

**MONITORING REPORT FORM (CDM-MR)**
Version 01 - in effect as of: 28/05/2010**CONTENTS**

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Annex I: Daily Calculation Result

**MONITORING REPORT**
Version 01.5 (01/06/2011)**Sudokwon Landfill Gas Electricity Generation Project (50MW)****0941****4th monitoring period (01/01/2009 – 31/12/2009)****SECTION A. General description of the project activity****A.1. Brief description of the project activity**

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Sudokwon landfill is one of the largest landfill in the world, which area is 19.79 million m² with total capacity of 228 million m³, and consists of 4 landfills. The 1st landfill was reclaimed from 1992 to 2000 and 2nd landfill has been in use for waste reclamation since 2000. The 3rd and 4th landfill will be used one after another.

About 50% of landfill gas (LFG) is composed of methane (CH₄), which is one of major greenhouse gases and has 21 times higher global warming potential (GWP) compare to carbon dioxide (CO₂). Thus, Sudokwon Landfill Gas Electricity Generation Project (50MW) was designed to minimize greenhouse gas emission by enhancing capturing efficiency of LFG and utilizing it as a fuel of 50MW power plant.

For enhancing capturing efficiency, lots of capturing pipelines and several LFG suction blowers were installed. The blower installation works had been finalized in 11/2007. Pipeline extension works will be continued until 2015 or more, the expected reclamation lifetime of 2nd landfill.

In order to treat LFG and generate renewable energy, 50MW power plant was constructed. This power plant is mainly composed of 2 boilers which generate steam and 1 steam turbine. The construction of power plant was finished in 15/12/2006 and it has been under commercial run since 15/03/2007.

Lastly, this is the 4th monitoring period covering 12 months from 01/01/2009 to 31/12/2009 (365 days) and monitored emission reductions are 944,885 tCO₂e.

A.2. Project Participants

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Sudokwon Landfill Site Management Corporation (SLC)

- Involved party: Republic of Korea (host country)

Rhodia Energy GHG

- Involved party: France

A.3. Location of the project activity

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#58 Baekseok Dong, Seo Gu, Incheon, Republic of Korea

GPS Coordinate: Latitude 37.55000° ~ 61667°, Longitude 126.55000° ~ 666667°

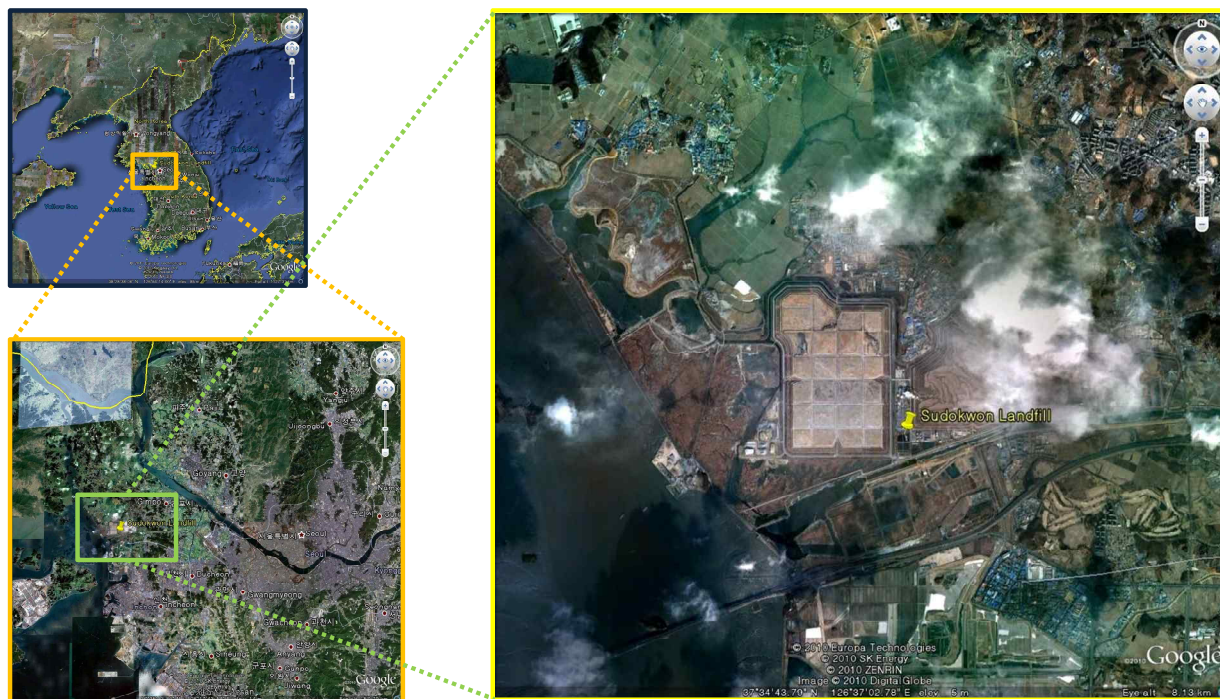


Figure 1 Location of the project activity (SLC)

A.4. Technical description of the project

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Landfill Gas Collection System

Stabilization of 1st landfill was completed in Dec 2004, and LFG is collected by existing horizontal pipes and new vertical pipes. These vertical pipes are installed as additional facilities for 50MW power plant.

Reclamation of 2nd landfill is on progress and vertical pipes are extended with ongoing reclamation for maximizing LFG collection efficiency, which makes LFG from 2nd landfill increase.

In case of normal operation, most of LFG is planned to be used by 50MW power plant and only the rest will be destroyed by central flaring facility. In case of emergency or maintenance of 50MW power plant, LFG will be flared by central flaring facility.

Major specifications of collection system (including comparison with PDD) are as follows;

Facilities	Capacity	Quantity	Remarks
Collection pipes (horizontal)	D150, D200	24 ea	O, P block
		24 ea	Level 6
		12 ea	Level 7
Collection pipes (separation linking)	D100	60 ea	
Collection pipes (vertical)	D200, D250	329 ea	



Transferring pipes	D100	80.5 km	
Outer header pipes	D600	6.4 km 6.2 km 6.0 km	Level 2 Level 4 Level 6
Condensing water excluding system		57 ea 57 ea	Level 2 Level 6
Gas blowers	85 m ³ /min 170 m ³ /min	4 ea 2 ea	
Gas distributor		31 ea	Manifold station

Table 1 LFG Collection system in 1st landfill

Facilities	Capacity	Quantity	Remarks
Collection pipes (horizontal)	D200, D300	36 km	
Collection pipes (supplement header)	D400	5 km	
Collection pipes (vertical)	D200, D250	699 ea	Extended with ongoing reclamation
Transferring pipes	D100	194 km	
Outer header pipes	D400 ~ D600 D700	6.5 km 8.6 km	Level 2 Level 3
Condensing water excluding system		52 ea	
Gas blowers	250 m ³ /min	5 ea	
Gas distributor		44 ea	Manifold station

Table 2 LFG Collection system in 2nd landfill

Item	PDD		Current status	
	1 st LF	2 nd LF	1 st LF	2 nd LF
Transferring pipe	18.6 km	7.6 km	80.5 km	194 km
Outer header pipe			18.6 km	15.1 km
Collection pipe (horizontal)	48 ea (12 ea)	39 ea	60 ea	36 km
Supplement header				5 km
Collection pipe (vertical)	389 ea	326 ea	329 ea	699 ea
Collection pipe (separation linking)			60 ea	
Condensing water excluding system	503 ea	27 ea	114 ea	52 ea
Gas distribution pipes	31 ea	20 ea	31 ea	44 ea
Blower	4 set	2 set	6 set	5 set

Table 3 LFG collection system comparison (PDD & current status)

* Note: PDD was based on SLC's operation manual (11/2005) and current status is on SLC's yearly statistical yearbook (01/07/2010) which for data of 2009.

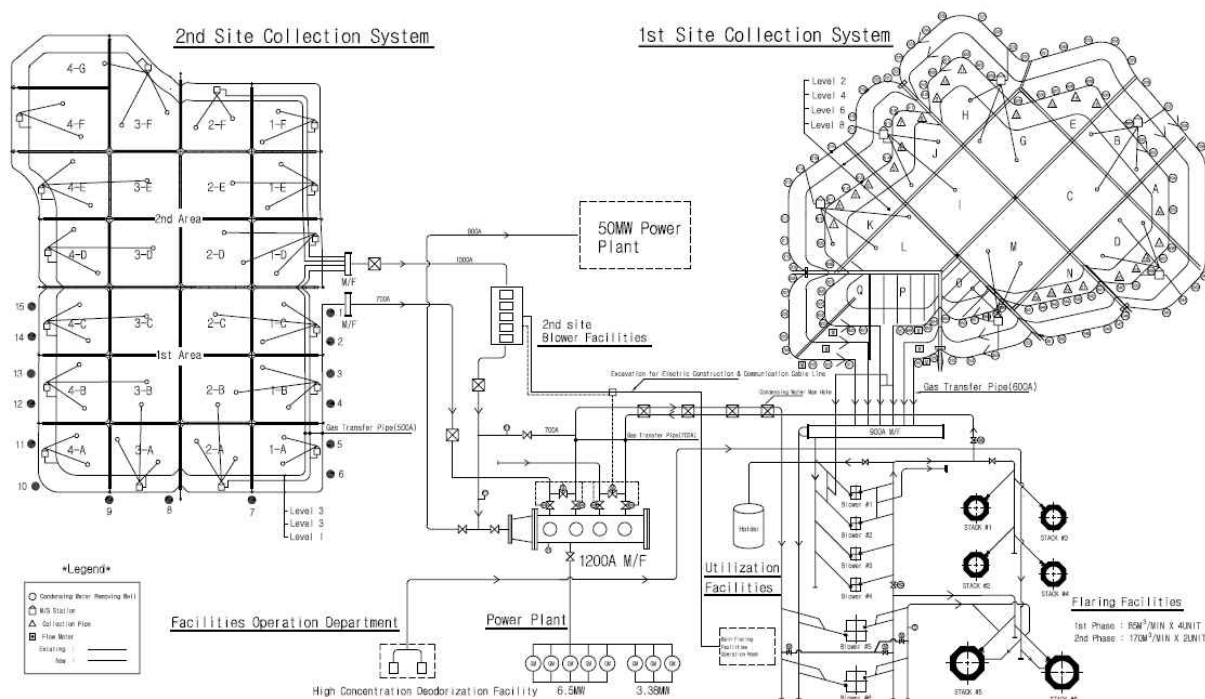


Figure 2 50MW project LFG Collection and Decomposition facilities

Generating System

There are two main facilities in 50MW power plant, LFG boiler and turbine. 2 boilers were supplied and installed by Doosan Heavy Industries and 1 steam turbine by Mitsubishi Heavy Industries.

The process of boiler is as follows; flue gas is generated by combustion of CH_4 in combustor, this flue gas produces steam by heat-transfer to heating surface and is supplied to turbine. This boiler is semi-open, drum, natural draft and forced draft type which has simple structure and is easy to operate. As a fuel, LPG is used for start-up and LFG for normal operation.

Major specification of boiler is as below

- Steam flow: 106.2 ton/hr (@BMCR)
- Steam pressure: 100 $\text{kg/cm}^2\cdot\text{g}$ (@BMCR)
- Steam Temperature: 539 °C
- Efficiency : 82.4 % @ HHV, ASME Condition

This project adopts steam turbine for following reasons; (1) it produces less pollutant than other alternatives (i.e. gas engine, gas turbine, HRSG etc.), (2) it needs no pretreatment facilities, (3) low quality LFG can be used and (4) when generating capacity exceeds 10MW, it is economically more attractive than other alternatives.

Most of thermal energy of superheated steam supplied by boiler is converted to kinetic energy which operates generator, some of thermal energy is used for heating feed water and the rest are transferred to circulation system by condenser. Supplied turbine is single casing, non-reheating, recycling and condensing one.

Major specification of steam turbine is as below

- Power: 50,000 kW
- Steam temperature and pressure: 536 °C, 95 kg/cm².g
- Rotation per minute: 3,600 rpm
- Steam flow: 184,300 kg/hr (@MGR)
- Heat Consumption: 2,201.4 kcal/kWh (@MGR)

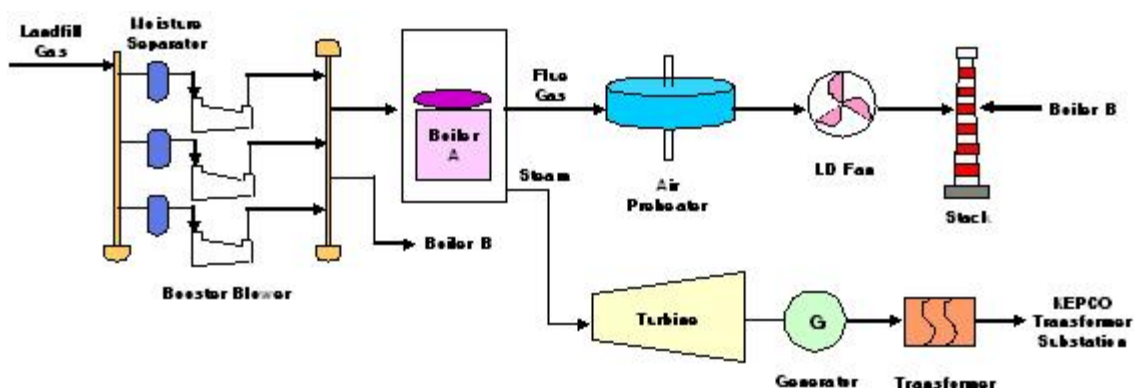


Figure 3 Steam Turbine and electricity grid system flow chart

Major specification of transmission system is as below

- Specification: 154kV 1 line, 240 mm²
- Overhead transmission tower: 29 units
- Overhead transmission line: 7.615 km
- Connection point : KEPCO Kyeyang Substation

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

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There are two methodologies applied to the project activity;

“Consolidated baseline methodology for landfill gas project activities”, ACM0001 version 04

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_TX29WGSXE4781NKGQGCPT_HM2F3V3D

“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, ACM0002 version 06

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763

A.6. Registration date of the project activity:

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30/04/2007

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

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The start date of this project is 30/04/2007 and crediting period chosen is 10 years (fixed).

According to the PDD, the crediting period started the 01/04/2007 for a period of 10 years. In accordance with the Conference of the Parties decision 17/CP.7, however, the start date of the crediting period has been changed to the date of registration, 30/04/2007.

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 50MW power plant has been under commercial run since 15/03/2007. Other facilities such as LFG blower and central flaring facility has been also under operational before the start date of crediting period (30/04/2007).



