
30/01/2010	2 hours	Unreasonable measuring values of analyzer (AT-A) were recorded.	Most conservative value of 0 % replaced unreasonable measuring value.
02/02/2010	2 hours	Unreasonable measuring values of analyzer (AT-A) were recorded.	Most conservative value of 0 % replaced unreasonable measuring value.

Table 2. Operational events of monitoring system and corrective actions

B.2. Revision of the monitoring plan

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The monitoring plan has not been revised.

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

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No deviation applied to this monitoring period.

B.4. Notification or request of approval of changes

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There is no notification or request of approval of changes from the project activity as described in the registered CDM-PDD.

SECTION C. Description of the monitoring system

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Monitoring system

All kinds of gas analyzing and gas measuring instruments are present. The data collected is registered continuously by the PLC(Programmable Logic Controller). The following equipments are used to monitor the operation of the project and to monitor the emission reduction.

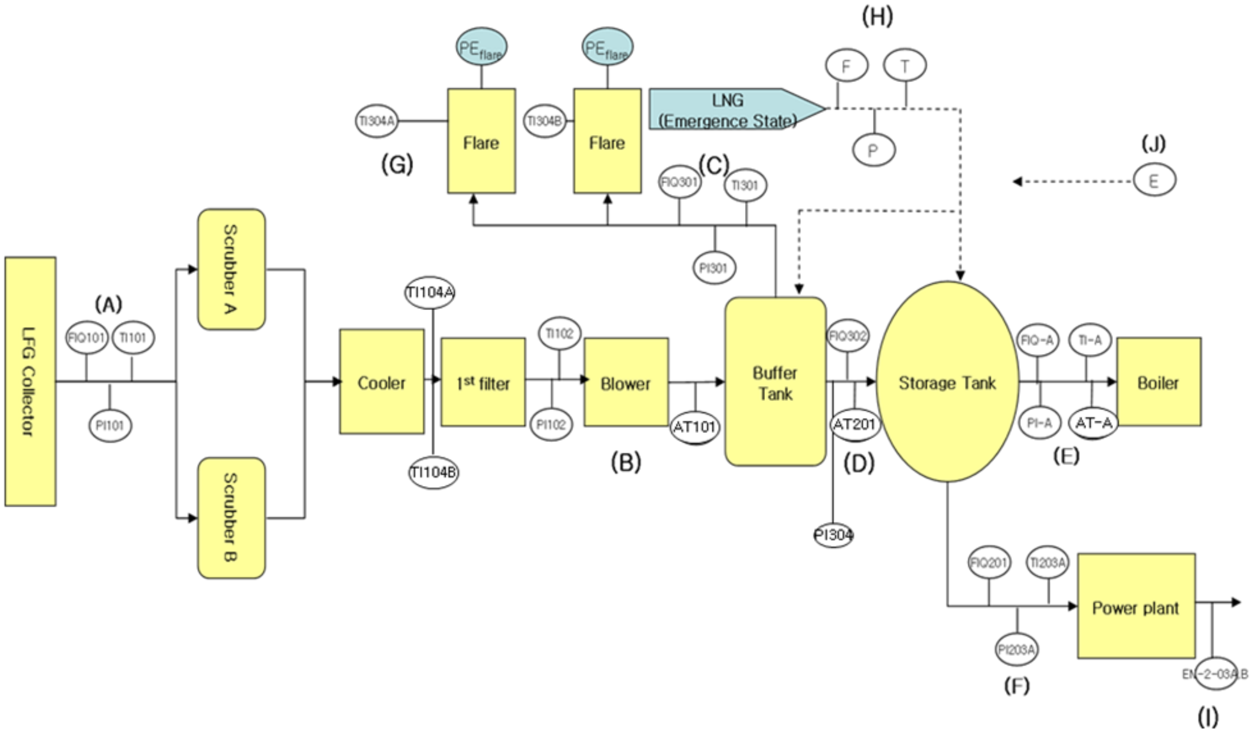

Figure 13. Line diagram of monitoring points

Link	Tag No.	Monitoring parameter	Type	range	Location
(A)	FIQ101	LFG_{total}	Vortex	42~150 Nm^3/min	Flow meter, the line that is from the LFG Collector to the Scrubber
	TI101		Bimetal	-30~50℃	Temperature transmitter, the line that is from the LFG Collector to the Scrubber
	PI101		Diaphragm	0~-0.5 kg/cm^2G	Pressure transmitter, the line that is from the LFG Collector to the Scrubber
(B)	TI102	reference	Bimetal	-30~50℃	Temperature transmitter, the line that is from the 1st filter to the Blower
	PI102	reference	Diaphragm	0~-0.5 kg/cm^2G	Pressure transmitter, the line that is from the 1st filter to the Blower
(C)	FIQ301	LFG_{flare}	Vortex	42~150 Nm^3/min	Flow meter, the line that is from the Buffer tank to the Flare
	AT101		Infrared analyzer	CH_4, CO_2, O_2	Gas analyzer, the line that is from the Blower to the Buffer tank
	TI301		Bimetal	-30~50℃	Temperature transmitter, the line that is from the Buffer tank to the Flare
	PI301		Diaphragm	0~-1 kg/cm^2G	Pressure transmitter, the line that is from the Buffer tank to the Flare
(D)	FIQ302	reference	Vortex	42~150 Nm^3/min	Flow meter, the line that is from the Buffer tank to the Storage tank
	PI304	reference	Diaphragm	0~-1 kg/cm^2G	Pressure transmitter, the line that is from the Buffer tank to the Storage tank
	AT201	reference	Infrared analyzer	CH_4, CO_2, O_2	Gas analyzer, the line that is from the Buffer tank to the Storage tank
(E)	FIQ-A	$LFG_{thermal}$	Turbine Flow Meter	42 ~ 150 Nm^3/min	Flow meter, the line that is from the Storage tank to the Boiler

	TI-A		Bimetal	-30~50℃	Temperature transmitter, the line that is from the Storage tank to the Boiler
	PI-A		Diaphragm	0~-15 kg/cm^2G	Pressure transmitter, the line that is from the Storage tank to the Boiler
	AT-A		Infrared analyzer	CH_4, CO_2, O_2	Gas analyzer, the line that is from the Storage tank to the Boiler
(F)	FIQ201	$LFG_{electricity}$	Vortex	42 ~ 150 Nm^3/min	Flow meter, the line that is from the Storage tank to the Power plant
	TI203A		Bimetal	-30~50℃	Temperature transmitter, the line that is from the Storage tank to the Power plant
	PI203A		Diaphragm	0~15 kg/cm^2G	Pressure transmitter, the line that is from the Storage tank to the Power plant
(G)	TI304A	Flare efficiency	Thermocouple	-50~500℃	Temperature transmitter, the line that is from the Flare
	TI304B		Thermocouple	-50~500℃	Temperature transmitter, the line that is from the Flare
(H)	F	PE_{LNG}	Rotary Flow Meter	0 ~ 20000 Nm^3/min	Flow meter, the line that is from the LNG supplier to the Storage tank
	T		Bimetal	-30~50℃	Temperature transmitter, the line that is from the LNG supplier to the Storage tank
	P		Bourdon	0~15 kg/cm^2G	Pressure transmitter, the line that is from the LNG supplier to the Storage tank
(I)	EN-2-03A, B	reference		MWh	Electricity from the Power plant
(J)	E	EL_{IMP}		MWh	Income Electricity used to operate the refining facility

Table 3. Monitoring points and related parameters

1) LFG flow

Captured LFG is monitored by FIQ-101 and combusted LFG is monitored by FIQ-201, FIQ-301 and FIQ-A. These flow meter measure LFG flow continuously and the measuring values hourly are recorded.

2) CH_4 fraction

The fraction of CH_4 in LFG is measured by using continuous gas analyzers which are AT-101 and AT-A. The analyzer monitoring CH_4 fraction fed to flare is AT-101 and the analyzer monitoring CH_4 fraction fed to boiler and gas engine is AT-A. These analyzers measure CH_4 fraction continuously and the measuring values hourly are recorded.

3) Flare efficiency

Flaring temperature (TI-304A/B) is measured based on hourly measurement. Also, monitoring of the operation time of the flares is made continuously by the PLC and every hour the instantaneously flare temperature is registered by the supervisory system. Therefore, project participant can monitor whether the flare stack is operated or not and can apply fixed flare efficiency of open flare.

To decide the $PE_{flare,y}$, the following guideline was applied

- A hourly average of flares temperature was measured, considering the temperature registers when the instant gas-flow was above 0 Nm3/h (flares are accepting gas)
- If the average temperature is below 300℃, the gas-flow registered during this certain hour is considered equal to zero and excluded from ERs calculation.
- For example, LFG_{flare} were 100 Nm^3, but the temperature (TI-304B) was below 300℃. They were excluded from ERs calculation

4) Electricity imported

The imported electricity is used for LFG capturing and treating. The amount of electricity is continuously measured by watt-hour meter(E) and double-checked with Electric bill monthly provided by KEPCO

5) LNG usage

LNG may abnormally be supplied to landfill site and mix with LFG which is supplied to the boiler as fuel to satisfy the operation condition of the boiler which is in KDHC. The amount of supplied LNG is continuously measured by flow meter(F) and double-checked with Gas bill monthly provided by LNG supplier.

Main monitoring equipment

1) Flow meter

► Rotary Flow Meter(F : LNG flow meter)

- specification : Rotary Flow Meter
- output signal : 4~20ma
- accuracy: ±1.0%
- power : DC 24V
- material(body/element) : STS 304/STS 316
- Temp. range : -10℃ ~ 60℃
- flow range : 0 ~ 20000 NM3/min

► Turbine Flow Meter(FIQ-A)

- specification : Turbine Flow Meter
- output signal : 4~20ma
- accuracy : ±1.0%
- power : DC 24V
- Temp. range : -10℃ ~ 60℃
- Repeatability : +/- 0.02%
- material(body/element) : STS 304/STS 316

► Vortex Flow Meter(FIQ-101)

- specification : vortex flow meter
- output signal : 4~20mA
- accuracy : ±1.0%
- power : DC 24V
- material(body/element) : SUS 316/SUS 316
- Temp. range : 40 ~ 60 ℃
- flow range : 42 ~ 150 Nm3/min

► Vortex Flow Meter(FIQ-201)

- specification : vortex flow meter
- output signal : 4~20mA
- accuracy : ±1.0%
- power : DC 24V
- material(body/element) : SUS 316/SUS 316
- Temp. range : 50 ~ 70 ℃
- flow range : 2.3 ~ 30.8 Nm3/min

► Vortex Flow Meter(FIQ-301)

- specification : vortex flow meter
- output signal : 4~20mA
- accuracy : ±1.0%
- power : DC 24V
-material(body/element) : SUS 316/SUS 316
- Temp. range : 50 ~ 70 ℃
- flow range : 18.7 ~ 175 Nm3/min

► Vortex Flow Meter(FIQ-302)

- specification : vortex flow meter
- output signal : 4~20mA
- accuracy : ±1.0%
- power : DC 24V
- material(body/element) : SUS 316/SUS 316
- Temp. range : 50 ~ 70 ℃
- flow range : 120.4 ~ 150 Nm3/min

2) Gas Analyzer(AT-101, 201, A)

- specification : infrared analyzer
- ambient temperature : -5℃ to 45℃
- ambient humidity : 90% RH max., non-condensing
- repeatability : ±0.5% of full-scale
- measurable gas components and measuring range;

	Minimum range	Maximum range
CO_2	0 ~ 500 ppm	0 ~ 100vol%
CH_4	0 ~ 1000 ppm	0 ~ 100 vol%
O_2(built-in paramagnet)	0 ~ 5 vol%	0 ~ 100 vol%

3) Transmitters

► Temperature Transmitter

- specification : bimetal
- structure : water proof
- accuracy : ±1.0%
- type : any angle
- cover material : STS 304
- cover dia.(outsize) : 6.4mm O.D.
- type of process connection : KS 10K FF FLANGE(1 1/2”)

► Pressure Transmitter

- specification : diaphragm
- accuracy : ±0.1%
- pressure use : -0.5~0kg/cm^2
- material(body/element) : STS 304/STS 316)
- type of process connection : 1/2” PT
- case size : 100mm
- etc. : oil fill, blow-out hole

Data Collection Procedures

All variables monitored are controlled by an electrical control system. This control system is provided with a PLC (Programmable Logic Controller). All the measured process signals are processed by the PLC. With this system it is possible to control and monitor the installation at a distance, including through the internet. The main functions of PLC are indicated below.

1) Monitoring Function
All of the status and trouble about the other equipment and PLC are monitored. If there are breakdowns or abnormal status, it is indicated, if necessary, the counterplan of it is also informed.

2) Controlling Function
Each control station perform continuous control and sequence control by 32bit CPU, and even if obstacles may occur at primary CPU, due to duplicated processor by 32bit machine, bumpless stable gas treatment process control is performed by back-up CPU through one to one correspondence.

3) Recording Function
Such data about gas treatment and power equipment operation is collected, and the event recording about trouble and the operation of operator is recorded.

4) Accumulation of DATA Function
The data about flow, water quality, power and other useful data is accessed and preserved for efficient system management and the improvement of treated water quality.

5) Emergency Operation Function
In case communication line or operation station is down, automatic operation will be performed by internal program of control station.

6) Down Loading Function
Each parameter, Database and Control program from the operator station is transferred to each remote control station and also be assigned and executed.

7) Warning Function
In case breakdowns occur during monitoring and controlling of each equipment, warning will be indicated and classified by importance.

Every five minutes, PLC reads data from the server and the data can be checked on MMI program. At the end of each day (at 12:00pm), the data is automatically stored into the PC at operation team. Archiving process of the stored data is as follows;

1) A person in charge of operation who belongs to operation team prints out the data of captured LFG (amount, temperature and pressure, etc.) as document.
2) The team leader of operation team inspects the document.
3) The document gets approval from the executive director.

The archived data are to be kept during the crediting period and two years after.

QA/QC

1) Calibration of analyzer

An analyzer to measure methane gas has been regularly calibrated one time a month on-site by standard gas. The calibration consists of two steps. One is zero calibration, the other is span calibration. Zero calibration is used for zero point adjustment and N_2 gas is used. Span calibration is used to perform a span point adjustment. For the span calibration, gas for CH_4, CO_2, O_2 measurement, the standard gas was used with a concentration of each specification.

► Internal regulation of Gas analyzer

- An analyzer to measure methane gas has been regularly calibrated one time a month on-site by standard gas.
- There is no relevant law or standard of Error tolerance of gas an analyzer, but the internal regulation of error tolerance is ±2%.
- If the result of calibration deviates from the error tolerance twice in row, or the gas meter operates improperly; the gas analyzer will be tested by the supplier or the third testing organization.
- The every single error is reflected to calculate emission reduction.

The certificate of standard gas(N2, CH4, CO2, O2) analysis was submitted to verifier.

► Average Error of the analyzer

$$Error(\%) = \frac{MV - SV}{SV}, \quad Error_{Ave}(\%) = \sqrt{(Er_1)^2 + (Er_1)^2 + (Er_1)^2 \cdots + (Er_n)^2}$$

MV : Measurement gas Value

SV : Standard gas Value

$Error_{Ave}$: Average Error

Parameter	Equipment	Tag NO.	Error(%)
$Fv_{CH4,RG}$	Gas analyzer	AT-101	0.39
w_{CH4}	Gas analyzer	AT-A	0.26

Table 4. Average error of analyzer during 3rd monitoring period

This average error is calculated by using above formulae and ‘Calibration report of analyzer’. This error is applied to calculate MD_{flare}, $MD_{electricity}$, $MD_{thermal}$, which in the end have an effect on ER_y.

2) Calibration of flow meter

The monitoring equipments to measure methane gas are calibrated every 2 years by a suitable accredited company. In 2008, the monitoring equipments have been calibrated. Therefore, this calibration is valid for 2 years.