Figure 4 1st landfill site and 50MW LFG power plant

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

Date	Duration	Operation events	Note
01/01/2009		Operated with full load (50MW)	
28/02/2009	2 hours	Lowered its output due to temporal stoppage of LFG blower at 1 st landfill	
10/03/2009	68 hours	Stopped for periodic maintenance	
28/05/2009	4 hours	Lowered its output due to temporal stoppage of LFG blower at 2 nd landfill	
31/05/2009	404 hours	Stopped for yearly overhaul	
18/06/2009	1 hour	Stopped on the way of restarting after overhaul	
04/08/2009	20 hours	Stopped due to unexpected damage of LFG blower bearing at 1 st landfill	
04/08/2009	76 hours	Operated by 1 boiler only due to LFG blower problem	
08/08/2009	8 hours	Stopped in order to install LFG blower bearing at 1 st landfill	
28/08/2009	14 hours	Lowered its output due to partial blackout of SLC and consequent stoppage of LFG blowers	
12/10/2009	1 hour	Lowered its output due to unexpected malfunctioning of high voltage line in transformer room	
25/10/2009	114 hours	Stopped for periodic maintenance	
14/11/2009	4 hours	Lowered its output due to temporal blackout of SLC and consequent stoppage of LFG blowers	
15/12/2009	1 hour	Lowered its output due to temporal blackout of SLC's	



		transformer room and consequent stoppage of LFG blowers	
16/12/2009	6 hours	Lowered its output due to maintenance of LFG header pipeline (1 of 4 pipeline was shut)	
17/12/2009	5 hours		
31/12/2009	1 hour	Lowered its output due to temporal blackout of SLC's transformer room and consequent stoppage of LFG blowers	

Table 4 Operational events of 50MW power plant

Date	Duration	Operation events	Note
01/01/2009		#6 flare operated for treating LFG which is not treated by 50MW power plant	
06/01/2009	7 hours	For landfill maintenance, #1 flare temporarily operated in order to treat LFG from 1 st landfill which is not collected by blowers daily	
07/01/2009	2 hours		
28/02/2009	2 hours	Operational flare changed from #6 to #5 due to temporal stoppage of LFG blower at 1 st landfill. After restart of blower, operational flare restored to #6	
10/03/2009	68 hours	Due to periodic maintenance and consequent stoppage of 50MW power plant, all flares ignited in order to treat LFG. After maintenance, all flares except #5 stopped	
06/04/2009	2 hours	Exhaust gas sampling was made for #5 and #6 flare	
16/05/2009	1 hour	Operational flare changed from # 5 to #6	
22/05/2009	1 hour	LFG flow of #6 flare decreased due to maintenance of flow meter (scale removal)	
28/05/2009	4 hours	#6 flare stopped due to temporal stoppage of LFG blower at 2 nd landfill	
31/05/2009	404 hours	Due to yearly overhaul and consequent stoppage of 50MW power plant, all flares ignited in order to treat LFG	
02/06/2009	11 hours	#6 flare stopped due to maintenance (backfire arrester cleansing)	
04/06/2009	3 hours	Flaring temperature of #3 flare lowered due to unstable damper condition	
15/06/2009	2 hours	Flaring temperature of #2 flare lowered due to check and determine minimum LFG flow rate	
16/06/2009	2 hours		
30/06/2009	4 hours	Temporal operation of #1 ~ #5 flares in order to perform exhaust gas sampling which used for demonstrating flaring efficiency. After sampling, operational flare changed from #6 to #5	
10/07/2009	1 hour	Operational flare changed from #5 to #6 flare	
16/07/2009	1 hour	Operational flare changed from #6 to #5 flare	
27/07/2009	1 hour	Operational flare changed from #5 to #6 flare	
30/07/2009	1 hour	Operational flare changed from #6 to #5 flare	
04/08/2009	76 hours	Due to temporal stoppage and output decreasing of 50MW power plant caused by LFG blower problem, all flares ignited in order to treat LFG	
08/08/2009	8 hours	Due to stoppage of 50MW power plant caused by installation of LFG blower bearing at 1 st landfill, all flares ignited in order to treat LFG	



28/08/2009	14 hours	#5 flare stopped due to partial blackout of SLC and consequent stoppage of LFG blowers. After stoppage, operational flare changed from #5 to #6 flare	
26/09/2009	1 hour	Operational flare changed from #6 to #5 flare	
28/09/2009	1 hour	Operational flare changed from #5 to #6 flare	
07/10/2009	4 hours	#6 flare stopped due to the temporal error of circuit breaker of LFG blower at 2 nd landfill. After repair, operational flare changed from #6 to #5 flare	
10/10/2009	3 hours	Flaring temperature of #5 flare was under 600°C due to unstable damper condition	
12/10/2009	1 hour	Operational flare changed from #5 to #6 flare	
12/10/2009	1 hour	#6 flare temporary stopped and restarted due to unexpected malfunctioning of high voltage line in transformer room	
24/10/2009	2 hours	For landfill maintenance, #2 flare ignited in order to treat LFG from 1 st landfill which is not collected by blowers daily	
25/10/2009	114 hours	As 50MW power plant stopped for periodic maintenance, all flares ignited in order to treat LFG	
25/10/2009	1 hours	#4 flare stopped because of unexpected trouble in ignition plug	
26/10/2009	2 hours	#4 flare restarted as ignition plug was repaired	
27/10/2009	6 hours	To prevent possible accident such as explosion, all flares except #6 stopped in order to install condensing water drainage system behind the LFG header pipeline	
29/10/2009	1 hour	Flare exhaust gas sampling conducted in order to demonstrate flare efficiency	
14/11/2009	4 hours	#6 flare stopped due to temporal blackout of SLC and consequent blower stoppage	
16/12/2009	6 hours	#6 flare stopped due to maintenance of LFG header pipeline (1 of 4 pipeline was shut)	
17/12/2009	5 hours		
17/12/2009	75 hours	Due to low temperature and consequent freeze of condensing water, LFG flow of #6 flare fluctuated, which resulted in changes of flaring temperature of #6 flare	
21/12/2009	3 hours	Due to low temperature and consequent freeze of condensing water, LFG flow of #6 flare fluctuated. In order to minimize the fluctuation, operational flare changed from #6 to #5 flare	

Table 5 Operational events of central flaring facility

Date	Duration	Operation events	Corrective actions on data
03/01/2009	4 hours	Due to low temperature, flow meter of 2 nd landfill recorded extraordinary value	In order to calculate the flow, following equation used; - $LFG_{2^{nd}} = LFG_{50MW} + LFG_{flare} - LFG_{1^{st}}$
11/01/2009	12 hours		
12/01/2009	15 hours		
14/01/2009	23 hours		
23/01/2009	18 hours		
25/01/2009	7 hours		
27/01/2009	3 hours		
23/12/2009	53 hours		
17/04/2009	3 hours	CH ₄ fraction of LFG at 2 nd landfill was not recorded due to	Most conservative value in 4 th monitoring period (43%) applied



		maintenance and inspection	
28/05/2009	2 hours	Due to temporal malfunctioning of signal transfer card, CH ₄ fraction of LFG at 2 nd landfill and pressure of LFG which fed to flares were not recorded	Minimum CH ₄ fraction of LFG at 2 nd landfill (43%) and lowest pressure (163 mmAq) in 4 th monitoring period were applied for conservativeness.
10/06/2009	145 hours	Meters related to 50MW power plant (FT-10, TT-04 and PT-06) detached and re-installed in order to conduct 3 rd party calibration.	Where the power plant was in overhaul, 0 Nm ³ applied for LFG flow of 50MW power plant. For conservativeness, highest (54.7°C) and lowest (0 mmAq) value in 4 th monitoring period applied to temperature and pressure of LFG (TT-04 and PT-06) respectively.
16/07/2009	5 hours	Blackout of LFG management centre due to the switch connection failure of circuit breaker. Though 50MW power plant was fully operational, flow, temperature, CH ₄ fraction & pressure of LFG from 1 st and 2 nd landfill and LFG flow and flaring temperature of all flare were not recorded.	For conservativeness, data of 0 (zero) or no data (blank) applied for omitted period.
28/08/2009	12 hours	Partial blackout of SLC in order to replace transformer in its transformer room.	Where CH ₄ fraction of 1 st landfill was lower than that of 2 nd landfill, LFG flow was calculated as follows in order to keep conservative approach; <ul style="list-style-type: none"> - LFG_{1st} = LFG_{50MW} - LFG_{2nd} = 0 Nm³ For CH ₄ fraction, minimum value in 4 th monitoring period (1 st 38%, 2 nd 43%) applied. Highest (64°C) and lowest (163 mmAq) value applied to TT-03 and PT-05 respectively.
19/10/2009	2 hours	Disturbance of some meters due to lightening at grid connection line (electricity export line, 154kV). LFG flow of 2 nd landfill decreased and CH ₄ fraction of 2 nd landfill was not recorded.	Minimum CH ₄ fraction of LFG at 2 nd landfill in 4 th monitoring period (43%) applied. Where average fraction is 52.2%, this approach is conservative.
24/10/2009	76 hours	Due to temporal signal line connection error, LFG flow from 1 st landfill was not recorded.	Following equation used to calculate LFG flow of 1 st landfill; <ul style="list-style-type: none"> - LFG_{1st} = LFG_{50MW} + LFG_{flare} - LFG_{2nd}
24/11/2009	3 hours	CH ₄ analyser of 1 st and 2 nd landfill (GA-01, 02) were replaced by reserve ones, which calibrated, in	Minimum value in 4 th monitoring period (1 st 38%, 2 nd 43%) applied during detached period.



		order to perform calibration.	
01/12/2009	39 hours	In order to perform 3 rd party calibration, flow meter of LFG from 2 nd landfill (DPT-02), temperature and pressure meter of LFG which fed to flares (TT-03, PT-05), thermocouples for #1, #2, #3 and #5 flares (TC-01~03, 05) were detached and consequently, related data were not recorded.	Following equation used to calculate LFG flow of 2 nd landfill; - $LFG_{2^{nd}} = LFG_{50MW} + LFG_{flare} - LFG_{1^{st}}$ For flaring temperature of #1, #2, #3 and #5 flares, 0°C applied. Highest (64°C) and lowest (163 mmAq) value applied to TT-03 and PT-05 respectively.
15/12/2009	2 hours	Due to low temperature, flow meter of 1 st landfill recorded extraordinary value	Following equation used to calculate LFG flow of 1 st landfill; - $LFG_{1^{st}} = LFG_{50MW} + LFG_{flare} - LFG_{2^{nd}}$
21/12/2009	11 hours		
15/12/2009	135 hours	Due to low temperature, flow meter of 1 st and 2 nd landfill recorded extraordinary value	Where CH ₄ fraction of 1 st landfill was lower than that of 2 nd landfill, LFG flow was calculated as follows in order to keep conservative approach; - $LFG_{1^{st}} = LFG_{50MW} + LFG_{flare}$ - $LFG_{2^{nd}} = 0 \text{ Nm}^3$
26/12/2009	83 hours		
30/12/2009	26 hours		
16/12/2009	118 hours	Due to gas sampling pump failure which caused by freezing of gas sampling line, CH ₄ analyser of 2 nd landfill was malfunctioning	Minimum CH ₄ fraction of LFG at 2 nd landfill in 4 th monitoring period (43%) applied.
26/12/2009	74 hours		
22/12/2009	6 hours	For maintenance of monitoring system, PLC communication card for LFG management centre was replaced. During this period, LFG flow and CH ₄ fraction of 2 nd landfill were not recorded.	Following equation used to calculate LFG flow of 2 nd landfill; - $LFG_{2^{nd}} = LFG_{50MW} + LFG_{flare} - LFG_{1^{st}}$ For CH ₄ fraction, minimum value in 4 th monitoring period (43%) applied.
25/12/2009	1 hour	Temporal blackout of transformer room due to earth fault of grid line.	Where CH ₄ fraction of 1 st landfill was lower than that of 2 nd landfill, LFG flow was calculated as follows in order to keep conservative approach; - $LFG_{1^{st}} = LFG_{50MW}$ - $LFG_{2^{nd}} = 0 \text{ Nm}^3$ For CH ₄ fraction, minimum value in 4 th monitoring period (1 st 38%, 2 nd 43%) applied. For LFG flow of #5 flare, 0 Nm ³ applied for conservativeness. Highest (64°C) and lowest (163 mmAq) value applied to TT-03 and PT-05 respectively.
31/12/2009	1 hour		

Table 6 Operational events of monitoring system and corrective actions



All facilities were already installed and fully operational as per PDD description except the 9.88MW power plant. It had not been operated since 03/2007 due to the technical problem. Therefore, the rest of LFG which is not treated in 50MW power plant was destroyed by central flaring facility only.

Regarding the stoppage of 9.88MW power plant, the request for review was made by CDM Executive Board during 1st request for issuance. In accordance with the request for review of CDM Executive Board, emissions from the electricity generated by the existing 9.88MW power plant are regarded as baseline emissions and therefore should be deducted from emission reductions generated by the project activity.

For conservativeness, maximum theoretical output of 9.88MW power plant (78,760MWh/yr or 215.79MWh/day, approx. 91% of total capacity) has been chosen for additional baseline emission calculation. Since this monitoring period is 1 year (365 days), total of 44,628 tCO₂ (215.79MWh × 365 days × 0.5666tCO₂/MWh) is deducted from emission reductions.

The request was raised in 18/02/2010. Joint response from SLC & DOE (TÜV-SÜD) was made in 05/03/2010 and approved on 53th EB meeting. Related documents are available on the UNFCCC website.

Issuance Request for Review

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1171534717.86/iProcess/TUEV-SUED1208270995.94/Review/PTFL27IU6U3QJIMC9WF8MZSN4F0HM7/viewPDF>

Joint response from project participant and DOE

<http://cdm.unfccc.int/UserManagement/FileStorage/CSV DHT7LAQW60Z8B5MKI4YN9RFPO2G>

Paragraph 83 (d) of CDM EB meeting report

<http://cdm.unfccc.int/EB/053/eb53rep.pdf>

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 to this monitoring period.

SECTION C. Description of the monitoring system

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Data Collection Procedures

Monitoring and emission reductions calculation are made in accordance with monitoring plan in PDD, internal data handling procedure as well as approved methodologies.

All continuously measured parameters (flow and CH₄ fraction of LFG, flaring temperature, amount of exported & imported electricity, etc) were recorded electronically via a data logger such as Citect MMI and Honeywell Hyperion DCS, which have the capacity to aggregate and print collected data at fixed frequencies.

The data are measured and collected at each control system of the 50MW power plant, central flaring facility and internal electricity monitoring system. Data aggregation and emission reductions calculation has been made on a daily basis. The result of calculation is reported monthly and raw data are archived every two months. In order to inspect the status of capturing facility, composition, flow, pressure and temperature of each capturing facility checked on daily basis. Gas flow and other related parameters are recorded electronically on hourly basis. Every recorded electronic data are also recorded in handwritten form.



Figure 5 The control room in 50MW power plant

In June & July 2008, LFG flow meters for central flaring facility (total of 6), which installed & operated more than 10 years and measure & record LFG flow in ACM (Actual Cubic Meter) unit, were replaced by new thermal mass type flow meters made by EPI ([Eldridge Product Inc.](#)). Newly installed meters are measure & record LFG flow in NCM (Normal Cubic Meter) unit.

**LFG flow**

Total of 9 continuous flow meters were installed for monitoring LFG flow. Captured LFG is monitored by FT-01 & FT-02, which installed at the end of the 1st and 2nd landfill gas recovery line respectively. Combusted LFG is checked by FT-04 ~ 10, where FT-04 ~ 09 is for each flare (total of 6) and FT-10 is for 50MW power plant.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
FT-01	27051601	EPI	1 st landfill	Thermal mass type
FT-02	CEQ-0383 HFV-20041004	Endress Hauser Hitrol	2 nd landfill	V-cone type
FT-04	28031701	EPI	#1 flare	Thermal mass type
FT-05	28012903	EPI	#2 flare	“
FT-06	28042402	EPI	#3 flare	“
FT-07	28042401	EPI	#4 flare	“
FT-08	28012904	EPI	#5 flare	“
FT-09	28031702	EPI	#6 flare	“
FT-10	465	GE	50MW power plant	Ultrasonic type
FT-03	28012905	EPI	Reserve meter for all EPI meters	Thermal mass type
700A	28031703	EPI		
900A	26050201	EPI		
FT-08 (old)	A1F3913T	Fuji Electrics	Reserve meter for #5 flare (DPT)	Pitot-tube type
FT-09 (old)	A5H2952T	Fuji Electrics	Reserve meter for #6 flare (DPT)	Pitot-tube type
TT-03	A6B3331T	Fuji Electrics	Temperature of LFG which fed to flares	For system stability check and (or) unit conversion from ACM to NCM, if needed
TT-04	099169	KONICS	Temperature of LFG which fed to 50MW power plant	
PT-05	A4J4159T	Fuji Electrics	Pressure of LFG which fed to flares	
PT-06	0447-04111204003	Honeywell	Pressure of LFG which fed to 50MW power plant	

CH₄ fraction

The fraction of CH₄ in LFG was measured by using continuous infra-red type gas analysers (total of 2). Data were recorded every hour in electronic method. Only CH₄ is considered as emission gas in the CDM monitoring procedure.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
GA-01	A2B4359T	Fuji Electrics	1 st landfill	
GA-02	A4J0063T	Fuji Electrics	2 nd landfill	
GA-03	N6E2427T	Fuji Electrics	Reserve meter for 1 st landfill	
Reserve GA	A4M0708T	Fuji Electrics	Reserve meter for 2 nd landfill	

**Electricity exported & imported**

The amount of imported electricity which used for LFG capturing and flaring was recorded electronically by electricity monitoring system of SLC. Imported electricity for 50MW power plant was monitored by watt-hour meter and recorded in handwritten form, which can cross-checked by invoices from Korea Electric Power Corporation (KEPCO).