Parameter	Equipment	TAG No	Serial number	Calibration Date	Expiration Date
LFG_{total}	Vortex flow meter	FIQ-101	DE26014G	2008.9.29	2010.9.28
	Temperature Transmitter	TI-101	TI-101	2008.6.4	2010.6.3
	Pressure Transmitter	PI-101	91F347305	2008.6.16	2010.6.15
MD_{flare}	Vortex flow meter	FIQ-301	DE28015G	2008.9.3	2010.9.2
	Temperature Transmitter	TI-301	TI-301	2008.6.4	2010.6.3
	Pressure Transmitter	PI-301	PI-301	2008.6.3	2010.6.2
$MD_{electriciy}$	Vortex flow meter	FIQ-201	C10-S1920HN	2008.8.18	2010.8.17
	Temperature Transmitter	TI-203A	TI-203A	2008.6.4	2010.6.3
	Pressure Transmitter	PI-203A	PI-203A	2008.6.3	2010.6.2
$MD_{thermal}$	Turbine flow meter	FIQ-A	10505776	2008.8.18	2010.8.17
	Temperature Transmitter	TI-A	06503213	2008.6.3	2010.6.2
	Pressure Transmitter	PI-A	PI-304	2008.6.3	2010.6.2
MD_{LNG} & PE_{LNG}	Rotary Flow Meter	F	20505437	2008.8.18	2010.8.17
	Temperature Transmitter	T	TE-503	2008.6.4	2010.6.3
	Pressure Transmitter	P	EJA 530A(P)	2008.6.3	2010.6.2

Table 5. Calibration of flow meter during 3rd monitoring period

Organizational Structure

Positions and roles for this CDM project activity were defined. From the point of view of the plant operation, positions and roles are defined. Requirements for job positions are determined in documented procedures, as presented in Monitoring Manual.

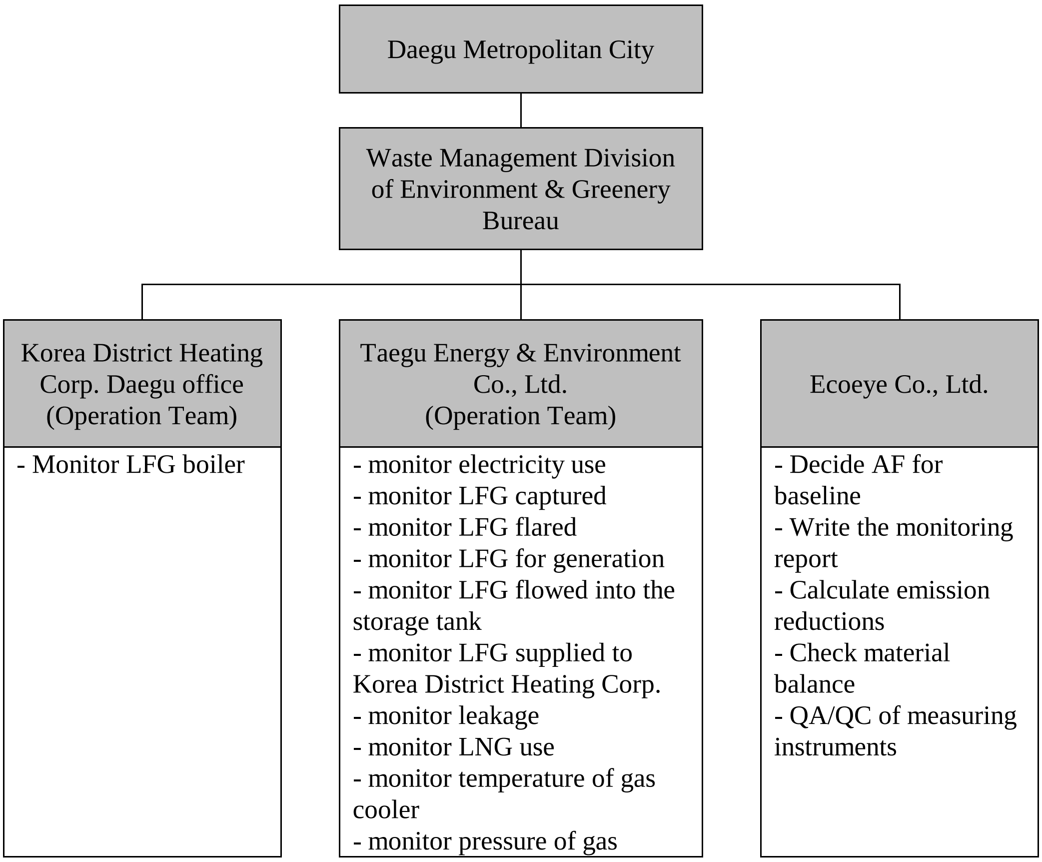

Table 6. Monitoring structure

Responsible department and person for the monitoring

- Han-su Kim / Waste Management Division of Environment & Greenery Bureau of Daegu Metropolitan city

Practical and responsible monitoring person (about electricity, LFG and LNG)

- Gee-cheon Chang / Taegu Energy & Environment Co., Ltd.(Operation Team)

Practical and responsible monitoring person (about LFG boiler)

- Sun-woo Kim / Korea District Heating Corp. Daegu office (Operation Team)

Practical and responsible monitoring person (about calculation of emission reductions)

- Jae-soo Jung / ECOEYE Co., Ltd.

Taegu Energy & Environment Co., Ltd. is responsible for all CDM monitoring. And Korea District Heating Corp. Daegu office monitor data related to boiler in company with Taegu Energy & Environment Co., Ltd.

Roles and Responsibilities of Personnel

Organization	Department	Position	Name	Roles
Taegu Energy & Environment Co., Ltd.	CEO		Suk-hyung Lee	Approval of monthly calculation result & monitoring report
	Executive Director		Yeong-bok Mun	Approval of monthly calculation result & monitoring report
	Operation Team	Team manager	Geum-seok Hyun	Approval of daily calculation result & supervision of facility management
		Assistant manager	Gee-cheon Chang	Data analysis, calculation & data aggregation & facility management
		Assistant manager, Staff (working in shifts)	Myeon-hui Nam Nam-eok Kim	Data aggregation & facility management
			Dong-hyeok Kwon O-geun Kwon	
			Seok-ho Mun Chang-man Kim	
Korea District Heating Corp. Daegu office	Operation Team	Team manager	Seon-u Kim	Approval of daily calculation result
		Assistant manager	Hyeon-gwan Seo	Data analysis, calculation & data aggregation

Table 7. Major responsible personnel and its rules

Emergency Procedures

In case of emergency (especially, monitoring equipment failure), the staff in charge should figure out the cause and then take action according to the internal procedure. And the data during the time is not considered to calculate ER_y. Refer to monitoring manual for more details.

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_2/tCH_4
Description:	Global warming potential for methane (CH_4)
Source of data used:	Default value in IPCC & ACM0001 version 5
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Additional comment:	N/A

Data / Parameter:	**AF**
Data unit:	%
Description:	Adjustment factor for calculating baseline emission
Source of data used:	1st monitoring report
Value(s) :	11.20
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation
Additional comment:	Fixed value for the remaining crediting period

Data / Parameter:	**$EF_{EL,leakage}$**
Data unit:	$tonCO_2/MWh$
Description:	CO_2 emissions intensity of the electricity imported
Source of data used:	PDD(Calculated)
Value(s) :	0.5554
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for leakage calculation
Additional comment:	Fixed value for the remaining crediting period

Data / Parameter:	**D_{CH4}**
Data unit:	tCH_4/Nm^3
Description:	Methane density
Source of data used:	ACM0001 version 05
Value(s) :	0.0007168
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Additional comment:	N/A

Data / Parameter:	$\eta_{flare,h}$
Data unit:	-
Description:	Flare efficiency in hour h
Source of data used:	Tool to determine project emissions from flaring gases containing methane
Value(s) :	0.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Additional comment:	If the average temperature is below 300℃, the gas-flow during this certain hour is considered equal to zero and excluded from ER 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 by the flow meter installed continuously
Source of data:	PLC data (the flow meter: FIQ-101)
Value(s) of monitored parameter:	46,657,747
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Reference
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<table><tr><td>Tag</td><td>FIQ-101</td></tr><tr><td>Type</td><td>vortex flow meter</td></tr><tr><td>Output signal</td><td>4~20mA</td></tr><tr><td>Accuracy class</td><td>±1.0%</td></tr><tr><td>Power</td><td>DC 24V</td></tr><tr><td>Material(body/element)</td><td>SUS 316/SUS 316</td></tr><tr><td>Temp. range</td><td>40~60℃</td></tr><tr><td>Flow range</td><td>42~150 Nm³/min</td></tr><tr><td>Serial number</td><td>DE26014G</td></tr><tr><td>Calibration frequency</td><td>2 years</td></tr><tr><td>Date of last calibration</td><td>29/09/2008</td></tr><tr><td>Validity</td><td>Valid</td></tr></table>
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	$LFG_{flare,y}$

Data unit:	Nm^3
Description:	Amount of landfill gas flared
Measured /Calculated /Default:	Measured by the flow meter installed continuously
Source of data:	PLC data (the flow meter: FIQ-301)
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Tag: FIQ-301 Type: vortex flow meter Output signal: 4~20mA Accuracy class: ±1.0% Power: DC 24V Material(body/element): SUS 316/SUS 316 Temp. range: 50~70℃ Flow range: 18.7~175 Nm^3/min Serial number: DE28015G Calibration frequency: 2 years Date of last calibration: 03/09/2008 Validity: Valid
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	**$LFG_{electricity,y}$**
Data unit:	Nm^3
Description:	Amount of landfill gas combusted in power plant
Measured /Calculated /Default:	Measured by the flow meter installed continuously
Source of data:	PLC data (the flow meter: FIQ-201)
Value(s) of monitored parameter:	74,086
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Tag: FIQ-201 Type: vortex flow meter Output signal: 4~20mA Accuracy class: ±1.0% Power: DC 24V Material(body/element): SUS 316/SUS 316 Temp. range: 50~70℃ Flow range: 2.3~30.8 Nm^3/min Serial number: C10-S1920HN Calibration frequency: 2 years Date of last calibration: 18/08/2008 Validity: Valid
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	**$LFG_{thermal,y}$**
Data unit:	Nm^3
Description:	Amount of landfill gas combusted in boiler
Measured /Calculated /Default:	Measured by the flow meter installed continuously
Source of data:	PLC data (the flow meter: FIQ-A) and KDHC data
Value(s) of monitored parameter:	47,089,676
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Tag: FIQ-A Type: Turbine Flow Meter Output signal: 4~20mA Accuracy class: ±1.0% Power: DC 24V Material(body/element): SUS 304/SUS 316 Temp. range: -10~60℃ Repeatability: +/- 0.02% Serial number: 10505776 Calibration frequency: 2 years Date of last calibration: 18/08/2008 Validity: Valid
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	$PE_{flare,y}$
Data unit:	tCO_2e
Description:	Project emissions from flaring of the residual gas stream
Measured /Calculated /Default:	Calculated (according to "Tool to determine project emissions from flaring gases containing methane")
Source of data:	N/A
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for project emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	N/A
Calculation method (if applicable):	$(LFG_{flared,y}*w_{CH4,y}*D_{CH4})*(1- \eta_{flare,h})*GWP$
QA/QC procedures applied:	According to "Tool to determine project emissions from flaring gases containing methane", QA/QC procedure will be applied for the parameters used for determining the project emissions from flaring of the residual gas stream in year y ($PE_{flare,y}$).

Data / Parameter:	$w_{CH4,y}$
Data unit:	m^3 CH_4/m^3 LFG
Description:	Methane fraction in the landfill gas
Measured /Calculated /Default:	Measured by the gas analyzer installed continuously
Source of data:	PLC data (the gas analyzer: AT-A, AT-101)
Value(s) of monitored parameter:	46.04~57.71 (Refer to calculation spread sheet file)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation

<table>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><td>Tag</td><td>AT-A</td></tr>
<tr><td>Type</td><td>Infrared analyzer</td></tr>
<tr><td>Ambient temperature</td><td>-5℃ ~ 45℃</td></tr>
<tr><td>Ambient humidity</td><td>90% RH max., non-condensing</td></tr>
<tr><td>Repeatability</td><td>±0.5% of full-scale</td></tr>
<tr><td>Measurable gas components and measuring range</td><td>CO_2 : 0~500ppm, 0~100vol%
CH_4: 0~1000ppm, 0~100vol%
O_2(built-in paramagnet) : 0~5vol%, 0~100vol%</td></tr>
<tr><td>Serial number</td><td>A6CO598T</td></tr>
<tr><td>Calibration frequency</td><td>one time a month</td></tr>
<tr><td>Date of last calibration</td><td>-</td></tr>
<tr><td>Validity</td><td>Valid, Applicable average error: 0.26%</td></tr>
</table>
<table>
<tr><td>Tag</td><td>AT-101</td></tr>
<tr><td>Type</td><td>Infrared analyzer</td></tr>
<tr><td>Ambient temperature</td><td>-5℃ ~ 45℃</td></tr>
<tr><td>Ambient humidity</td><td>90% RH max., non-condensing</td></tr>
<tr><td>Repeatability</td><td>±0.5% of full-scale</td></tr>
<tr><td>Measurable gas components and measuring range</td><td>CO_2 : 0~500ppm, 0~100vol%
CH_4: 0~1000ppm, 0~100vol%
O_2(built-in paramagnet) : 0~5vol%, 0~100vol%</td></tr>
<tr><td>Serial number</td><td>A6CO599T</td></tr>
<tr><td>Calibration frequency</td><td>one time a month</td></tr>
<tr><td>Date of last calibration</td><td>-</td></tr>
<tr><td>Validity</td><td>Valid, Applicable average error: 0.39%</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Continuous measuring and reading, hourly recording</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures applied:</td><td>Regular maintenance and internally calibrated one time a month</td></tr>
</table>

Data / Parameter:	T
Data unit:	℃
Description:	Temperature in the exhaust gas of the flare
Measured /Calculated /Default:	Measured by the thermocouple (-200℃ ~ 1200℃) installed continuously
Source of data:	PLC data (the thermocouple: TI-304A, TI-304B)
Value(s) of monitored parameter:	-200~42.7 (Refer to calculation spread sheet file)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Tag: TI-304A Type: Bimetal Structure: Water proof Accuracy class: ±1.0% Cover material: STS 304 Cover dia.(outsize): 6.4mm O.D Type of process connection: KS 10K FF FLANGE(1 1/2”) Serial number: TE-304A Calibration frequency: 2 years Date of last calibration: 04/06/2008 Validity: Valid Tag: TI-304B Type: Bimetal Structure: Water proof Accuracy class: ±1.0% Cover material: STS 304 Cover dia.(outsize): 6.4mm O.D Type of process connection: KS 10K FF FLANGE(1 1/2”) Serial number: TE-305B Calibration frequency: 2 years Date of last calibration: 04/06/2008 Validity: Valid
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	**EL_{IMP}**
Data unit:	MWh
Description:	Total amount of electricity imported to meet project requirement
Measured /Calculated /Default:	Measured by the watt-hour meter installed continuously
Source of data:	PLC data (read from watt-hour meter) and KEPCO data(Electric bill)
Value(s) of monitored parameter:	7,341.24
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for leakage emissions calculation

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording(watt-hour meter) and Monthly provided by KEPCO(Electric bill)
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	**LNG**
Data unit:	Nm^3
Description:	Amount of LNG supplied
Measured /Calculated /Default:	Measured by the flow meter installed continuously
Source of data:	PLC data (the flow meter: F) and data provided by LNG supplier(Gas bill)
Value(s) of monitored parameter:	512,414
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for project emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Tag: F Type: Rotary Flow Meter Output signal: 4~20ma Accuracy class: ±1.0% Power: DC 24V Material(body/element): STS 304/STS 316 Temp. range: -10℃~60℃ Flow range: 0~20,000Nm^3/min Serial number: 20505437 Calibration frequency: 2 years Date of last calibration: 18/08/2008 Validity: Valid
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording(the flow meter) and Monthly provided by LNG supplier(Gas bill)
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Regular maintenance and calibrated by approved 3rd party authority

Data / Parameter:	**PE_{LNG}**
Data unit:	tonCO^2eq.
Description:	CO2 emissions caused by combustion of LNG