EL_{EX,LPG}, mentioned in PDD B.7.1 as total amount of electricity exported out of the project boundary, is a typing error of EL_{EX,LFG}. The amount of exported electricity was recorded electronically by watt hour meter which is connected to Korea Power Exchange (KPX) and cross-checked by relative documents from KPX.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
WH-01	PR-0411A055-02	Seochang Electric Communication	Exported electricity (50MW power plant)	Cross-checked with KPX data
WH-03	6063941	Seochang Electric Communication	Imported electricity (50MW power plant)	Cross-checked with KEPCO invoice
WH-04	HPM-12-040325-06	Hyosung	Imported electricity (50MW power plant)	
WH-05	MFR0411001F	KDT	Imported electricity (2 nd landfill blower facility)	
WH-06	2KLM001A	KDT	Imported electricity (LFG mgt. centre)	

Flare efficiency

ACM0001 version 4 stipulates that efficiency of flare (FE) shall be measured in a yearly basis if enclosed flare is used and in case the yearly measurement of FE is not performed, default value of 90% should be used.

Since the flare exhaust gas analysis was made in 12/12/2008 and there were no methane content in exhaust gas at the start of the monitoring period, FE was regarded as 99.9% if the flaring temperature exceeds 600°C. Otherwise, the efficiency was regarded as 0% for conservativeness.

Considering the operational condition, the content analysis of flare's exhaust gas was conducted by 3rd party (Institute of Industrial Pollution Co. Ltd) in 12/12/2008, 08/04/2009, 06/07/2009, 10/11/2009 and 30/12/2009. Detailed results and FE application are as follows;

	Date of analysis	Result of analysis (ppm CH ₄)	FE application over 600°C	
#1 Flare	12/12/2008 (at 599°C)	Not detected	01/01/2009 ~ 31/12/2009	99.9%
	06/07/2009 (at 611°C)	38.8		
	10/11/2009 (at 602°C)	7.42		
#2 Flare	12/12/2008 (at 602°C)	Not detected	01/01/2009 ~ 31/12/2009	99.9%
	06/07/2009 (at 606°C)	11.1		
	10/11/2009 (at 611°C)	5.11		
#3 Flare	12/12/2008 (at 605°C)	Not detected	01/01/2009 ~ 31/12/2009	99.9%



	06/07/2009 (at 599°C)	17.0		
	10/11/2009 (at 604°C)	10.35		
#4 Flare	12/12/2008 (at 589°C)	Not detected	01/01/2009 ~ 05/07/2009	99.9%
	06/07/2009 (at 600°C)	503.9	06/07/2009 ~ 09/11/2009	99.7%
	10/11/2009 (at 599°C)	10.41	10/11/2009 ~ 31/12/2009	99.9%
#5 Flare	12/12/2008 (at 597°C)	Not detected	01/01/2009 ~ 31/12/2009	99.9%
	08/04/2009 (at 602°C)	Not detected		
	06/07/2009 (at 602°C)	11.7		
	10/11/2009 (at 600°C)	6.29		
	30/12/2009 (at 603°C)	153.9		
#6 Flare	12/12/2008 (at 607°C)	Not detected	01/01/2009 ~ 31/12/2009	99.9%
	08/04/2009 (at 597°C)	Not detected		
	06/07/2009 (at 610°C)	1372.6	06/07/2009 ~ 09/11/2009	99.6%
	10/11/2009 (at 602°C)	5.30	10/11/2009 ~ 29/12/2009	99.9%
	30/12/2009 (at 599°C)	1587.4	30/12/2009 ~ 31/12/2009	99.6%

Table 7 Summary of flare exhaust gas analysis results

In ACM0001 version 4, FE should be calculated by analyzing methane contents of the flare emissions at least on a yearly basis for enclosed flares. Considering above and the result of former analysis made in 12/12/2008 showed that there were no methane detected in exhaust gas of all flares at 600°C, above FE application is assumed conservative. Furthermore, as explained earlier, FE of 0% applied when the temperature is below 600°C even the above results provide that there were no methane at 600°C of flaring temperature and this is also conservative approach.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
TC-01	07014281	Wise	Flaring temperature of #1 flare	
TC-02	07014283	“	Flaring temperature of #2 flare	
TC-03	07014280	“	Flaring temperature of #3 flare	
TC-04	07014282	“	Flaring temperature of #4 flare	
TC-05	07014284	“	Flaring temperature of #5 flare	
TC-06	07014285	“	Flaring temperature of #6 flare	

Calibration of meters

All meters were calibrated by authorized 3rd party or manufacturer. In case the calibration was made after the required calibration frequency, “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” was applied during the period. Detailed information is as follows;

ID	Date of Last Calibration	Calibration Due Date	Date of Calibration	Remarks
FT-01	14/05/2008	14/05/2009	16/12/2009	Guideline* applied from “calibration due date” to “date of calibration”.
FT-02 (DPT)	27/11/2008	27/11/2009	03/12/2009	
FT-04	12/05/2008	12/05/2009	03/11/2009	
FT-05	09/07/2008	09/07/2009	16/12/2009	
FT-06	09/05/2008	09/05/2009	03/11/2009	
FT-07	09/05/2008	09/05/2009	03/11/2009	
FT-08	09/07/2008	09/07/2009	16/12/2009	



FT-09	12/05/2008	12/05/2009	03/11/2009	
FT-10	13/08/2008	13/08/2009	18/06/2009	
FT-03	09/07/2008	09/07/2009	16/12/2009	Guideline* applied from “calibration due date” to “date of calibration”.
700A	12/05/2008	12/05/2009	16/12/2009	
900A	18/05/2007	18/05/2008	03/11/2009	
FT-08 (old)	15/10/2007	14/10/2008	25/11/2010	In order to apply the guideline, calibration was made in 2010.
FT-09 (old)	15/10/2007	14/10/2008	25/11/2010	
GA-01	09/06/2008	09/06/2009	30/11/2009	Guideline* applied from “calibration due date” to “date of calibration”.
GA-02	09/06/2008	09/06/2009	30/11/2009	
GA-03	09/06/2008	09/06/2009	30/11/2009	
Reserve GA	23/11/2004	23/11/2005	30/11/2009	
TT-03	26/11/2008	26/11/2009	07/12/2009	
TT-04	03/12/2008	03/12/2009	15/06/2009	
PT-05	27/11/2008	27/11/2009	03/12/2009	Guideline* applied from “calibration due date” to “date of calibration”.
PT-06	27/11/2008	27/11/2009	11/06/2009	
WH-01	11/07/2007	11/01/2011		
WH-03	15/12/2006	15/12/2013		
WH-04	15/12/2006	15/12/2013		
WH-05	01/02/2005	01/02/2012		
WH-06	01/11/2003	01/11/2010		
TC-01	26/11/2008	26/11/2009	07/12/2009	Guideline* applied from “calibration due date” to “date of calibration”.
TC-02	26/11/2008	26/11/2009	07/12/2009	
TC-03	26/11/2008	26/11/2009	07/12/2009	
TC-04	26/11/2008	26/11/2009	07/12/2009	
TC-05	26/11/2008	26/11/2009	07/12/2009	
TC-06	26/11/2008	26/11/2009	07/12/2009	

* “Guidelines for assessing compliance with the calibration frequency requirements (version 01)”
http://cdm.unfccc.int/Reference/Guidclarif/iss/iss_guid05.pdf

Fossil fuel usage

The amount of fossil fuel (LPG) usage which supplied to flares and boilers of 50MW power plant in its ignition stage was checked monthly by weighing LPG vessels. The difference between each month was regarded as LPG usage.

Data Management

The accumulated data from control station was analyzed for the verification of this project. All required guides were stated in SLC’s internal procedure. These include data handling protocol, monitoring procedure, operation & maintenance guide, problem solving procedure, etc.

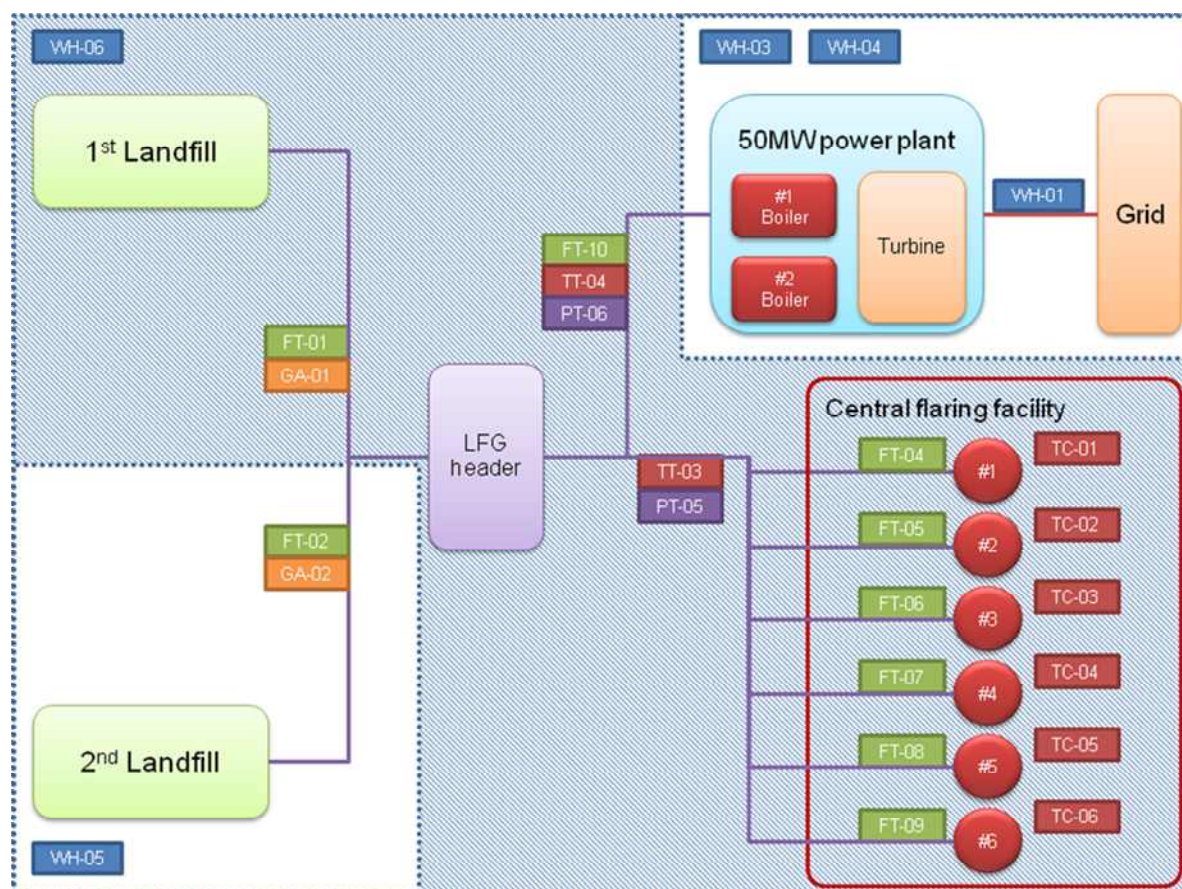


Figure 6 Line Diagram of Monitoring Points

Organizational Structure

SLC is responsible for all CDM monitoring related works. It supervises the private operator of 50MW power plant, Ecoenergy, which also commissioned to operate central flaring facility and LFG capturing system of 1st and 2nd landfill from SLC.

Ecoenergy is responsible for operation of 50MW power plant, central flaring facility and LFG capturing system of 1st and 2nd landfill.

Roles and Responsibilities of Personnel

Organization	Department	Position	Name	Roles
SLC	CEO		ChunKoo Cho	Approval of monthly calculation result & monitoring report
	Executive Director (Project Development)		ChongSik Shin	Approval calculation result & monitoring report
	Climate Change Business Division (Former Environmental)	Head	SooSung Song	Approval calculation result & monitoring report
		Manager	Lae Bong Han	Approval of daily calculation result & supervision of facility management



	Technology Support Division)	Assistant manager	Seongmin Park	Data analysis, calculation & arrangement of monitoring report
		Staff	HyunSeong Shin	Data aggregation & facility management
Ecoenergy	CEO		DongIl Cho	Management & operation of 50MW power plant & central flaring facility
	Power Generation Div.	Team manager	KyungYong Song	Management & operation of 50MW power plant
	Facility Management Centre	Part manager	HyunGil Kim	Management & operation of central flaring facility