Measured /Calculated /Default:	Calculated (using the amount of LNG supply and content of LNG, this value will be calculated. And this value is calculated for conservativeness of the project activity.)
Source of data:	N/A
Value(s) of monitored parameter:	1001.27
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for project emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly recording
Calculation method (if applicable):	- PE_{LNG} (tCO_2)= LNG(m^3) * mol(%) * CO_2 factor / 22.4(m^3/kmol) * 44(kg/kmol) * Oxidation factor /1000(kg/t) - $PE_{LNG} = CO_{2LNG,CH4} + CO_{2LNG,C2H6} + CO_{2LNG,C3H8} + CO_{2LNG,C4H10} + CO_{2LNG,C5H12}$
QA/QC procedures applied:	N/A

Data / Parameter:	**Content of supplied LNG**
Data unit:	vol%
Description:	Monthly average value of content of supplied LNG
Measured /Calculated /Default:	When LNG is supplied, monthly average value of content of supplied LNG can be provided by the LNG supplier.
Source of data:	Data provided by the LNG supplier
Value(s) of monitored parameter:	Refer to calculation spread sheet file
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for project emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly recording

Calculation method (if applicable):	N/A
QA/QC procedures applied:	N/A

Data / Parameter:	Operation time of gas engine generator(electricity generator)
Data unit:	Hours
Description:	This is monitored to ensure claimed methane destruction caused by methane combustion in the electricity generator when it is operational.
Measured /Calculated /Default:	Measured
Source of data:	PLC data
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	N/A

Data / Parameter:	Operation time of boiler
Data unit:	Hours
Description:	This is monitored to ensure claimed methane destruction caused by methane combustion in the boiler when it is operational.
Measured /Calculated /Default:	Measured
Source of data:	KDHC(Korea District Heating Corp.) data
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Continuous measuring and reading, hourly recording
Calculation method (if	N/A

applicable):	
QA/QC procedures applied:	N/A

SECTION E. Emission reductions calculation

Emission Reduction

According to registered PDD, emission reductions are calculated by following formulae.

$$ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} – EL_{leakage} - PE_{LNG}$$

ER_y	tCO_2e	Emission Reduction, in tones of CO_2 equivalents
$MD_{project,y}$	tCH_4	The amount of methane that would have been destroyed/combusted during the year, in tonnes of methane
$MD_{reg,y}$	tCH_4	The amount of methane that would have been destroyed/combusted during the year in the absence of the project, in tonnes of methane
GWP_{CH4}		Global Warming Portential of Methane during the first period : 21 tCO_2e/tCH_4
$EL_{leakage}$	tCO_2e	CO_2 emissions caused by imported electricity to meet the project requirements
PE_{LNG}	tCO_2e	CO_2 emissions caused by combustion of supplied LNG.

E.1. Baseline emissions calculation

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Formulae related to $MD_{project,y}$ and $MD_{reg,y}$

1) $MD_{project,y}=MD_{flared,y}+ MD_{electricity,y}+ MD_{thermal,y} - MD_{LNG}$

The total sum of methane destroyed at the boiler, the electricity generator and the flare is $MD_{project,y}$. But, in the abnormal situation LNG is supplied. Thus, $MD_{project,y}$ is deducted for destroyed methane of LNG.

$MD_{flared,y}$	tCH_4	the quantity of methane destroyed by flaring
$MD_{electricity,y}$	tCH_4	the quantity of methane destroyed by generation of electricity
$MD_{thermal,y}$	tCH_4	the quantity of methane destroyed for the generation of thermal energy
MD_{LNG}	tCH_4	the quantity of methane destroyed by using LNG

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

$LFG_{flared,y}$	Nm^3	Amount of landfill gas flared
$w_{CH4,y}$	m^3CH_4/ m^3LFG	Methane fraction in the landfill gas flared(AT-101)
D_{CH4}	tCH_4/m^3CH_4	the methane density expressed in tonnes of methane per cubic meter of methane (at standard temperature and pressure, the density of methane, 0.0007168 $tCH_4 / m^3 CH_4$
GWP_{CH4}		Global Warming Portential of Methane during the first period : 21 tCO_2e/tCH_4

$PE_{flared,y}$	tCO_2e	Project emissions from flaring of the residual gas stream in year y. In case of open flares, decision of the flare efficiency in the hour h ($\eta_{flare,h}$) is - 0% if the flame is not detected for more than 20 minutes during the hour h. - 50%, if the flare is detected for more than 20 minutes during the hour h.

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

$LFG_{electricity,y}$	Nm^3	Amount of landfill gas combusted in power plant
$w_{CH4,y}$	m^3CH_4/ m^3LFG	Methane fraction in the landfill gas combusted in power plant(AT-A)
D_{CH4}	tCH_4/m^3CH_4	the methane density expressed in tonnes of methane per cubic meter of methane (at standard temperature and pressure, the density of methane, 0.0007168 tCH_4 / m^3 CH_4

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

$LFG_{thermal,y}$	Nm^3	Amount of landfill gas combusted in boiler
$w_{CH4,y}$	m^3CH_4/ m^3LFG	Methane fraction in the landfill gas combusted in boiler(AT-A)
D_{CH4}	tCH_4/m^3CH_4	the methane density expressed in tonnes of methane per cubic meter of methane (at standard temperature and pressure, the density of methane, 0.0007168 tCH_4 / m^3 CH_4

► $MD_{LNG,y} = LNG * w_{CH4,y,LNG} * D_{CH4}$

LNG	Nm^3	Amount of LNG supplied
$w_{CH4,y,LNG}$	m^3CH_4/ m^3LNG	Methane fraction of LNG
D_{CH4}	tCH_4/m^3CH_4	the methane density

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

Baseline emission of this project is CH4 emission which is treated by simple burning system before the project activity. The amount of CH4 which is treated by simple burning system can be calculated using AF as shown in the methodology ACM0001. AF for this project is calculated as 11.20%.

AF	Adjustment Factor is a rate of the amount of captured LFG and flared LFG by existing simple burning system

Values related to $MD_{project,y}$ and $MD_{reg,y}$

1) $MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y} - MD_{LNG}$

When $MD_{flared,y}$, $MD_{electricity,y}$ and $MD_{thermal,y}$ is calculated, average error of gas analyzer through QA/QC is considered. And values reflecting error is the error adjustment values. Average error of AT-101 and AT-A is respectively 0.39% and 0.26%.

a. Real value

Period	$MD_{project}$	=	$MD_{thermal}$	+	MD_{flared}	+	$MD_{electricity}$	-	MD_{LNG}
Apr.2009	934.23	=	934.23	+	0.00	+	0.00	-	0.00
May.2009	1,556.93	=	1,556.93	+	0.00	+	0.00	-	0.00
Jun.2009	1,161.83	=	1,161.83	+	0.00	+	0.00	-	0.00
July.2009	1,451.20	=	1,422.75	+	0.00	+	28.45	-	0.00
Aug.2009	1,067.87	=	1,067.87	+	0.00	+	0.00	-	0.00
Sep.2009	956.74	=	956.06	+	0.00	+	0.68	-	0.00
Oct.2009	1,574.49	=	1,598.78	+	0.00	+	0.00	-	24.28
Nov.2009	1,590.88	=	1,644.06	+	0.00	+	0.00	-	53.18
Dec.2009	1,636.67	=	1,715.47	+	0.00	+	0.00	-	78.80
Jan.2010	1,261.54	=	1,323.27	+	0.00	+	0.00	-	61.73
Feb.2010	1,433.01	=	1,487.14	+	0.00	+	0.00	-	54.13
Mar.2010	1,617.29	=	1,680.99	+	0.00	+	0.00	-	63.70
Total	**16,242.70**	**=**	**16,549.38**	**+**	**0.00**	**+**	**29.13**	**-**	**335.82**

b. Error adjustment value

Period	$MD_{project}$	=	$MD_{thermal}$	+	MD_{flared}	+	$MD_{electricity}$	-	MD_{LNG}
Apr.2009	931.83	=	931.83	+	0.00	+	0.00	-	0.00
May.2009	1,552.93	=	1,552.93	+	0.00	+	0.00	-	0.00
Jun.2009	1,158.85	=	1,158.85	+	0.00	+	0.00	-	0.00
July.2009	1,447.47	=	1,419.10	+	0.00	+	28.38	-	0.00
Aug.2009	1,065.12	=	1,065.12	+	0.00	+	0.00	-	0.00
Sep.2009	954.28	=	953.60	+	0.00	+	0.68	-	0.00
Oct.2009	1,570.38	=	1,594.67	+	0.00	+	0.00	-	24.28
Nov.2009	1,586.66	=	1,639.84	+	0.00	+	0.00	-	53.18
Dec.2009	1,632.26	=	1,711.06	+	0.00	+	0.00	-	78.80
Jan.2010	1,258.14	=	1,319.86	+	0.00	+	0.00	-	61.73
Feb.2010	1,429.19	=	1,483.32	+	0.00	+	0.00	-	54.13
Mar.2010	1,612.97	=	1,676.67	+	0.00	+	0.00	-	63.70
Total	**16,200.08**	**=**	**16,506.84**	**+**	**0.00**	**+**	**29.06**	**-**	**335.82**