Table 8 Major responsible personnel and its rules

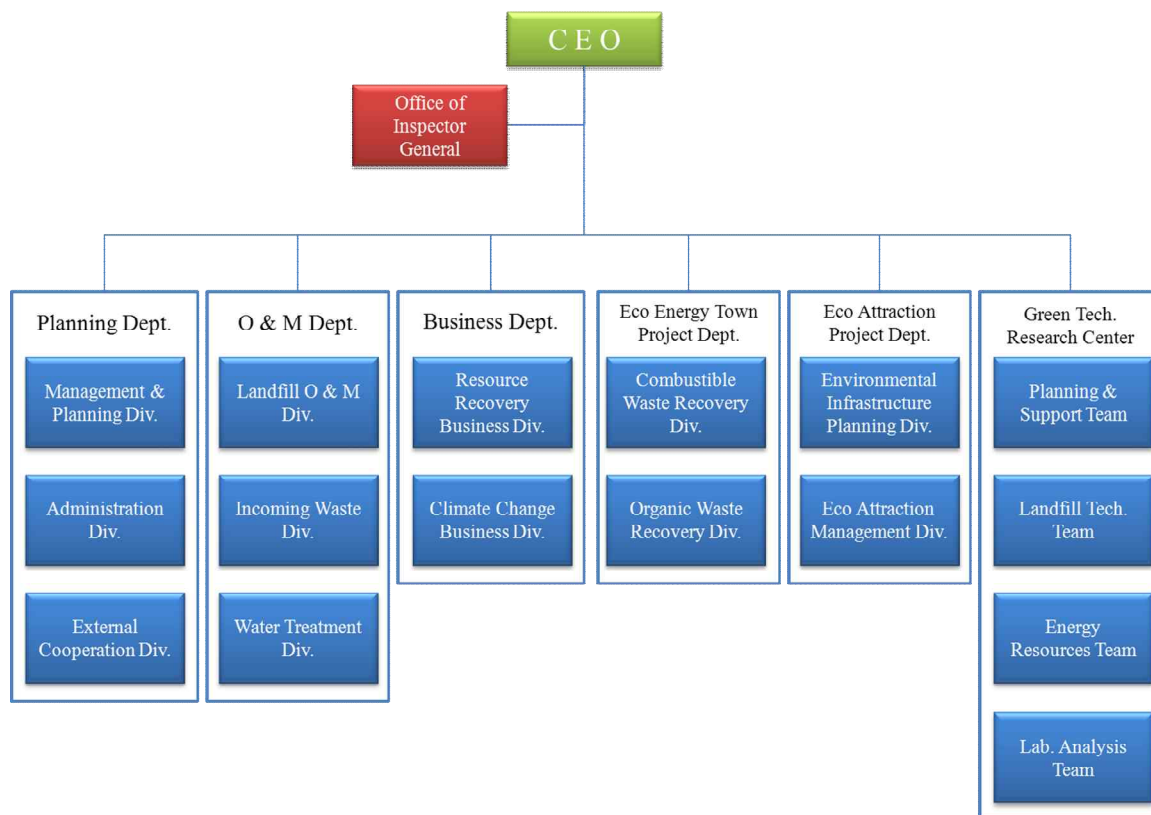


Figure 7 Organization Chart of SLC

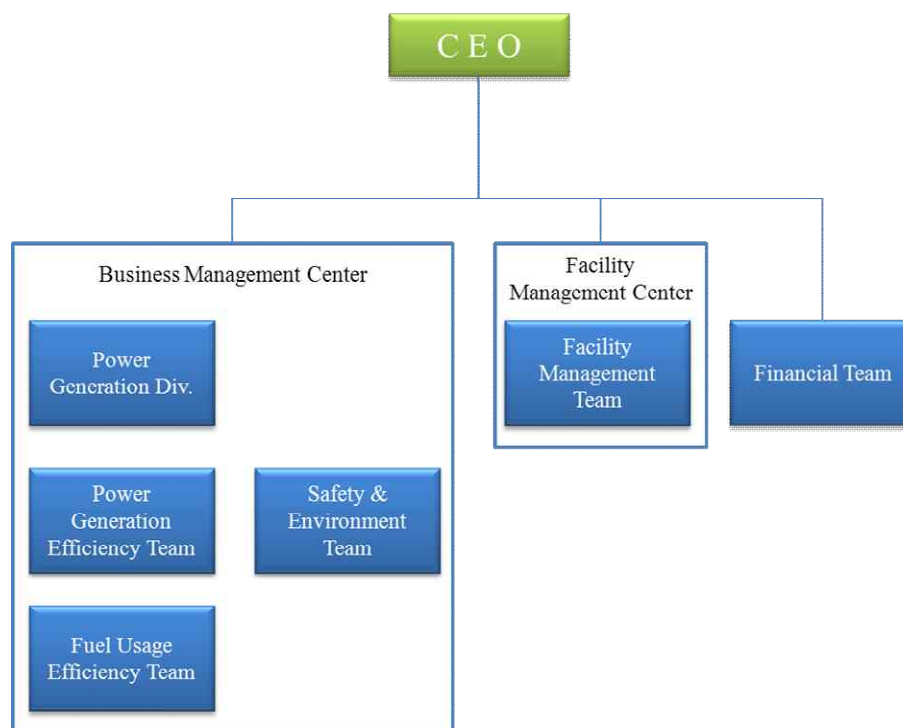


Figure 8 Organization Chart of Ecoenergy

Emergency Procedures

In order to handle emergency situations, SLC prepares internal ‘Emergency Procedures’, which updated every year to compensate changes of site conditions.

For emergency in 50MW power plant, Ecoenergy includes emergency plan in its ‘Maintenance & Operational Plan’ which also updated and reported to SLC on a yearly basis.

	Fire	LFG leakage
Duty	Prevent fire expansion and extinguishing	Prevent fire and (or) explosion
Report system	Discoverer -> Team manager -> Managing Partner -> CEO	Discoverer -> Team manager -> Managing Partner -> CEO
Countermeasures	<ul style="list-style-type: none"> - Use fire extinguisher located nearby road - Stop LFG capture - Use watering cart - Use soil to prevent O₂ supply - Contact neighbouring fire station (Kum am 032-568-7119, Seo bu 032-565-8119) 	<ul style="list-style-type: none"> - Stop LFG capture - Isolate leaking part from other capturing pipeline - Isolate leaking part from flammable things - Contact neighbouring fire station (Kum am 032-568-7119, Seo bu 032-565-8119) if needed
Check frequency	Per week	Per month

Table 9 Typical emergency cases and its countermeasures

**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:	tCO₂/tCH₄
Description:	Global warming potential for methane (CH ₄)
Source of data used:	Default value in IPCC & ACM0001 version 4
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:	PDD
Value(s) :	61.15
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation.
Additional comment:	Ex-ante calculation in accordance with ACM0001 ver. 4 for entire crediting period.

Data / Parameter:	EF
Data unit:	tCO₂/MWh
Description:	Grid CO ₂ emission factor
Source of data used:	PDD
Value(s) :	0.5666
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation.
Additional comment:	Ex-ante calculation in accordance with ACM0002 ver. 6 for entire crediting period.

Data / Parameter:	D_{CH4}
Data unit:	tCH₄/Nm³
Description:	Density of methane
Source of data used:	Default value in ACM0001 version 4
Value(s) :	0.0007168
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for emission reductions calculation.



Leakage emission calculations)	
Additional comment:	N/A

D.2. Data and parameters monitored

Data / Parameter:	LFG_{total,y}	
Data unit:	Nm³	
Description:	Total amount of landfill gas captured in year y	
Measured /Calculated /Default:	Continuously measured by flow meters (total of 2)	
Source of data:	MMI data The two flow meters, FT-01 and FT-02 are continuously measure the captured LFG from 1 st and 2 nd landfill.	
Value(s) of monitored parameter:	269,056,600.8	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	FT-01
	Coverage	LFG flow of 1 st landfill from 01/01/2009 to 31/12/2009 except calibration period (from 09/11/2009 to 23/12/2009)
	Type	Thermal mass type flow meter
	Accuracy class	±[1% RDG +(0.5%FS + 0.02%/°C)]
	Serial number	27051601
	Calibration frequency	1 year
	Date of last calibration	14/05/2008, 16/12/2009
	Validity	Valid from 14/05/2008 to 14/05/2009 and from 16/12/2009 to 16/12/2010 In order to deal with the uncertainty caused by delayed calibration, -1.783% ~ -2.173% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 14/05/2009 to 09/11/2009.
	Item name	FT-04
	Coverage	LFG flow of 1 st landfill from 09/11/2009 to 23/12/2009 (temporally installed)
	Type	Thermal mass type flow meter



	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28031701
	Calibration frequency	1 year
	Date of last calibration	12/05/2008, 03/11/2009
	Validity	Valid from 12/05/2008 to 12/05/2009 and from 03/11/2009 to 03/11/2010
	Item name	FT-02
	Coverage	LFG flow of 2 nd landfill
	Type	V-cone type flow meter
	Accuracy class	FE: $\pm 1\%$ DPT: $\pm 0.1\%$
	Serial number	FE: HFV-20041004 DPT: CEQ-0383
	Calibration frequency	FE: 2 years DPT: 1 year
	Date of last calibration	FE: 31/07/2008 DPT: 27/11/2008, 03/12/2009
	Validity	FE: Valid from 31/07/2008 to 30/07/2010 DPT: Valid from 27/11/2008 to 27/11/2009 and from 03/12/2009 to 03/12/2010 In order to deal with the uncertainty caused by delayed calibration of DPT, maximum permissible error of -0.1% applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 27/11/2009 to 05/12/2009.
	Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording
	Calculation method (if applicable):	(FT-01) + (FT-02) or (FT-04) + (FT-02)
	QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority

Data / Parameter:	LFG_{flare,v}
Data unit:	Nm³
Description:	Amount of landfill gas which flared
Measured /Calculated /Default:	Continuously measured by flow meters (total of 6)
Source of data:	MMI data: The six flow meters, FT-04 to FT-09 are continuously measure the LFG flow of 6 flaring stacks
Value(s) of monitored parameter:	33,789,470.5



Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)		
	Item name	FT-04
	Coverage	LFG flow of #1 flare from 01/01/2009 to 23/10/2009 and from 23/12/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28031701
	Calibration frequency	1 year
	Date of last calibration	12/05/2008, 09/11/2009
	Validity	Valid from 12/05/2008 to 12/05/2009 and from 09/11/2009 to 09/11/2010 In order to deal with the uncertainty caused by delayed calibration, -1.581% ~ -2.360% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 12/05/2009 to 09/11/2009.
	Item name	FT-05
	Coverage	LFG flow of #2 flare from 01/01/2009 to 08/11/2009 and from 23/12/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28012903
	Calibration frequency	1 year
	Date of last calibration	08/07/2008, 16/12/2009
	Validity	Valid from 08/07/2008 to 08/07/2009 and from 16/12/2009 to 16/12/2010 In order to deal with the uncertainty caused by delayed calibration, -1.581% ~ -2.360% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 08/07/2009 to 23/12/2009.
	Item name	FT-06
	Coverage	LFG flow of #3 flare



		from 01/01/2009 to 23/10/2009 and from 09/11/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28042402
	Calibration frequency	1 year
	Date of last calibration	09/05/2008, 03/11/2009
	Validity	Valid from 09/05/2008 to 09/05/2009 and from 03/11/2009 to 03/11/2010 In order to deal with the uncertainty caused by delayed calibration, -1.783% ~ -2.173% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 09/05/2009 to 09/11/2009.
	Item name	FT-07
	Coverage	LFG flow of #4 flare from 01/01/2009 to 23/10/2009 and from 09/11/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28042401
	Calibration frequency	1 year
	Date of last calibration	09/05/2008, 03/11/2009
	Validity	Valid from 09/05/2008 to 09/05/2009 and from 03/11/2009 to 03/11/2010 In order to deal with the uncertainty caused by delayed calibration, -1.885% ~ -2.173% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 09/05/2009 to 23/10/2009.
	Item name	Reserve (900A)
	Coverage	LFG flow of #4 flare (reserve) from 24/10/2009 to 08/11/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28012905
	Calibration frequency	1 year
	Date of last calibration	18/05/2007, 03/11/2009



	Validity	Valid from 18/05/2007 to 18/05/2008 and from 03/11/2009 to 03/11/2010 In order to deal with the uncertainty caused by delayed calibration, -1.788% ~ -2.040% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 24/10/2009 to 08/11/2009.
	Item name	FT-08
	Coverage	LFG flow of #5 flare from 01/01/2009 to 23/10/2009 and from 23/12/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28012904
	Calibration frequency	1 year
	Date of last calibration	09/07/2008, 16/12/2009
	Validity	Valid from 09/07/2008 to 09/07/2009 and from 16/12/2009 to 31/12/2009 In order to deal with the uncertainty caused by delayed calibration, -1.885% ~ -2.173% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 09/07/2009 to 23/10/2009.
	Item name	FT-08 (old)
	Coverage	LFG flow of #5 flare (reserve) from 10/24/2009 to 23/12/2009
	Type	Pitot-tube type flow meter
	Accuracy class	FE: $\pm 1\%$ DPT: $\pm 0.1\%$
	Serial number	FE: V2973-01.1 DPT: A1F3913T
	Calibration frequency	FE: 2 years DPT: 1 year
	Date of last calibration	FE: 13/06/2008 DPT: 15/10/2007, 25/11/2010
	Validity	FE: Valid from 13/06/2008 to 12/06/2010 DPT: Valid from 04/10/2007 to 03/10/2008 and from 25/11/2010 to 25/11/2011



		In order to deal with the uncertainty caused by delayed calibration of DPT, - 0.1% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 10/24/2009 to 23/12/2009.
	Item name	FT-09
	Coverage	LFG flow of #6 flare from 01/01/2009 to 04/10/2009 and from 09/11/2009 to 31/12/2009
	Type	Thermal mass type flow meter
	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{ FS} + 0.02\% / ^\circ\text{C})]$
	Serial number	28031702
	Calibration frequency	1 year
	Date of last calibration	12/05/2008, 03/11/2009
	Validity	Valid from 12/05/2008 to 11/05/2009 and from 03/11/2009 to 03/11/2010
		In order to deal with the uncertainty caused by delayed calibration, -1.783% ~ -2.173% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 12/05/2009 to 23/10/2009.
	Item name	FT-09 (old)
	Coverage	LFG flow of #6 flare (reserve) from 24/10/2009 to 08/11/2009
	Type	Pitot-tube type flow meter
	Accuracy class	FE: $\pm 1\%$ DPT: $\pm 0.1\%$
	Serial number	FE: V2973-01.2 DPT: A5H2952T
	Calibration frequency	FE: 2 years DPT: 1 year
	Date of last calibration	FE: 13/06/2008 DPT: 04/10/2007, 25/11/2010
	Validity	FE: Valid from 13/06/2008 to 12/06/2010 DPT: Valid from 04/10/2007 to 13/10/2008 and from 25/11/2010 to 25/11/2011
		In order to deal with the uncertainty



	caused by delayed calibration of DPT, - 0.1% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 24/10/2009 to 08/11/2009.
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording
Calculation method (if applicable):	(FT-04) + (FT-05) + (FT-06) + (FT-07) + (FT-08) + (FT-09)
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority

Data / Parameter:	LFG_{electricity,v}	
Data unit:	Nm³	
Description:	Amount of landfill gas which fed to 50MW power plant	
Measured /Calculated /Default:	Continuously measured by flow meter	
Source of data:	DCS data: The flow meter, FT-10 is continuously measure the LFG flow of the power plant	
Value(s) of monitored parameter:	235,268,026.9	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	FT-10
	Coverage	LFG flow of 50MW power plant
	Type	Ultrasonic type flow meter
	Accuracy class	±1%
	Serial number	465
	Calibration frequency	1 year
	Date of last calibration	13/08/2008, 18/06/2009
	Validity	Valid from 13/08/2008 to 18/06/2010
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority	

Data / Parameter:	W_{CH₄,v}
Data unit:	% (Nm³ CH₄ / Nm³ LFG)
Description:	Methane fraction in LFG
Measured /Calculated /Default:	Continuously measured by methane gas analyzers (total of 2)



Source of data:	MMI data: The methane gas analyzer, GA-01 and GA-02 are continuously measure the methane concentration of LFGs from 1 st and 2 nd landfill	
Value(s) of monitored parameter:	43.00 ~ 53.06 (average: 50.0)	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	GA-01
	Coverage	CH ₄ fraction of LFG at 1 st landfill from 01/01/2009 to 23/11/2009 and 04/12/2009 to 31/12/2009
	Type	Infrared gas analyser
	Accuracy class	Linearity: $\pm 1\%$ of FS Repeatability: $\pm 0.5\%$ of FS
	Serial number	A2B4359T
	Calibration frequency	1 year
	Date of last calibration	09/06/2008, 30/11/2009
	Validity	Valid from 09/06/2008 to 09/06/2009 and 30/11/2009 to 23/11/2010. In order to deal with the uncertainty caused by delayed calibration, -1.5% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 09/06/2009 to 23/11/2009.
	Item name	GA-02
	Coverage	CH ₄ fraction of LFG at 2 nd landfill from 01/01/2009 to 23/11/2009 and 04/12/2009 to 31/12/2009
	Type	Infrared gas analyser
	Accuracy class	Linearity: $\pm 1\%$ of FS Repeatability: $\pm 0.5\%$ of FS
	Serial number	A4J0063T
	Calibration frequency	1 year
	Date of last calibration	09/06/2008, 30/11/2009
	Validity	Valid from 09/06/2008 to 09/06/2009 and 30/11/2009 to 23/11/2010. In order to deal with the uncertainty caused by delayed calibration, -1.5% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency



	requirements (version 01)” from 09/06/2009 to 23/11/2009.
Item name	GA-03
Coverage	CH ₄ fraction of LFG at 1 st landfill from 24/11/2009 to 03/12/2009 (reserve)
Type	Infrared gas analyser
Accuracy class	Linearity: ±1% of FS Repeatability: ±0.5% of FS
Serial number	N6E2427T
Calibration frequency	1 year
Date of last calibration	09/06/2008, 30/11/2009
Validity	Valid from 09/06/2008 to 09/06/2009 and 30/11/2009 to 30/11/2010. In order to deal with the uncertainty caused by delayed calibration, -1.5% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 24/11/2009 to 30/11/2009.
Item name	Reserve GA
Coverage	CH ₄ fraction of LFG at 2 nd landfill from 24/11/2009 to 03/12/2009 (reserve)
Type	Infrared gas analyser
Accuracy class	Linearity: ±1% of FS Repeatability: ±0.5% of FS
Serial number	A4M0708T
Calibration frequency	1 year
Date of last calibration	30/11/2009
Validity	Valid from 30/1/2009 to 30/11/2010. In order to deal with the uncertainty caused by delayed calibration, -1.51% of identified error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 24/11/2009 to 30/11/2009.
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording
Calculation method (if applicable):	$\frac{(FT - 01) \times (GA - 01) + (FT - 02) \times (GA - 02)}{LFG_{total}}$
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority



Data / Parameter:	FE	
Data unit:	%	
Description:	Efficiency of flare	
Measured /Calculated /Default:	Laboratory measurement and calculation	
Source of data:	Test report made by 3 rd party authority which mentioning the result of exhaust gas analysis for each flares. Thermocouples installed in order to measure flaring temperature in each flares (total of 6)	
Value(s) of monitored parameter:	0 ~ 99.9% <ul style="list-style-type: none"> - 0%, in case flaring temperature is below 600°C - 99.6%, in case flaring temperature is above 600°C and the result of exhaust gas analysis is appropriate (over 1,000 ppm CH₄). - 99.7%, in case flaring temperature is above 600°C and the result of exhaust gas analysis is appropriate (over 500 ppm CH₄). - 99.9%, in case flaring temperature is above 600°C and the result of exhaust gas analysis is appropriate (below 250 ppm CH₄). 	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	FE
	Coverage	Flaring efficiency of each flares
	Type	Accredited 3 rd party laboratory analysis result
	Accuracy class	-
	Serial number	Certification No. 38120201, 39040601, 39062201, 39102801, 39122101 * For detailed results, please refer to Table 7 in page 16
	Calibration frequency	-
	Date of last calibration	-
	Validity	
	Item name	TC-01 ~ 06 from 01/01/2009 to 31/12/2009
	Coverage	Flaring temperature of each flares
	Type	Thermocouple, k-type
	Accuracy class	±(B) 0.3 class
	Serial number	TC-01: 07014280 TC-02: 07014281 TC-03: 07014282 TC-04: 07014283 TC-05: 07014284 TC-06: 07014285
	Calibration frequency	1 year
	Date of last calibration	26/11/2008, 07/12/2009
	Validity	Valid from 26/11/2008 to 26/11/2009 and 07/12/2009 to 07/12/2010.
	In order to deal with the uncertainty	



		caused by delayed calibration of each TCs, -0.3% of maximum permissible error applied in accordance with Guideline from 27/11/2009 to 14/12/2009.
Measuring/ Reading/ Recording frequency:	Periodic analysis was made for flare exhaust gas. Continuous measuring & reading, hourly recording for TC-01 to TC-06	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance, calibrated by approved 3 rd party authority for TC-01 to TC-06	

Data / Parameter:	T	
Data unit:	°C	
Description:	Temperature of LFG	
Measured /Calculated /Default:	Measured	
Source of data:	MMI / DCS data The temperature transmitters, TT-03 and TT-04 are continuously measure the temperature of LFG for the flow normalization.	
Value(s) of monitored parameter:	24.3 ~ 64.0 (average: 42.2)	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	TT-03
	Coverage	Temperature of LFG which fed to flares
	Type	PT 100Ω
	Accuracy class	Transmitter : ±0.1% RTD: ±0.1%
	Serial number	A6B3331T
	Calibration frequency	1 year
	Date of last calibration	26/11/2008, 07/12/2009
	Validity	Valid from 26/11/2008 to 26/11/2009 and from 07/12/2009 to 07/12/2010 In order to deal with the uncertainty caused by delayed calibration, +0.2% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 26/11/2009 to 07/12/2009.
	Item name	TT-04
	Coverage	Temperature of LFG which fed to 50MW power plant
	Type	Thermocouple E



	Accuracy class	±0.5%
	Serial number	099169
	Calibration frequency	1 year
	Date of last calibration	03/12/2008, 15/06/2009
	Validity	Valid from 03/12/2008 to 15/06/2010
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority	

Data / Parameter:	P	
Data unit:	mmAq	
Description:	Pressure of LFG	
Measured /Calculated /Default:	Measured	
Source of data:	MMI / DCS data The pressure transmitters, PT-05 and PT-06 are continuously measure the pressure of LFG for the flow normalization.	
Value(s) of monitored parameter:	163.00 ~ 712.79 (average: 567.93)	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	PT-05
	Coverage	Pressure of LFG which fed to flares
	Type	Absolute pressure transmitter
	Accuracy class	±0.5%
	Serial number	A4J4159T
	Calibration frequency	1 year
	Date of last calibration	27/11/2008, 03/12/2009
	Validity	Valid from 27/11/2008 to 26/11/2009 and from 03/12/2009 to 03/12/2010 In order to deal with the uncertainty caused by delayed calibration, -0.5% of maximum permissible error applied in accordance with “Guidelines for assessing compliance with the calibration frequency requirements (version 01)” from 27/11/2009 to 02/12/2009.
	Item name	PT-06
	Coverage	Pressure of LFG which fed to 50MW power plant
	Type	Absolute pressure transmitter



	Accuracy class	±0.5%
	Serial number	0447-04111204003
	Calibration frequency	1 year
	Date of last calibration	27/11/2008, 11/06/2009
	Validity	Valid from 27/11/2008 to 11/06/2010
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority	

Data / Parameter:	EL_{EX,LFG}	
Data unit:	MWh	
Description:	Total amount of electricity exported out of the project boundary	
Measured /Calculated /Default:	Measured	
Source of data:	Log sheet & KPX data The watt-hour meter, WH-01 is continuously measure the exported electricity and written in log sheet by operators	
Value(s) of monitored parameter:	363,259.12	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	WH-01
	Coverage	Electricity exported from 50MW power plant
	Type	Electronic watt hour meter
	Accuracy class	0.2 class
	Serial number	PR-0411A055-02
	Calibration frequency	3.5 ± 0.5 years (according to the operational directive of Korean electricity market controlled by KPX)
	Date of last calibration	11/07/2007
	Validity	Valid from 11/07/2007 to 10/07/2011
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by KPX	

Data / Parameter:	EL_{IMP}	
Data unit:	MWh	
Description:	Total amount of electricity imported to the project boundary	
Measured /Calculated	Measured	



/Default:		
Source of data:	Log sheet & KEPCO data Total of 4 watt hour meters are installed to monitor electricity imported. WH-03 & WH-04 are for imported electricity in 50MW power plant. WH-05 is for LFG blower of 2 nd landfill and WH-06 is for central flaring facility.	
Value(s) of monitored parameter:	4,142.74	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used for baseline emissions calculation	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Item name	WH-03
	Coverage	Electricity imported to the 50MW power plant
	Type	Electronic watt hour meter
	Accuracy class	0.5 class
	Serial number	6063941
	Calibration frequency	7 years (according to the national standard)
	Date of last calibration	17/08/2005
	Validity	Valid from 17/08/2005 to 16/08/2012
	Item name	WH-04
	Coverage	Electricity imported to the 50MW power plant
	Type	Electronic watt hour meter
	Accuracy class	0.5 class
	Serial number	HPM-12-040325-06
	Calibration frequency	7 years (according to the national standard)
	Date of last calibration	29/03/2004
	Validity	Valid from 29/03/2004 to 28/03/2011
	Item name	WH-05
	Coverage	Electricity imported to the LFG blower of 2 nd landfill
	Type	Electronic watt hour meter
	Accuracy class	0.5 class
	Serial number	MFR0411001F
	Calibration frequency	7 years (according to the national standard)
	Date of last calibration	05/2005
	Validity	Valid 05/2005 to 01/05/2012
	Item name	WH-06
	Coverage	Electricity imported to the central flaring facility



	Type	Electronic watt hour meter
	Accuracy class	0.5 class
	Serial number	2KLM001A
	Calibration frequency	7 years (according to the national standard)
	Date of last calibration	10/2003
	Validity	Valid from 10/2003 to 01/10/2010
Measuring/ Reading/ Recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	Not applicable	
QA/QC procedures applied:	Daily check and regular maintenance Calibrated by approved 3 rd party authority	

Data / Parameter:	Regulatory requirements relating to landfill gas projects
Data unit:	Not applicable
Description:	Regulatory requirements relating to landfill gas projects
Measured /Calculated /Default:	Not applicable
Source of data:	Investigation of legislation by CDM monitoring staff (Lae Bong Han)
Value(s) of monitored parameter:	Not applicable
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not applicable
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Annually recorded
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	Hours
Data unit:	Hours
Description:	Operation of the energy plant (50MW power plant)
Measured /Calculated /Default:	Measured
Source of data:	Generated (exported) amount of electricity by 50MW power plant
Value(s) of monitored parameter:	Not applicable
Indicate what the data are	Not applicable



used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Same as above 'EL _{EXLFG} '
Measuring/ Reading/ Recording frequency:	Annually recorded
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	LPG
Data unit:	Kg
Description:	The amount of LPG used for start-up (ignition) of 50MW power plant and each flares
Measured /Calculated /Default:	Measured
Source of data:	Log sheet
Value(s) of monitored parameter:	114 Kg
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)	Not applicable
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

According to ACM0001 version 4, emission reductions are calculated by following equation (page 2).

Emission Reduction

The greenhouse gas emission reduction achieved by the project activity during a given year “y” (ER_y) are estimated as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} + EL_y * CEF_{electricity,y} - ET_y * CEF_{thermal,y} \quad (1)$$

where:

ER_y	is emissions reduction, in tonnes of CO ₂ equivalents (tCO ₂ e).
$MD_{project,y}$	the amount of methane that would have been destroyed/combusted during the year, in, tonnes of methane (tCH ₄)
$MD_{reg,y}^2$	the 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 value for methane for the first commitment period is 21 tCO ₂ e/tCH ₄
EL_y	net quantity of electricity exported during year y, in megawatt hours (MWh).
$CEF_{electricity,y}$	CO ₂ emissions intensity of the electricity displaced, in tCO ₂ e/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.
ET_y	incremental quantity of fossil fuel, defined as difference of fossil fuel used in the baseline and fossil use during project, for energy requirement on site under project activity during the year y, in TJ.
$CEF_{thermal,y}$	CO ₂ emissions intensity of the fuel used to generate thermal/mechanical energy, in tCO ₂ e/TJ

Figure 9 Emission reduction equation in ACM0001 version 4 (page 2)

As there are no consideration about project emissions and leakage in ACM0001 version 4, above equation can be used to calculate baseline emissions;

$$BE = (MD_{project} - MD_{reg}) * GWP_{CH4} + EL * CEF_{electricity} + ET * CEF_{thermal}$$

Where this project does not include thermal energy displacement and MD_{reg} is calculated by AF (Adjustment factor), above equation can be simplified as below, which could be divided into two steps, baseline emissions from methane avoidance and from electricity generation;

$$BE = (MD_{project} * AF) * GWP_{CH4} + (EL_{exp} - EL_{imp}) * EF$$

Baseline emissions from methane avoidance

In accordance with ACM0001 version 4, captured amount of LFG and treated amount of LFG should be compared and smaller value ($LFG_{selected}$) should be used to determine the amount of methane destruction.

Next, weighted average of methane fraction from 1st and 2nd landfill multiplied in order to calculate methane content and global warming potential and AF applied to calculate baseline emissions.

$$BE_{methane_avoidance} = (LFG_{selected} \times W_{CH_4} \times D_{CH_4} \times AF) \times GWP_{CH_4}$$

	LFG _{selected} (Nm ³)	W _{CH₄} (%)	CH ₄ treated (Nm ³)	BE from CH ₄ avoidance (tCO ₂ e)	AF applied BE (tCO ₂ e)
Jan 2009	25,416,642.4	48.2	12,254,932.2	184,471.0	71,667
Feb	23,569,175.0	49.4	11,630,662.7	175,074.0	68,016
Mar	24,381,957.9	50.6	12,340,043.8	185,752.2	72,165
Apr	25,111,758.5	50.2	12,599,758.2	189,661.6	73,684
May	26,093,397.4	51.0	13,304,597.0	200,271.4	77,805
Jun	18,764,127.7	49.8	9,336,091.9	140,534.3	54,598
Jul	21,662,685.1	51.1	11,072,523.0	166,672.5	64,752
Aug	20,435,931.2	51.6	10,540,621.8	158,665.9	61,642
Sep	20,303,362.7	51.8	10,517,661.9	158,320.3	61,507
Oct	20,850,651.3	49.7	10,343,993.7	155,706.1	60,492
Nov	20,903,511.6	49.5	10,347,913.1	155,765.1	60,515
Dec	21,563,400.2	46.9	10,122,592.6	152,373.4	59,197
Total	269,056,600.8	50.0	134,411,391.8	2,023,267.8	786,039

* The above data, sum of each month, may not be equal to calculation. Calculation of emission reductions is more accurate than the above data because it was calculated on daily basis and especially, CH₄_{treated} on hourly basis. Please refer calculation spread sheet file and Annex I for more detailed calculation.

Baseline emissions from electricity generation

In accordance with methodology, the amount of net generation and CO₂ emission factor of grid (EF) shall be used to calculate baseline emissions.

$$BE_{electricity_generation} = (EL_{exp} - EL_{imp}) \times EF$$

	Elec. exported (MWh)	Elec. imported (MWh)	Net generation (MWh)	BE from elec. generation (tCO ₂ e)
Jan 2009	33,718.1	345.8	33,372.3	18,909
Feb	30,431.1	304.7	30,126.4	17,070
Mar	29,661.3	410.8	29,250.6	16,573
Apr	32,739.5	300.5	32,439.0	18,380
May	32,958.7	318.5	32,640.2	18,494
Jun	13,508.5	498.1	13,010.4	7,372
Jul	33,665.9	291.0	33,374.9	18,910
Aug	29,920.8	326.8	29,594.1	16,768



Sep	32,587.6	251.7	32,335.9	18,322
Oct	27,891.4	474.3	27,417.1	15,535
Nov	32,526.0	300.3	32,225.7	18,259
Dec	33,650.1	320.3	33,329.8	18,885
Total	363,259.1	4,142.7	359,116.4	203,475

* The above data, sum of each month, may not be equal to calculation because emission reductions are calculated with several decimal places i.e. it is calculated in kWh unit instead of MWh for accuracy. Please refer calculation spread sheet file and Annex I for more detailed calculation.

Baseline emissions from 9.88MW power plant

As described in B. 1, however, request for review was made by CDM Executive Board during 1st request for issuance of the project regarding the stoppage of 9.88MW power plant. In accordance with the request for review of CDM Executive Board, emissions from the electricity generated by the existing 9.88MW power plant are regarded as baseline emissions and should be deducted from calculated baseline emissions. It is calculated as follows;

$$BE_{9.88MW} = \text{Maximum theoretical output of 9.88MW power plant} \times \text{monitoring period} \times EF$$

	Maximum theoretical output of 9.88MW (MWh)	Monitoring period (days)	EF (tCO ₂ /MWh)	BE _{9.88MW} (tCO ₂)
Total	215.79	365	0.5666	44,628

E.2. Project emissions calculation

>>

Project emissions calculation is included in E.1 Emission reductions calculation, e.g. electricity usage is included in EL_{imp} except project emissions from fossil fuel usage, which is not included in above emission reductions calculation equation.

Project emissions from fossil fuel (LPG) usage are calculated as following equation:

$$PE_{LPG} = Usage(Kg) \times 0.509 Nm^3 / Kg \times 57.8 MJ / Nm^3 \times 20.2 CKg / GJ \times 10^{-6} \times \frac{44}{12} CO_2 / C$$

	Usage of 50MW power plant (Kg)	Usage of central flaring facility (Kg)	PE _{LPG} (tCO ₂ e)
Jan 2009	3	0	0.006537
Feb	0	0	0.000000
Mar	7	6	0.028328
Apr	1	0	0.002179
May	7	6	0.028328
Jun	21	12	0.071909
Jul	8	0	0.017432
Aug	3	12	0.032686
Sep	2	0	0.004358



Oct	15	6	0.045760
Nov	1	0	0.002179
Dec	4	0	0.008716
Total	72	42	0.248412

For conservativeness, 1 tCO₂e applied though calculated project emissions from LPG usage were 0.248412 tCO₂e.

E.3. Leakage calculation

>>

There was no leakage in this monitoring period (in accordance with applied methodologies, leakage considered as zero (0) in PDD).

E.4. Emission reductions calculation / table

>>

Total emission reductions

Total emission reductions can be calculated as follows;

$$ER_{total} = BE_{methane_avoidance} + BE_{electricity_generation} - BE_{9.88MW} - PE_{fossilfuel} - Leakage$$

(Units: tCO₂e)

Total baseline emissions		944,886
	Baseline emissions from methane avoidance	786,039
	Baseline emissions from electricity generation	203,475
	Baseline emissions from 9.88MW power plant	(-) 44,628
Total project emissions		1
	Project emissions from fossil fuel (LPG) usage	1
Total leakage		0
	Leakage	0
Total emission reductions		944,885

* Please refer calculation spread sheet file and Annex I 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 (tCO₂e)	1,319,283	944,885

The estimated emission reductions in PDD (page 8) are as follows;

**A.4.4 Estimated amount of emission reductions over the chosen crediting period:**

Years	Annual estimation of emission reduction in tonnes of CO ₂ e
2007	1,012,459
2008	1,334,940
2009	1,319,283
2010	1,303,224
2011	1,286,969
2012	1,270,689
2013	1,254,526
2014	1,147,223
2015	1,033,187
2016	931,042
2017	209,875
Total estimated reductions (tonnes of CO₂e)	12,103,416
Total number of crediting years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	1,210,342

Crediting period is 10years from 01.Apr.2007 to 31.Mar.2017.

Figure 10 Estimated emission reductions in PDD

Estimated emission reductions of 1,319,283 tCO₂e used in order to compare with actual emission reductions.

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

>>

Claimed actual emission reductions are about 71.6% of estimated ones in PDD. This is mainly owing to the difference between estimated LFG generation by MELF model in PDD and actual amount of treated LFG which caused by model's own limitation and change of characteristics of reclaimed waste (portion of degradable organic waste decreased).

It seems that the ratio increased compare to 1st monitoring period (50.1%), but this is mainly because there was long overhaul period (90 days of stoppage for maintenance) of 50MW power plant in 1st monitoring period. Considering 2nd and 3rd monitoring period, which ratio was 69.05% and 70.4% respectively, monitored emission reductions in this period can be regarded as reasonable and normal.



In addition, compare to other landfill projects listed in CDM Pipeline (dated 01/05/2011) which issuance success rate is about 39%, however, the performance of this project is not extraordinary.



ANNEX I: Daily Calculation Results

Date	LFG _{selected} (Nm ³ /day)	W _{CH4} weighted (%)	CH ₄ combusted (Nm ³ /day)	BE from CH ₄ combusted (tCO ₂)	AF adjusted BE (tCO ₂)	Net elec. Generation (MWh)	BE from generation (tCO ₂)	Total BE (tCO ₂)
2009-01-01	835,858.2	47.7	398,900.0	6,004.6	2,332.8	1,076.8	610.1	2,942.9
2009-01-02	839,283.0	47.2	395,962.2	5,960.3	2,315.6	1,076.3	609.9	2,925.4
2009-01-03	839,444.0	47.0	394,429.3	5,937.3	2,306.6	1,076.7	610.0	2,916.7
2009-01-04	838,872.3	47.0	393,983.7	5,930.6	2,304.0	1,077.0	610.2	2,914.3
2009-01-05	841,004.0	46.9	394,337.3	5,935.9	2,306.1	1,076.3	609.9	2,915.9
2009-01-06	827,835.9	47.2	390,801.3	5,882.7	2,285.4	1,075.9	609.6	2,895.0
2009-01-07	829,212.5	47.7	395,937.4	5,960.0	2,315.4	1,076.1	609.7	2,925.2
2009-01-08	820,769.5	48.3	396,098.5	5,962.4	2,316.4	1,076.4	609.9	2,926.3
2009-01-09	818,800.8	48.6	397,897.2	5,989.5	2,326.9	1,076.9	610.2	2,937.1
2009-01-10	819,988.2	48.5	398,081.9	5,992.2	2,328.0	1,077.0	610.2	2,938.2
2009-01-11	817,363.5	48.3	394,949.9	5,945.1	2,309.7	1,077.2	610.4	2,920.0
2009-01-12	828,410.1	48.1	398,638.6	6,000.6	2,331.2	1,076.2	609.8	2,941.0
2009-01-13	814,606.0	47.9	390,289.4	5,874.9	2,282.4	1,076.3	609.8	2,892.2
2009-01-14	827,310.5	47.5	392,747.5	5,911.9	2,296.8	1,076.4	609.9	2,906.7
2009-01-15	810,396.2	47.7	386,956.4	5,824.8	2,262.9	1,076.4	609.9	2,872.8
2009-01-16	807,136.7	47.9	386,566.2	5,818.9	2,260.6	1,076.7	610.0	2,870.7
2009-01-17	782,149.9	48.4	378,272.6	5,694.1	2,212.1	1,077.0	610.2	2,822.4
2009-01-18	804,751.8	48.3	388,965.3	5,855.0	2,274.7	1,077.6	610.6	2,885.2
2009-01-19	799,939.6	48.1	384,761.8	5,791.7	2,250.1	1,076.9	610.2	2,860.3
2009-01-20	778,846.7	48.4	377,120.1	5,676.7	2,205.4	1,087.9	616.4	2,821.8
2009-01-21	793,262.6	48.8	386,752.3	5,821.7	2,261.7	1,066.4	604.2	2,865.9
2009-01-22	835,840.2	48.9	408,491.3	6,148.9	2,388.9	1,077.7	610.6	2,999.5
2009-01-23	831,346.0	48.8	405,527.8	6,104.3	2,371.5	1,076.2	609.8	2,981.3
2009-01-24	818,391.7	49.4	404,552.2	6,089.6	2,365.8	1,084.3	614.3	2,980.2
2009-01-25	830,285.5	48.9	406,237.0	6,115.0	2,375.7	1,086.7	615.7	2,991.4
2009-01-26	821,757.4	48.6	399,043.4	6,006.7	2,333.6	1,086.7	615.7	2,949.3
2009-01-27	827,027.0	49.0	405,539.1	6,104.5	2,371.6	1,086.6	615.7	2,987.3
2009-01-28	820,004.4	48.7	398,971.4	6,005.6	2,333.2	1,035.9	586.9	2,920.1
2009-01-29	810,114.5	49.0	396,720.4	5,971.8	2,320.0	1,075.8	609.6	2,929.6
2009-01-30	834,032.2	49.2	410,546.3	6,179.9	2,400.9	1,076.0	609.7	3,010.6
2009-01-31	812,601.3	48.8	396,854.4	5,973.8	2,320.8	1,075.9	609.6	2,930.4
2009-02-01	814,259.3	49.3	401,661.2	6,046.1	2,348.9	1,076.2	609.8	2,958.7
2009-02-02	826,320.3	49.3	407,728.0	6,137.4	2,384.4	1,075.6	609.5	2,993.8
2009-02-03	817,645.4	49.0	400,844.9	6,033.8	2,344.1	1,075.6	609.4	2,953.6
2009-02-04	828,837.5	49.2	407,581.7	6,135.2	2,383.5	1,075.7	609.5	2,993.0
2009-02-05	837,680.6	49.1	411,182.3	6,189.4	2,404.6	1,075.7	609.5	3,014.1
2009-02-06	831,200.4	48.9	406,205.1	6,114.5	2,375.5	1,075.6	609.4	2,984.9
2009-02-07	846,037.6	48.3	408,880.1	6,154.8	2,391.1	1,075.9	609.6	3,000.7
2009-02-08	857,806.8	48.3	414,364.9	6,237.4	2,423.2	1,076.0	609.6	3,032.9
2009-02-09	869,043.5	48.0	417,532.7	6,285.0	2,441.7	1,075.8	609.5	3,051.3
2009-02-10	871,826.9	48.2	420,637.3	6,331.8	2,459.9	1,076.0	609.6	3,069.5
2009-02-11	868,841.9	48.0	416,867.2	6,275.0	2,437.8	1,075.9	609.6	3,047.5
2009-02-12	850,461.0	48.3	410,748.6	6,182.9	2,402.1	1,076.0	609.6	3,011.7
2009-02-13	871,384.3	48.9	425,782.8	6,409.2	2,490.0	1,074.4	608.7	3,098.7
2009-02-14	862,104.8	49.2	424,064.7	6,383.4	2,479.9	1,076.6	610.0	3,089.9
2009-02-15	865,445.4	49.4	427,938.4	6,441.7	2,502.6	1,076.1	609.7	3,112.3
2009-02-16	861,949.0	49.8	429,338.6	6,462.7	2,510.8	1,075.3	609.2	3,120.0
2009-02-17	846,615.5	50.1	424,128.9	6,384.3	2,480.3	1,081.8	613.0	3,093.3
2009-02-18	849,306.1	50.3	427,381.2	6,433.3	2,499.3	1,069.3	605.8	3,105.2
2009-02-19	848,719.2	50.9	431,641.2	6,497.4	2,524.2	1,076.0	609.7	3,133.9
2009-02-20	856,504.3	49.9	427,089.2	6,428.9	2,497.6	1,076.0	609.6	3,107.3
2009-02-21	849,597.5	49.9	424,313.5	6,387.1	2,481.4	1,076.9	610.2	3,091.6
2009-02-22	847,559.5	49.6	420,597.5	6,331.2	2,459.7	1,077.3	610.4	3,070.1
2009-02-23	825,668.4	49.5	408,674.6	6,151.7	2,389.9	1,077.0	610.2	3,000.2



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2009-02-24	827,349.7	50.0	413,979.9	6,231.6	2,421.0	1,076.7	610.1	3,031.0
2009-02-25	830,570.4	49.9	414,315.3	6,236.6	2,422.9	1,079.8	611.8	3,034.7
2009-02-26	800,114.2	50.3	402,300.7	6,055.8	2,352.7	1,073.9	608.5	2,961.1
2009-02-27	805,310.0	50.1	403,826.9	6,078.7	2,361.6	1,077.1	610.3	2,971.9
2009-02-28	801,015.6	50.1	401,055.2	6,037.0	2,345.4	1,072.4	607.6	2,953.0
2009-03-01	825,447.7	49.7	410,496.9	6,179.1	2,400.6	1,074.2	608.6	3,009.2
2009-03-02	809,723.7	50.0	405,211.0	6,099.6	2,369.7	1,079.0	611.4	2,981.1
2009-03-03	819,911.2	49.9	409,040.0	6,157.2	2,392.1	1,077.7	610.6	3,002.7
2009-03-04	820,106.1	49.6	406,921.9	6,125.3	2,379.7	1,077.7	610.6	2,990.3
2009-03-05	821,568.7	50.3	413,487.0	6,224.1	2,418.1	1,078.1	610.8	3,028.9
2009-03-06	841,643.2	49.9	419,748.9	6,318.4	2,454.7	1,077.4	610.5	3,065.2
2009-03-07	834,452.7	50.0	416,910.0	6,275.7	2,438.1	1,080.9	612.4	3,050.5
2009-03-08	832,935.5	50.1	417,455.6	6,283.9	2,441.3	1,088.0	616.5	3,057.7
2009-03-09	834,969.6	50.0	417,367.1	6,282.5	2,440.8	1,065.5	603.7	3,044.5
2009-03-10	585,646.7	50.3	294,690.4	4,435.9	1,723.4	239.3	135.6	1,859.0
2009-03-11	522,536.9	50.6	264,635.3	3,983.5	1,547.6	-29.8	-16.9	1,530.7
2009-03-12	483,436.1	51.0	246,771.1	3,714.6	1,443.1	-30.7	-17.4	1,425.7
2009-03-13	538,710.1	51.8	279,112.7	4,201.4	1,632.3	2.5	1.4	1,633.7
2009-03-14	823,314.5	51.4	422,880.9	6,365.5	2,473.0	1,037.6	587.9	3,060.9
2009-03-15	827,083.9	51.3	424,217.1	6,385.7	2,480.8	1,080.0	611.9	3,092.8
2009-03-16	813,022.4	51.0	414,669.6	6,241.9	2,425.0	1,080.0	611.9	3,036.9
2009-03-17	833,483.1	51.2	426,327.3	6,417.4	2,493.2	1,079.5	611.6	3,104.8
2009-03-18	833,095.5	50.8	423,564.4	6,375.8	2,477.0	1,078.6	611.1	3,088.2
2009-03-19	808,456.3	50.8	410,753.3	6,183.0	2,402.1	1,078.9	611.3	3,013.4
2009-03-20	834,844.9	51.0	425,558.1	6,405.8	2,488.7	1,079.6	611.7	3,100.4
2009-03-21	818,778.7	51.5	421,796.5	6,349.2	2,466.7	1,079.8	611.8	3,078.5
2009-03-22	833,035.5	50.7	422,249.8	6,356.0	2,469.3	1,079.3	611.5	3,080.8
2009-03-23	840,210.1	50.7	426,271.8	6,416.6	2,492.8	1,079.9	611.9	3,104.7
2009-03-24	811,906.0	51.2	415,980.7	6,261.7	2,432.7	1,080.7	612.3	3,045.0
2009-03-25	812,920.2	51.3	416,832.9	6,274.5	2,437.6	1,080.9	612.4	3,050.1
2009-03-26	824,079.7	50.7	418,110.0	6,293.7	2,445.1	1,080.7	612.3	3,057.4
2009-03-27	824,964.3	50.5	416,920.6	6,275.8	2,438.2	1,080.6	612.3	3,050.4
2009-03-28	805,383.7	50.5	406,501.4	6,119.0	2,377.2	1,081.0	612.5	2,989.7
2009-03-29	810,808.7	50.2	407,205.4	6,129.6	2,381.3	1,081.4	612.7	2,994.1
2009-03-30	831,127.5	50.6	420,549.3	6,330.4	2,459.4	1,080.8	612.4	3,071.8
2009-03-31	824,354.6	50.7	417,807.0	6,289.2	2,443.3	1,051.3	595.7	3,039.0
2009-04-01	798,233.4	50.4	402,277.6	6,055.4	2,352.5	1,081.0	612.5	2,965.0
2009-04-02	813,275.7	50.3	409,468.2	6,163.6	2,394.6	1,081.0	612.5	3,007.0
2009-04-03	808,920.5	50.7	410,172.0	6,174.2	2,398.7	1,081.0	612.5	3,011.2
2009-04-04	816,817.3	50.9	415,437.0	6,253.5	2,429.5	1,081.6	612.9	3,042.3
2009-04-05	810,042.7	50.7	410,813.6	6,183.9	2,402.4	1,081.4	612.7	3,015.2
2009-04-06	820,994.7	50.8	417,319.5	6,281.8	2,440.5	1,081.4	612.7	3,053.2
2009-04-07	798,656.9	50.7	405,150.6	6,098.7	2,369.3	1,080.7	612.3	2,981.7
2009-04-08	808,970.6	50.6	409,743.3	6,167.8	2,396.2	1,080.9	612.4	3,008.6
2009-04-09	804,369.3	50.9	409,395.5	6,162.5	2,394.1	1,080.6	612.3	3,006.4
2009-04-10	802,389.0	50.8	407,807.4	6,138.6	2,384.9	1,081.1	612.6	2,997.4
2009-04-11	802,194.0	50.7	406,731.2	6,122.4	2,378.6	1,081.7	612.9	2,991.5
2009-04-12	794,476.3	50.4	400,309.3	6,025.8	2,341.0	1,082.2	613.2	2,954.2
2009-04-13	828,972.5	50.5	418,895.9	6,305.6	2,449.7	1,081.1	612.6	3,062.3
2009-04-14	849,578.3	50.1	425,972.9	6,412.1	2,491.1	1,081.1	612.5	3,103.6
2009-04-15	866,723.4	49.6	429,815.9	6,469.9	2,513.6	1,083.8	614.1	3,127.7
2009-04-16	863,279.7	49.6	428,508.9	6,450.3	2,505.9	1,091.7	618.6	3,124.5
2009-04-17	860,409.4	49.7	427,643.3	6,437.2	2,500.9	1,071.5	607.1	3,108.0
2009-04-18	863,790.2	49.7	429,556.8	6,466.0	2,512.1	1,081.1	612.5	3,124.6
2009-04-19	862,940.4	49.7	428,483.5	6,449.9	2,505.8	1,083.3	613.8	3,119.6