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

$$MD_{flared,y} = (LFG_{flared,y}*w_{CH4,y}*D_{CH4})-(PE_{flared,y}/GWP_{CH4})$$
$$PE_{flared,y}=(LFG_{flared,y}*w_{CH4,y}*D_{CH4})*(1- \eta_{flare,h})*GWP$$

a. Real value

	MD_{flared}	LFG_{flared}	W_{CH4}	D_{CH4}	PE_{flared}	$1- \eta_{flare,h}$
	t CH_4	Nm3	(%)	ton/Nm3	t CO_2	
Apr.09	0.00	0.00	Use each hourly data	0.0007168	0.00	0.5
May.09	0.00	0.00		0.0007168	0.00	0.5
Jun.09	0.00	0.00		0.0007168	0.00	0.5
Jul.09	0.00	0.00		0.0007168	0.00	0.5
Aug.09	0.00	0.00		0.0007168	0.00	0.5
Sep.09	0.00	0.00		0.0007168	0.00	0.5
Oct.09	0.00	0.00		0.0007168	0.00	0.5
Nov.09	0.00	0.00		0.0007168	0.00	0.5
Dec.09	0.00	0.00		0.0007168	0.00	0.5
Jan.10	0.00	0.00		0.0007168	0.00	0.5
Feb.10	0.00	0.00		0.0007168	0.00	0.5
Mar.10	0.00	0.00		0.0007168	0.00	0.5
Total	**0.00**	**0.00**		**0.0007168**		

b. Error adjustment value

	$MD_{flared,error}$	MD_{flared}	Error of gas analyzer
	t CH_4	t CH_4	%
Apr.09	0.00	0.00	0.39
May.09	0.00	0.00	0.39
Jun.09	0.00	0.00	0.39
Jul.09	0.00	0.00	0.39
Aug.09	0.00	0.00	0.39
Sep.09	0.00	0.00	0.39
Oct.09	0.00	0.00	0.39
Nov.09	0.00	0.00	0.39
Dec.09	0.00	0.00	0.39
Jan.10	0.00	0.00	0.39
Feb.10	0.00	0.00	0.39

Mar.10	0.00	0.00	0.39
Total	**0.00**	**0.00**	

* $MD_{flared,error} = MD_{flared} \times (1 - \text{Error of gas analyzer})$

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

a. Real value

	$MD_{electricity}$	$LFG_{electricity}$	W_{CH4}	D_{CH4}
	t CH_4	Nm3	(%)	ton/Nm3
Apr.2009	0.00	0	Use each hourly data (refer to CERs sheet)	0.0007168
May. 2009	0.00	0		0.0007168
Jun. 2009	0.00	0		0.0007168
Jul. 2009	28.45	72,436		0.0007168
Aug. 2009	0.00	0		0.0007168
Sep. 2009	0.68	1,650		0.0007168
Oct. 2009	0.00	0		0.0007168
Nov. 2009	0.00	0		0.0007168
Dec. 2009	0.00	0		0.0007168
Jan. 2010	0.00	0		0.0007168
Feb. 2010	0.00	0		0.0007168
Mar. 2010	0.00	0		0.0007168
Total	**29.13**	**74,086**		

b. Error adjustment value

	$MD_{electricity,error}$	$MD_{electricity}$	Error of gas analyzer
	t CH_4	t CH_4	%
Apr.09	0.00	0.00	0.26
May.09	0.00	0.00	0.26
Jun.09	0.00	0.00	0.26
Jul.09	28.38	28.45	0.26
Aug.09	0.00	0.00	0.26
Sep.09	0.68	0.68	0.26
Oct.09	0.00	0.00	0.26
Nov.09	0.00	0.00	0.26

Dec.09	0.00	0.00	0.26
Jan.10	0.00	0.00	0.26
Feb.10	0.00	0.00	0.26
Mar.10	0.00	0.00	0.26
Total	**29.06**	**29.13**	

*** $MD_{electricity,error}$ = $MD_{electricity}$ × (1- Error of gas analyzer)**

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

a. Real value

	$MD_{thermal}$	$LFG_{thermal}$	W_{CH4}	D_{CH4}
	t CH_4	Nm3	(%)	ton/Nm3
Apr.2009	934.23	2,484,208	Use each hourly data (refer to CERs sheet)	0.0007168
May. 2009	1,556.93	4,619,480		0.0007168
Jun. 2009	1,161.83	3,127,056		0.0007168
Jul. 2009	1,422.75	3,657,472		0.0007168
Aug. 2009	1,067.87	2,638,976		0.0007168
Sep. 2009	956.06	2,537,504		0.0007168
Oct. 2009	1,598.78	4,712,144		0.0007168
Nov. 2009	1,644.06	4,773,024		0.0007168
Dec. 2009	1,715.47	5,037,296		0.0007168
Jan. 2010	1,323.27	3,917,620		0.0007168
Feb. 2010	1,487.14	4,491,000		0.0007168
Mar. 2010	1,680.99	5,093,896		0.0007168
Total	**16,549.38**	**47,089,676**		

b. Error adjustment value

	$MD_{thermal,error}$	$MD_{thermal}$	Error of gas analyzer
	t CH_4	t CH_4	%
Apr.2009	931.83	934.23	0.26
May. 2009	1,552.93	1,556.93	0.26
Jun. 2009	1,158.85	1,161.83	0.26
Jul. 2009	1,419.10	1,422.75	0.26
Aug. 2009	1,065.12	1,067.87	0.26
Sep. 2009	953.60	956.06	0.26

Oct. 2009	1,594.67	1,598.78	0.26
Nov. 2009	1,639.84	1,644.06	0.26
Dec. 2009	1,711.06	1,715.47	0.26
Jan. 2010	1,319.86	1,323.27	0.26
Feb. 2010	1,483.32	1,487.14	0.26
Mar. 2010	1,676.67	1,680.99	0.26
Total	**16,506.84**	**16,549.38**	

*** $MD_{thermal,erro}$ = $MD_{thermal}$ × (1- Error of gas analyzer)**

► $MD_{LNG,y} = LNG * w_{CH4,y,LNG} * D_{CH4}$

	LNG	**$w_{CH4,y,LNG}$**	**D_{CH4}**	**$MD_{LNG,y}$**
	m^3	mol %	tonCH4/Nm^{3}CH4	tCH_4
Oct. 2009	37,203	91.06	0.0007168	24.28
Nov. 2009	81,178	91.39		53.18
Dec. 2009	120,116	91.52		78.80
Jan. 2010	94,123	91.49		61.73
Feb. 2010	82,733	91.28		54.13
Mar. 2010	97,061	91.56		63.70
Total	**512,414**			**335.82**

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

a. Real value

	MDreg	**$MD_{project}$**	**AF**
	$t\ CH_4$	$t\ CH_4$	(%)
Apr.2009	104.63	934.23	11.20
May. 2009	174.38	1,556.93	
Jun. 2009	130.13	1,161.83	
Jul. 2009	162.53	1,451.20	
Aug. 2009	119.60	1,067.87	
Sep. 2009	107.15	956.74	
Oct. 2009	176.34	1,574.49	
Nov. 2009	178.18	1,590.88	
Dec. 2009	183.31	1,636.67	

Jan. 2010	141.29	1,261.54	
Feb. 2010	160.50	1,433.01	
Mar. 2010	181.14	1,617.29	
Total	**1819.18**	**16,242.70**	

b. Error adjustment value

	MDreg	**$MD_{project}$**	**AF**
	t CH_4	t CH_4	(%)
Apr.2009	104.36	931.83	11.20
May. 2009	173.93	1,552.93	
Jun. 2009	129.79	1,158.85	
Jul. 2009	162.12	1,447.47	
Aug. 2009	119.29	1,065.12	
Sep. 2009	106.88	954.28	
Oct. 2009	175.88	1,570.38	
Nov. 2009	177.71	1,586.66	
Dec. 2009	182.81	1,632.26	
Jan. 2010	140.91	1,258.14	
Feb. 2010	160.07	1,429.19	
Mar. 2010	180.65	1,612.97	
Total	**1814.41**	**16,200.08**	

E.2. Project emissions calculation

In the abnormal situation, CO_2 emission caused by combustion of LNG is considered as project emission (PE_{LNG}). PE_{LNG} can be calculated using the amount of LNG and monthly average values of LNG (city gas) content which can be provided by LNG (city gas) supplier.