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2009-04-20	863,635.0	49.5	427,552.1	6,435.9	2,500.3	1,080.9	612.4	3,112.8
2009-04-21	869,604.4	48.8	424,111.5	6,384.1	2,480.2	1,078.3	611.0	3,091.2
2009-04-22	871,184.5	49.0	426,875.3	6,425.7	2,496.4	1,081.7	612.9	3,109.3
2009-04-23	858,810.5	49.3	423,614.9	6,376.6	2,477.3	1,081.2	612.6	3,089.9
2009-04-24	861,793.6	49.9	430,108.9	6,474.3	2,515.3	1,080.3	612.1	3,127.4
2009-04-25	859,890.9	50.1	431,175.4	6,490.4	2,521.5	1,082.0	613.0	3,134.6
2009-04-26	842,886.1	50.2	423,027.7	6,367.8	2,473.9	1,082.6	613.4	3,087.3
2009-04-27	848,453.2	50.3	426,520.5	6,420.3	2,494.3	1,081.5	612.8	3,107.1
2009-04-28	862,860.8	50.3	433,691.9	6,528.3	2,536.2	1,081.6	612.8	3,149.1
2009-04-29	847,915.8	50.7	430,012.8	6,472.9	2,514.7	1,080.8	612.4	3,127.1
2009-04-30	849,689.4	50.6	429,564.7	6,466.2	2,512.1	1,079.8	611.8	3,123.9
2009-05-01	849,886.4	50.5	429,421.2	6,464.0	2,511.3	1,080.9	612.4	3,123.7
2009-05-02	849,838.4	50.2	426,354.5	6,417.8	2,493.3	1,080.4	612.2	3,105.5
2009-05-03	840,352.3	50.0	420,534.1	6,330.2	2,459.3	1,079.7	611.8	3,071.1
2009-05-04	851,712.3	50.0	426,275.8	6,416.6	2,492.9	1,081.1	612.6	3,105.4
2009-05-05	841,021.6	49.9	419,865.5	6,320.2	2,455.4	1,080.5	612.2	3,067.6
2009-05-06	852,123.1	50.1	427,101.2	6,429.1	2,497.7	1,076.6	610.0	3,107.7
2009-05-07	859,453.3	49.9	429,169.6	6,460.2	2,509.8	1,076.7	610.1	3,119.9
2009-05-08	864,755.6	50.0	432,344.2	6,508.0	2,528.4	1,073.4	608.2	3,136.6
2009-05-09	862,526.0	50.1	432,289.7	6,507.2	2,528.0	1,073.7	608.3	3,136.4
2009-05-10	869,716.3	50.0	434,526.8	6,540.8	2,541.1	1,072.6	607.7	3,148.8
2009-05-11	864,617.4	50.1	433,473.0	6,525.0	2,535.0	1,071.5	607.1	3,142.0
2009-05-12	858,082.2	50.9	436,803.2	6,575.1	2,554.4	1,071.0	606.8	3,161.3
2009-05-13	858,260.6	50.6	434,439.3	6,539.5	2,540.6	1,074.7	609.0	3,149.6
2009-05-14	859,550.7	50.5	433,718.8	6,528.7	2,536.4	1,073.8	608.4	3,144.8
2009-05-15	857,319.8	50.9	436,463.4	6,570.0	2,552.4	1,073.1	608.0	3,160.5
2009-05-16	846,309.0	51.7	437,612.8	6,587.3	2,559.2	1,073.9	608.5	3,167.6
2009-05-17	845,785.3	51.2	433,157.7	6,520.2	2,533.1	1,072.7	607.8	3,140.9
2009-05-18	845,069.3	51.6	435,829.3	6,560.5	2,548.7	1,073.3	608.1	3,156.9
2009-05-19	850,728.8	51.5	437,773.3	6,589.7	2,560.1	1,072.7	607.8	3,167.9
2009-05-20	851,860.3	51.5	438,527.9	6,601.1	2,564.5	1,071.0	606.9	3,171.4
2009-05-21	843,382.8	52.6	444,015.1	6,683.7	2,596.6	1,072.0	607.4	3,204.0
2009-05-22	837,431.8	52.5	439,714.4	6,618.9	2,571.5	1,071.3	607.0	3,178.5
2009-05-23	835,827.4	52.1	435,067.0	6,549.0	2,544.3	1,072.2	607.5	3,151.8
2009-05-24	840,407.6	52.0	436,676.9	6,573.2	2,553.7	1,072.3	607.6	3,161.3
2009-05-25	836,315.5	52.3	437,140.7	6,580.2	2,556.4	1,070.5	606.6	3,163.0
2009-05-26	833,529.0	52.2	435,398.6	6,554.0	2,546.2	1,070.8	606.7	3,152.9
2009-05-27	838,425.0	52.0	436,390.4	6,568.9	2,552.0	1,071.6	607.2	3,159.2
2009-05-28	810,761.3	50.7	410,780.5	6,183.4	2,402.2	1,018.9	577.3	2,979.6
2009-05-29	847,503.3	51.3	434,447.4	6,539.6	2,540.7	1,074.4	608.8	3,149.4
2009-05-30	851,423.9	51.0	434,580.3	6,541.6	2,541.4	1,075.0	609.1	3,150.5
2009-05-31	639,421.0	50.8	324,704.4	4,887.7	1,898.9	467.4	264.8	2,163.7
2009-06-01	571,719.7	50.6	289,546.5	4,358.5	1,693.3	-31.5	-17.8	1,675.4
2009-06-02	406,942.5	49.0	199,431.6	3,002.0	1,166.3	-20.4	-11.6	1,154.7
2009-06-03	597,083.1	50.4	300,987.6	4,530.7	1,760.2	-18.2	-10.3	1,749.8
2009-06-04	614,528.9	50.1	308,147.1	4,638.5	1,802.0	-9.6	-5.5	1,796.6
2009-06-05	612,913.0	50.0	306,164.3	4,608.6	1,790.5	-9.3	-5.3	1,785.2
2009-06-06	610,629.7	49.7	303,547.2	4,569.2	1,775.1	-7.4	-4.2	1,771.0
2009-06-07	605,157.4	49.5	299,303.5	4,505.4	1,750.3	0.0	0.0	1,750.3
2009-06-08	603,311.1	49.8	300,201.2	4,518.9	1,755.6	-21.5	-12.2	1,743.4
2009-06-09	601,928.5	49.2	295,982.1	4,455.4	1,730.9	-9.6	-5.5	1,725.4
2009-06-10	607,373.6	49.6	301,128.1	4,532.8	1,761.0	-9.6	-5.4	1,755.6
2009-06-11	602,747.7	49.2	296,543.1	4,463.8	1,734.2	-9.5	-5.4	1,728.8
2009-06-12	601,618.8	49.3	296,472.6	4,462.7	1,733.8	-9.6	-5.4	1,728.4
2009-06-13	380,492.9	49.8	189,651.4	2,854.8	1,109.1	-11.0	-6.2	1,102.9



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2009-06-14	559,223.2	50.4	281,824.9	4,242.3	1,648.1	-25.4	-14.4	1,633.7
2009-06-15	560,332.6	49.9	279,547.0	4,208.0	1,634.8	-27.5	-15.6	1,619.2
2009-06-16	546,413.0	49.9	272,602.9	4,103.4	1,594.2	-31.4	-17.8	1,576.4
2009-06-17	585,730.6	50.5	296,053.3	4,456.4	1,731.3	-14.6	-8.3	1,723.0
2009-06-18	644,635.6	50.2	323,820.7	4,874.4	1,893.7	443.4	251.2	2,144.9
2009-06-19	708,788.3	49.5	351,202.4	5,286.6	2,053.8	1,076.5	609.9	2,663.8
2009-06-20	700,510.6	49.6	347,476.2	5,230.5	2,032.0	1,076.2	609.8	2,641.8
2009-06-21	698,534.5	50.2	350,730.4	5,279.5	2,051.1	1,076.8	610.1	2,661.2
2009-06-22	700,982.3	49.9	349,626.7	5,262.9	2,044.6	1,077.6	610.6	2,655.2
2009-06-23	703,691.5	49.8	350,380.9	5,274.2	2,049.0	1,077.2	610.4	2,659.4
2009-06-24	698,229.0	49.5	345,415.5	5,199.5	2,020.0	1,076.2	609.8	2,629.8
2009-06-25	702,401.4	49.6	348,568.1	5,246.9	2,038.4	1,077.0	610.2	2,648.6
2009-06-26	703,406.2	49.7	349,686.2	5,263.8	2,045.0	1,075.5	609.4	2,654.4
2009-06-27	705,068.4	49.8	351,223.4	5,286.9	2,054.0	1,075.8	609.5	2,663.5
2009-06-28	705,794.7	49.7	350,645.5	5,278.2	2,050.6	1,076.3	609.8	2,660.4
2009-06-29	711,055.7	49.4	350,922.2	5,282.4	2,052.2	1,076.2	609.8	2,662.0
2009-06-30	712,883.0	49.0	349,259.8	5,257.3	2,042.5	991.7	561.9	2,604.3
2009-07-01	719,936.5	49.5	356,315.8	5,363.6	2,083.7	1,074.8	609.0	2,692.7
2009-07-02	725,366.6	49.5	358,825.8	5,401.3	2,098.4	1,076.1	609.7	2,708.1
2009-07-03	721,890.2	49.7	358,907.8	5,402.6	2,098.9	1,076.6	610.0	2,708.9
2009-07-04	724,376.6	49.9	361,440.7	5,440.7	2,113.7	1,076.5	609.9	2,723.6
2009-07-05	727,073.8	49.7	361,420.9	5,440.4	2,113.6	1,076.1	609.7	2,723.3
2009-07-06	729,138.6	49.8	362,925.8	5,463.0	2,122.4	1,075.4	609.3	2,731.7
2009-07-07	730,202.6	49.4	360,471.0	5,426.1	2,108.0	1,075.8	609.5	2,717.6
2009-07-08	732,525.1	49.2	360,427.9	5,425.4	2,107.8	1,075.7	609.5	2,717.3
2009-07-09	722,307.1	49.8	359,885.2	5,417.3	2,104.6	1,076.0	609.6	2,714.3
2009-07-10	713,919.9	49.9	356,349.5	5,364.1	2,083.9	1,078.2	610.9	2,694.8
2009-07-11	700,772.8	49.7	348,391.7	5,244.3	2,037.4	1,079.5	611.6	2,649.0
2009-07-12	692,949.3	50.4	349,535.6	5,261.5	2,044.1	1,079.9	611.9	2,656.0
2009-07-13	691,217.3	50.3	347,815.2	5,235.6	2,034.0	1,064.8	603.3	2,637.3
2009-07-14	686,423.9	51.2	351,790.9	5,295.4	2,057.3	1,076.3	609.8	2,667.1
2009-07-15	681,352.3	51.2	349,152.2	5,255.7	2,041.8	1,077.0	610.2	2,652.0
2009-07-16	663,997.5	52.6	349,136.7	5,255.5	2,041.8	1,076.7	610.1	2,651.8
2009-07-17	685,393.2	52.3	358,279.6	5,393.1	2,095.2	1,076.5	609.9	2,705.2
2009-07-18	685,012.2	52.6	359,988.9	5,418.8	2,105.2	1,077.3	610.4	2,715.6
2009-07-19	684,725.3	52.5	359,584.5	5,412.8	2,102.9	1,077.4	610.4	2,713.3
2009-07-20	684,898.1	52.5	359,587.3	5,412.8	2,102.9	1,076.9	610.2	2,713.1
2009-07-21	685,779.8	52.2	358,296.1	5,393.4	2,095.3	1,077.5	610.5	2,705.8
2009-07-22	689,155.7	52.0	358,254.2	5,392.7	2,095.1	1,077.7	610.6	2,705.7
2009-07-23	690,347.3	51.9	358,601.1	5,397.9	2,097.1	1,077.6	610.6	2,707.7
2009-07-24	690,973.5	52.3	361,225.9	5,437.5	2,112.5	1,077.6	610.5	2,723.0
2009-07-25	690,031.0	52.7	363,402.7	5,470.2	2,125.2	1,079.4	611.6	2,736.8
2009-07-26	690,537.5	52.6	363,308.8	5,468.8	2,124.6	1,077.0	610.2	2,734.9
2009-07-27	688,507.9	52.5	361,274.2	5,438.2	2,112.7	1,077.0	610.2	2,723.0
2009-07-28	676,815.6	52.2	353,338.8	5,318.7	2,066.3	1,077.6	610.6	2,676.9
2009-07-29	675,471.5	51.7	349,525.2	5,261.3	2,044.0	1,077.1	610.3	2,654.3
2009-07-30	684,401.6	51.8	354,713.5	5,339.4	2,074.4	1,076.8	610.1	2,684.5
2009-07-31	697,184.8	51.7	360,349.9	5,424.3	2,107.3	1,076.2	609.8	2,717.1
2009-08-01	700,610.2	51.4	360,069.4	5,420.1	2,105.7	1,077.1	610.3	2,716.0
2009-08-02	702,368.6	51.1	358,993.0	5,403.9	2,099.4	1,077.5	610.5	2,709.9
2009-08-03	704,082.6	51.1	359,472.5	5,411.1	2,102.2	1,076.7	610.0	2,712.2
2009-08-04	365,561.1	51.5	188,292.5	2,834.3	1,101.1	108.5	61.5	1,162.6
2009-08-05	547,773.4	52.8	289,209.5	4,353.4	1,691.3	408.1	231.3	1,922.6
2009-08-06	574,342.6	52.9	303,547.7	4,569.2	1,775.2	465.6	263.8	2,039.0
2009-08-07	565,309.7	53.1	299,960.9	4,515.3	1,754.2	464.4	263.2	2,017.3