Formulae related to PE_{LNG}

Project emissions from fossil fuel (LNG) usage are calculated as following formulae.

► $PE_{LNG} = CO_{2LNG,CH4} + CO_{2LNG,C2H6} + CO_{2LNG,C3H8} + CO_{2LNG,C4H10} + CO_{2LNG,C5H12}$

$CO_{2LNG,CH4}$	CO_2 emissions caused by combustion of CH_4 in LNG
$CO_{2LNG,C2H6}$	CO_2 emissions caused by combustion of C_2H_6 in LNG
$CO_{2LNG,C3H8}$	CO_2 emissions caused by combustion of C_3H_8 in LNG
$CO_{2LNG,C4H10}$	CO_2 emissions caused by combustion of C_4H_{10} in LNG
$CO_{2LNG,C5H12}$	CO_2 emissions caused by combustion of C_5H_{12} in LNG

►PE_{LNG} (tCO_2)= LNG(m^3) * mol(%) * CO_2 factor / 22.4(m^3/kmol) * 44(kg/kmol) * Oxidation factor /1000(kg/t)

	CO_2 factor	volume of kmol (m3/kmol)	kmol weight of CO_2 (kg/kmol)	Oxidation Factor
CH_4(Methane)	1	22.4	44	0.995
C_2H_6(Ethene)	2	22.4	44	0.995
C_3H_8(Propane)	3	22.4	44	0.995
I-C_4H_{10} (I-Butane)	4	22.4	44	0.995
N-C_4H_{10}(N-Butane)	4	22.4	44	0.995
I-C_5H_{12}(I-Pentane)	5	22.4	44	0.995
N-C_5H_{12} (N-Pentane)	5	22.4	44	0.995

Values related to PE_{LNG}

	Oct. 2009		Nov. 2009		Dec. 2009		Jan. 2010		Feb. 2010		Mar. 2010	
	mol%	tCO_2	mol%	tCO_2	mol%	tCO_2	mol%	tCO_2	mol%	tCO_2	mol%	tCO_2
LNG(m^3)	37,203		81,178		120,116		94,123		82,733		97,061	
CH_4 (Methane)	91.06	66.21	91.39	145.00	91.52	214.85	91.49	66.52	91.28	147.60	91.56	173.69
C_2H_6 (Ethene)	5.70	8.29	5.22	16.56	5.15	24.18	5.19	7.55	5.62	18.17	5.16	19.58
C_3H_8 (Propane)	2.16	4.71	2.33	11.09	2.21	15.56	2.21	4.82	2.11	10.24	2.19	12.46
I-C_4H_{10} (I-Butane)	0.46	1.34	0.48	3.05	0.49	4.60	0.50	1.45	0.41	2.65	0.45	3.41
N-C_4H_{10} (N-Butane)	0.49	1.43	0.45	2.86	0.49	4.60	0.46	1.34	0.45	2.91	0.48	3.64
I-C_5H_{12} (I-Pentane)	0.02	0.07	0.02	0.16	0.02	0.23	0.02	0.07	0.02	0.16	0.02	0.19
N-C_5H_{12} (N-Pentane)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N_2(Nitrogen)	0.12	0.00	0.12	0.00	0.11	0.00	0.13	0.00	0.10	0.00	0.14	0.00
	100.00	82.05	100.00	178.71	100.00	264.04	100.00	81.76	100.00	181.73	100.00	212.98
Total PE_{LNG} (tCO_2)	**1001.27**											

E.3. Leakage calculation

>>

In this project, electricity generated using captured LFG is not exported to a grid but electricity is imported to meet project requirement. Therefore, imported electricity is considered as leakage. EL_{imp} can be calculated using the amount of electricity which can be provided by Electric bill.

Formulae related to $EL_{leakage}$

►$EL_{leakage} = EL_{imp} * EF_{EL,\ leakage}$

EL_{imp}	MWh	net quantity of electricity imported during year y, in megawatt hours
$FE_{EL,leakage}$	tCO_2e/MWh	CO_2 emissions intensity of the electricity displaced, in tCO_2e/MWh. This can estimated using either ACM0002 or AMSI.D, if the capacity is within the small scale threshold values, when grid electricity is used or displaced, or AMS-I.A if captive electricity is used or displaced

Values related to $EL_{leakage}$

	$EL_{leakage}$	EL_{imp}	$EF_{EL,\ leakage}$
	ton CO_2 eq	MWh	$tonCO_2/MWh$
Apr.2009	223.36	402.17	**0.5554(option 1)**
May. 2009	417.15	751.08	
Jun. 2009	297.03	534.81	
Jul. 2009	291.58	524.99	
Aug. 2009	240.32	432.70	
Sep. 2009	223.67	402.72	
Oct. 2009	368.51	663.50	
Nov. 2009	365.96	658.92	
Dec. 2009	435.10	783.41	
Jan. 2010	403.46	726.43	
Feb. 2010	397.02	714.84	
Mar. 2010	414.15	745.68	
Total	**4077.33**	**7,341.24**	

E.4. Emission reductions calculation / table

>>

Formulae related to ER_y

Total emission reductions is calculated as following formulae.

► $ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} – EL_{leakage} - PE_{LNG}$

ER_y	tCO_2e	Emission Reduction, in tones of CO_2 equivalents
$MD_{project,y}$	tCH_4	The amount of methane that would have been destroyed/combusted during the year, in tonnes of methane
$MD_{reg,y}$	tCH_4	The amount of methane that would have been destroyed/combusted during the year in the absence of the project, in tonnes of methane
GWP_{CH4}		Global Warming Portential of Methane during the first period : 21 tCO_2e/tCH_4
$EL_{leakage}$	tCO_2e	CO_2 emissions caused by imported electricity to meet the project requirements
PE_{LNG}	tCO_2e	CO_2 emissions caused by combustion of supplied LNG.

Values related to ER_y

a. Real value

Period	$ER_y(tCO_2e)$	=	$(MD_{project}$	-	$MD_{reg,y})$	*	GWP_{CH4}	-	$EL_{leakage}$	-	PE_{LNG}
Apr.2009	17,198.14	=	934.23	-	104.63	*	21	-	223.36	-	0.00
May.2009	28,616.55	=	1,556.93	-	174.38	*	21	-	417.15	-	0.00
Jun.2009	21,368.85	=	1,161.83	-	130.13	*	21	-	297.03	-	0.00
July.2009	26,770.42	=	1,451.20	-	162.53	*	21	-	291.58	-	0.00
Aug.2009	19,673.28	=	1,067.87	-	119.60	*	21	-	240.32	-	0.00
Sep.2009	17,617.58	=	956.74	-	107.15	*	21	-	223.67	-	0.00
Oct.2009	28,910.60	=	1,574.49	-	176.34	*	21	-	368.51	-	82.05
Nov.2009	29,122.13	=	1,590.88	-	178.18	*	21	-	365.96	-	178.71
Dec.2009	29,821.57	=	1,636.67	-	183.31	*	21	-	435.10	-	264.04
Jan.2010	23,039.99	=	1,261.54	-	141.29	*	21	-	403.46	-	81.76
Feb.2010	26,144.01	=	1,433.01	-	160.50	*	21	-	397.02	-	181.73
Mar.2010	29,532.09	=	1,617.29	-	181.14	*	21	-	414.15	-	212.98
Total	**297,815.20**	**=**	**16,242.70**	**-**	**1819.18**	*****	**21**	**-**	**4077.33**	**-**	**1001.27**

b. Error adjustment value

Period	$ER_y(tCO_2e)$	=	$(MD_{project}$	-	$MD_{reg,y})$	*	GWP_{CH4}	-	$EL_{leakage}$	-	PE_{LNG}
Apr.2009	17,153.35	=	931.83	-	104.36	*	21	-	223.36	-	0.00
May.2009	28,541.91	=	1,552.93	-	173.93	*	21	-	417.15	-	0.00
Jun.2009	21,313.15	=	1,158.85	-	129.79	*	21	-	297.03	-	0.00
July.2009	26,700.85	=	1,447.47	-	162.12	*	21	-	291.58	-	0.00
Aug.2009	19,622.09	=	1,065.12	-	119.29	*	21	-	240.32	-	0.00

Sep.2009	17,571.72	=	954.28	-	106.88	*	21	-	223.67	-	0.00
Oct.2009	28,833.96	=	1,570.38	-	175.88	*	21	-	368.51	-	82.05
Nov.2009	29,043.31	=	1,586.66	-	177.71	*	21	-	365.96	-	178.71
Dec.2009	29,739.34	=	1,632.26	-	182.81	*	21	-	435.10	-	264.04
Jan.2010	22,976.55	=	1,258.14	-	140.91	*	21	-	403.46	-	81.76
Feb.2010	26,072.72	=	1,429.19	-	160.07	*	21	-	397.02	-	181.73
Mar.2010	29,451.51	=	1,612.97	-	180.65	*	21	-	414.15	-	212.98
Total	**297,020.46**	=	**16,200.08**	-	**1814.41**	*	**21**	-	**4077.33**	-	**1001.27**

Total emission reductions

Methane destroyed by CDM project	(tCH_4)
$MD_{project}$	16,200.08
Total baseline emissions	(tCH_4)
$MD_{reg,y}$	1814.41
Total project emissions	(tCO_2e)
$EL_{leakage}$	4077.33
Total leakage	(tCO_2e)
PE_{LNG}	1001.27
Total emission reductions	(tCO_2e)
$ER_y = (MD_{project,y} - MD_{reg,y}) * 21 – EL_{leakage} - PE_{LNG}$	**297,020**

* Refer calculation spread sheet file for more detailed calculation.

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

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**395,953**	**297,020**

The estimated ER for a period of 7 years in PDD is as follows;

Years	Annual estimation of emission reductions in tones of CO_2e
August 2007~July 2008	391,276
August 2008~July 2009	390,332
August 2009~July 2010	398,763

August 2010~July 2011	414,457
August 2011~July 2012	413,949
August 2012~July 2013	413,171
August 2013~July 2014	412,159
Total estimated reductions (Tonnes of CO2 e)	**2,834,107**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tones of CO2e)	404,872

The estimated ER during 01/04/2009 - 31/03/2010 is 395,953 tCO2e, which is calculated according to the following equation.

395,953 tCO2e = 390,332 tCO2e/ 12 months x 4 months + 398,763 tCO2e/ 12 months x 8 months

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

>>
The amount of actual treated LFG is lower than the amount of estimated LFG in the registered PDD.

From 2005, landfilling of food waste is prohibited by related law. Therefore, the level of methane generation from landfill site is lower than before.

And temporary failure of measuring equipments is another cause of the difference. For example, the flow values of FIQ-A were not read during the period 23 to 28 January 2010 due to compensator failure. The flow values of FIQ-A is 0 for the period. And the FIQ-A and AT-A sent the wrong signals to Taegu Energy & Environment Co., Ltd. and Korea District Heating Corp. Daegu office on 30 December 2009, 23 to 30 January 2010 and 2 February 2010. (The signals have huge values.) For the conservativeness, the wrong values were replaced with 0.

For the reason above, the actual value of $MD_{project,y}$ decreased, which lastly go into effect at $ER_{y.}$

ANNEX Ⅰ: Description and consideration of measurement uncertainties and error propagation

1) Dry basis check

The landfill gas after cooler is considered as dry gas. In order to check dry basis, the amount of moisture in the gas after cooler was calculated and compared with the limited moisture content to be dry gas. (Based on “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”, The gas will be considered to be dry if the moisture content is less or equal to 0.0129kgH2O/m2 dry gas.) The amount of landill gas after cooler is sum of the gas flow after buffer tank (FIQ302) and the gas flow to Flare (FIQ301). (refer to MR page 10).

Moisture content in the gas after cooler is calculated with the formula below;

$$H_2O(Nm^3) = \frac{Wet\,Gas Volume\,(Nm^3) \times steam\ pressure(kg\,/\,cm^2)}{(Outlet\ pressure(kg\,/\,cm^2)}$$

date	moisture in the gas of FIQ101	moisture in the gas after cooler (FIQ301+FIQ302)	limited moisture to be dry basis
	Nm3	Nm3	Nm3
09. 04	119,870	26,279	39,624
09. 05	281,427	42,220	74,126
09. 06	200,140	37,161	50,844
09. 07	225,013	37,208	60,390
09. 08	167,060	24,921	42,661
09. 09	167,213	24,447	40,638
09. 10	295,517	41,874	75,598
09. 11	288,675	41,314	75,960
09. 12	269,891	41,232	80,974
10. 01	171,727	30,562	62,564
10. 02	204,756	35,534	72,145
10. 03	227,203	40,115	81,983

As shown in the table above, moisture content in the gas after cooler (FIQ301+FIQ302) is lower than the limited moisture content to be dry gas. Therefore, the gas after cooler is dry basis. On the other hand, LFG_{total} is higher than the limited moisture content to be dry gas. Therefore, $LFGt_{otal}$ is wet basis.

2) Material balance check

On the previous result, flow volume of LFG_{total}(FIQ-101) is in wet-base with moisture and flow volume after the cooler is in dry-base. Therefore, there are two methods to check the material balance. The one is to compare the value of $LFG_{total,dry}$ subtracted moisture with $LFG_{project}$. The other is to compare the flow volume (FIQ301+FIQ302) after the cooler with $LFG_{project}$.

In the first method, it was supposed that LFG_{total} is in the state of a saturated vapor. And the value of moisture was calculated through this assumption. Then, the value of LFG_{total} subtracted moisture and $LFG_{project}$ were compared for material balance check. The outcome is min.104.95% and max. 110.48%.

Considering the outcome, there is a wide gap in a difference of each value. This difference is regarded as the error by assuming that LFG_{total} is in the state of a saturated vapor. This results for checking material balance was contained spread sheet in detail.

Accordingly, for an accurate check of material balance, the flow volume after the cooler was used instead of LFG_{total}. The result is as follows;

In order to check material balance, adjusted LFG_{total} and $LFG_{project}$ are compared. The range of deviation from the value of input and output is within ±2 %. Result for checking material balance is follows.

▶Material balance check(%) = $LFG_{project}$ / LFG_{total} * 100

	$LFG_{project}$ (Nm³)	LFG_{total} (Nm³)	Material balance %
Apr.09	2,484,208	2,468,300	100.6%
May.09	4,619,480	4,617,495	100.0%
Jun.09	3,127,056	3,167,180	98.7%
Jul.09	3,729,908	3,761,840	99.2%
Aug.09	2,638,976	2,657,440	99.3%
Sep.09	2,539,154	2,531,412	100.3%
Oct.09	4,712,144	4,709,188	100.1%
Nov.09	4,773,024	4,731,752	100.9%
Dec.09	5,037,296	5,044,036	99.9%
Jan.10	3,917,620	3,897,232	100.5%
Feb.10	4,491,000	4,494,084	99.9%
Mar.10	5,093,896	5,106,939	99.7%

* Adjusted LFG_{total} is sum of FIQ301 and FIQ302
* $LFG_{project}$ is sum of $LFG_{thermal}$, LFG_{flare} and $LFG_{electricity}$.

This result for checking material balance was contained spread sheet in detail.

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		