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Date	LFG _{selected} (Nm ³ /day)	W _{CH4} weighted (%)	CH ₄ combusted (Nm ³ /day)	BE from CH ₄ combusted (tCO ₂)	AF adjusted BE (tCO ₂)	Net elec. Generation (MWh)	BE from generation (tCO ₂)	Total BE (tCO ₂)
2009-08-08	552,968.4	52.5	290,320.8	4,370.1	1,697.8	530.9	300.8	1,998.6
2009-08-09	700,492.7	51.9	363,618.2	5,473.5	2,126.4	1,076.9	610.2	2,736.6
2009-08-10	703,018.6	51.2	360,158.7	5,421.4	2,106.2	1,077.0	610.2	2,716.5
2009-08-11	700,779.2	51.4	359,989.4	5,418.8	2,105.2	1,077.1	610.3	2,715.5
2009-08-12	699,044.9	52.1	363,858.7	5,477.1	2,127.9	1,076.8	610.1	2,738.0
2009-08-13	694,997.5	52.0	361,052.2	5,434.8	2,111.4	1,077.0	610.2	2,721.6
2009-08-14	691,589.3	52.3	361,644.3	5,443.8	2,114.9	1,076.9	610.2	2,725.1
2009-08-15	693,259.0	51.9	359,838.0	5,416.6	2,104.3	1,077.2	610.3	2,714.7
2009-08-16	693,264.3	51.7	358,415.1	5,395.2	2,096.0	1,077.0	610.3	2,706.3
2009-08-17	691,634.8	51.6	356,997.6	5,373.8	2,087.7	1,076.2	609.8	2,697.5
2009-08-18	693,659.2	51.8	359,166.1	5,406.5	2,100.4	1,076.0	609.6	2,710.0
2009-08-19	694,285.7	52.0	361,113.5	5,435.8	2,111.8	1,076.3	609.8	2,721.6
2009-08-20	697,302.3	51.5	359,111.2	5,405.6	2,100.1	1,075.7	609.5	2,709.6
2009-08-21	696,880.9	51.2	356,821.4	5,371.2	2,086.7	1,075.6	609.5	2,696.1
2009-08-22	697,774.8	51.6	360,332.5	5,424.0	2,107.2	1,076.3	609.8	2,717.1
2009-08-23	699,115.9	51.2	358,107.3	5,390.5	2,094.2	1,076.2	609.8	2,704.0
2009-08-24	699,329.9	50.9	356,178.9	5,361.5	2,082.9	1,075.5	609.4	2,692.3
2009-08-25	699,863.5	51.0	356,598.6	5,367.8	2,085.4	1,084.6	614.5	2,699.9
2009-08-26	702,472.4	50.9	357,486.3	5,381.2	2,090.6	1,066.4	604.3	2,694.8
2009-08-27	703,098.8	50.9	357,974.4	5,388.5	2,093.4	1,075.7	609.5	2,702.9
2009-08-28	476,710.1	47.7	227,623.1	3,426.4	1,331.1	739.5	419.0	1,750.1
2009-08-29	664,662.8	52.2	346,822.9	5,220.7	2,028.2	1,076.8	610.1	2,638.3
2009-08-30	665,116.4	51.8	344,652.1	5,188.0	2,015.5	1,076.1	609.7	2,625.3
2009-08-31	664,561.5	51.6	343,194.9	5,166.0	2,007.0	1,042.2	590.5	2,597.5
2009-09-01	663,056.7	51.7	342,989.3	5,162.9	2,005.8	1,075.4	609.3	2,615.1
2009-09-02	661,272.3	52.1	344,474.4	5,185.3	2,014.5	1,076.4	609.9	2,624.4
2009-09-03	657,950.1	52.5	345,333.0	5,198.2	2,019.5	1,076.1	609.7	2,629.2
2009-09-04	658,261.6	52.5	345,342.8	5,198.4	2,019.6	1,075.9	609.6	2,629.2
2009-09-05	662,697.0	52.5	347,671.7	5,233.4	2,033.2	1,075.0	609.1	2,642.3
2009-09-06	665,182.1	52.3	348,056.4	5,239.2	2,035.4	1,074.9	609.0	2,644.5
2009-09-07	665,403.0	52.0	346,093.9	5,209.7	2,024.0	1,074.3	608.7	2,632.7
2009-09-08	665,092.4	51.8	344,627.9	5,187.6	2,015.4	1,075.6	609.4	2,624.8
2009-09-09	668,162.3	51.4	343,461.1	5,170.1	2,008.6	1,077.5	610.5	2,619.1
2009-09-10	669,618.5	51.3	343,566.0	5,171.6	2,009.2	1,078.0	610.8	2,620.0
2009-09-11	674,455.3	51.4	346,939.6	5,222.4	2,028.9	1,077.6	610.6	2,639.5
2009-09-12	686,910.1	51.7	355,249.7	5,347.5	2,077.5	1,077.8	610.7	2,688.2
2009-09-13	688,293.2	51.7	355,633.1	5,353.3	2,079.7	1,086.1	615.4	2,695.1
2009-09-14	685,777.3	51.7	354,468.3	5,335.7	2,072.9	1,069.0	605.7	2,678.6
2009-09-15	685,934.4	51.6	353,725.1	5,324.6	2,068.6	1,077.4	610.4	2,679.0
2009-09-16	685,975.0	51.5	353,096.6	5,315.1	2,064.9	1,076.9	610.1	2,675.1
2009-09-17	688,257.0	51.4	353,561.4	5,322.1	2,067.6	1,080.9	612.5	2,680.1
2009-09-18	689,724.0	51.3	353,785.9	5,325.5	2,068.9	1,072.0	607.4	2,676.3
2009-09-19	688,791.2	51.3	353,571.6	5,322.2	2,067.7	1,078.9	611.3	2,679.0
2009-09-20	689,781.8	51.2	353,203.2	5,316.7	2,065.5	1,077.6	610.6	2,676.1
2009-09-21	689,667.0	51.3	353,719.8	5,324.5	2,068.6	1,075.7	609.5	2,678.1
2009-09-22	687,641.3	51.5	354,083.8	5,330.0	2,070.7	1,078.6	611.1	2,681.8
2009-09-23	686,650.9	51.3	352,573.3	5,307.2	2,061.9	1,081.2	612.6	2,674.5
2009-09-24	684,732.9	51.8	354,759.5	5,340.1	2,074.6	1,077.5	610.5	2,685.1
2009-09-25	683,971.7	52.1	356,610.3	5,368.0	2,085.5	1,079.4	611.6	2,697.0
2009-09-26	668,386.8	52.4	350,289.2	5,272.8	2,048.5	1,077.8	610.7	2,659.2
2009-09-27	661,510.6	52.6	347,786.6	5,235.2	2,033.9	1,077.8	610.7	2,644.5
2009-09-28	669,071.5	52.5	351,081.1	5,284.8	2,053.1	1,084.5	614.5	2,667.6
2009-09-29	683,739.9	52.0	355,643.5	5,353.4	2,079.8	1,085.6	615.1	2,694.9
2009-09-30	687,394.6	51.8	356,263.7	5,362.8	2,083.4	1,084.7	614.6	2,698.0
2009-10-01	688,142.9	51.7	356,103.5	5,360.4	2,082.5	1,086.1	615.4	2,697.9



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Date	LFG _{selected} (Nm ³ /day)	W _{CH4} weighted (%)	CH ₄ combusted (Nm ³ /day)	BE from CH ₄ combusted (tCO ₂)	AF adjusted BE (tCO ₂)	Net elec. Generation (MWh)	BE from generation (tCO ₂)	Total BE (tCO ₂)
2009-10-02	691,700.2	51.1	353,124.0	5,315.5	2,065.1	1,088.4	616.7	2,681.8
2009-10-03	694,698.3	50.5	350,566.0	5,277.0	2,050.1	1,089.9	617.5	2,667.6
2009-10-04	696,981.9	50.5	351,714.6	5,294.3	2,056.8	1,089.4	617.3	2,674.1
2009-10-05	699,391.0	50.6	353,854.3	5,326.5	2,069.3	1,088.6	616.8	2,686.1
2009-10-06	701,299.8	50.1	351,375.9	5,289.2	2,054.9	1,001.7	567.6	2,622.4
2009-10-07	694,281.4	49.7	344,967.3	5,192.7	2,017.4	1,079.3	611.5	2,628.9
2009-10-08	708,779.3	49.5	350,564.8	5,277.0	2,050.1	1,080.2	612.1	2,662.2
2009-10-09	716,189.5	48.7	348,605.9	5,247.5	2,038.7	1,079.8	611.8	2,650.5
2009-10-10	715,989.7	48.2	344,910.7	5,191.9	2,017.0	1,079.5	611.7	2,628.7
2009-10-11	725,170.4	47.9	347,225.1	5,226.7	2,030.6	1,079.8	611.8	2,642.4
2009-10-12	709,338.2	48.0	340,573.9	5,126.6	1,991.7	1,077.0	610.2	2,601.9
2009-10-13	715,536.2	48.1	344,360.9	5,183.6	2,013.8	1,081.4	612.7	2,626.6
2009-10-14	704,117.8	48.4	340,445.6	5,124.7	1,990.9	1,079.1	611.4	2,602.4
2009-10-15	711,717.1	48.2	343,209.7	5,166.3	2,007.1	1,079.0	611.4	2,618.5
2009-10-16	714,724.4	48.6	347,388.8	5,229.2	2,031.5	1,079.0	611.4	2,642.9
2009-10-17	711,575.1	48.9	347,727.4	5,234.3	2,033.5	1,079.3	611.5	2,645.0
2009-10-18	699,508.9	48.9	341,964.3	5,147.5	1,999.8	1,081.4	612.7	2,612.5
2009-10-19	715,049.9	48.5	346,803.5	5,220.4	2,028.1	1,085.6	615.1	2,643.2
2009-10-20	710,762.9	49.0	348,001.1	5,238.4	2,035.1	1,076.8	610.1	2,645.2
2009-10-21	716,733.8	49.1	352,267.0	5,302.6	2,060.1	1,079.7	611.8	2,671.8
2009-10-22	715,960.3	49.3	352,741.2	5,309.7	2,062.8	1,080.1	612.0	2,674.8
2009-10-23	718,622.2	49.2	353,286.9	5,318.0	2,066.0	1,078.9	611.3	2,677.3
2009-10-24	714,339.8	50.3	359,605.8	5,413.1	2,103.0	1,079.1	611.4	2,714.4
2009-10-25	535,028.4	51.8	277,292.7	4,174.0	1,621.6	378.1	214.2	1,835.8
2009-10-26	520,353.3	52.6	273,651.0	4,119.2	1,600.3	-30.4	-17.2	1,583.1
2009-10-27	435,349.7	50.0	217,632.4	3,276.0	1,272.7	-23.2	-13.1	1,259.6
2009-10-28	534,887.5	50.7	271,320.6	4,084.1	1,586.7	-23.2	-13.2	1,573.5
2009-10-29	546,622.8	50.7	277,101.2	4,171.1	1,620.5	-25.2	-14.3	1,606.2
2009-10-30	597,209.2	50.9	304,236.3	4,579.6	1,779.2	200.9	113.8	1,893.0
2009-10-31	690,589.4	50.9	351,371.2	5,289.1	2,054.8	1,061.0	601.1	2,656.0
2009-11-01	688,493.9	50.7	348,787.1	5,250.2	2,039.7	1,080.0	611.9	2,651.6
2009-11-02	698,969.3	50.1	350,530.4	5,276.5	2,049.9	1,078.8	611.2	2,661.1
2009-11-03	696,838.3	50.5	352,012.7	5,298.8	2,058.6	1,078.8	611.2	2,669.8
2009-11-04	696,944.9	50.6	352,570.0	5,307.2	2,061.8	1,077.8	610.7	2,672.5
2009-11-05	697,952.8	50.1	349,944.9	5,267.7	2,046.5	1,077.6	610.6	2,657.0
2009-11-06	698,988.4	50.1	350,147.9	5,270.7	2,047.7	1,077.1	610.3	2,658.0
2009-11-07	701,501.8	49.5	347,541.8	5,231.5	2,032.4	1,076.7	610.1	2,642.5
2009-11-08	699,732.3	50.1	350,433.2	5,275.0	2,049.3	1,076.1	609.7	2,659.1
2009-11-09	689,314.2	50.2	346,007.3	5,208.4	2,023.5	1,076.7	610.1	2,633.5
2009-11-10	697,250.2	50.0	348,787.1	5,250.2	2,039.7	1,077.8	610.7	2,650.4
2009-11-11	696,566.6	50.1	348,690.6	5,248.8	2,039.1	1,078.1	610.9	2,650.0
2009-11-12	696,295.1	50.2	349,301.0	5,258.0	2,042.7	1,078.9	611.3	2,654.0
2009-11-13	700,338.4	50.4	352,963.4	5,313.1	2,064.1	1,080.1	612.0	2,676.1
2009-11-14	602,766.2	51.1	307,757.7	4,632.6	1,799.8	945.5	535.7	2,335.5
2009-11-15	691,535.5	50.2	347,167.4	5,225.8	2,030.2	1,077.2	610.3	2,640.6
2009-11-16	681,930.1	49.9	340,171.1	5,120.5	1,989.3	1,080.9	612.4	2,601.7
2009-11-17	694,760.1	50.0	347,418.2	5,229.6	2,031.7	1,077.6	610.6	2,642.3
2009-11-18	701,515.8	49.4	346,495.9	5,215.7	2,026.3	1,079.4	611.6	2,637.9
2009-11-19	696,032.5	49.3	343,406.0	5,169.2	2,008.2	1,079.0	611.4	2,619.6
2009-11-20	705,793.1	48.3	340,978.7	5,132.7	1,994.0	1,079.0	611.3	2,605.4
2009-11-21	704,598.9	47.6	335,177.4	5,045.4	1,960.1	1,079.4	611.6	2,571.7
2009-11-22	715,008.4	47.6	340,562.1	5,126.4	1,991.6	1,079.7	611.8	2,603.4
2009-11-23	714,252.6	47.7	340,626.6	5,127.4	1,992.0	1,079.2	611.5	2,603.5
2009-11-24	712,991.4	47.9	341,601.8	5,142.1	1,997.7	1,081.0	612.5	2,610.2
2009-11-25	712,982.1	48.6	346,685.2	5,218.6	2,027.4	1,079.4	611.6	2,639.0



Date	LFG _{selected} (Nm ³ /day)	W _{CH4} weighted (%)	CH ₄ combusted (Nm ³ /day)	BE from CH ₄ combusted (tCO ₂)	AF adjusted BE (tCO ₂)	Net elec. Generation (MWh)	BE from generation (tCO ₂)	Total BE (tCO ₂)
2009-11-26	705,708.2	49.0	345,826.8	5,205.7	2,022.4	1,077.2	610.4	2,632.8
2009-11-27	701,379.3	49.3	345,782.6	5,205.0	2,022.1	1,078.9	611.3	2,633.5
2009-11-28	697,191.1	49.1	342,435.2	5,154.6	2,002.6	1,079.3	611.5	2,614.1
2009-11-29	706,911.8	49.0	346,391.1	5,214.2	2,025.7	1,079.6	611.7	2,637.4
2009-11-30	698,968.4	48.9	341,711.9	5,143.7	1,998.3	1,078.9	611.3	2,609.6
2009-12-01	698,809.4	50.1	349,888.3	5,266.8	2,046.2	1,078.9	611.3	2,657.5
2009-12-02	706,223.6	50.0	352,895.9	5,312.1	2,063.7	1,079.1	611.4	2,675.1
2009-12-03	705,344.6	49.8	351,021.5	5,283.9	2,052.8	1,079.2	611.5	2,664.3
2009-12-04	705,502.5	49.8	351,326.8	5,288.5	2,054.6	1,079.4	611.6	2,666.2
2009-12-05	705,402.4	48.9	345,063.2	5,194.2	2,017.9	1,079.6	611.7	2,629.6
2009-12-06	703,129.3	48.9	343,610.0	5,172.3	2,009.4	1,079.4	611.6	2,621.0
2009-12-07	710,187.0	48.7	345,613.1	5,202.4	2,021.2	1,078.7	611.2	2,632.3
2009-12-08	713,540.8	48.7	347,848.4	5,236.1	2,034.2	1,078.2	610.9	2,645.1
2009-12-09	705,186.5	48.7	343,374.2	5,168.7	2,008.1	1,079.0	611.4	2,619.4
2009-12-10	708,334.8	48.9	346,727.1	5,219.2	2,027.7	1,079.2	611.5	2,639.1
2009-12-11	700,063.0	49.1	343,872.3	5,176.2	2,011.0	1,079.4	611.6	2,622.6
2009-12-12	703,323.9	49.0	344,916.6	5,192.0	2,017.1	1,079.4	611.6	2,628.6
2009-12-13	701,587.5	48.9	342,739.8	5,159.2	2,004.3	1,079.6	611.7	2,616.0
2009-12-14	703,738.1	48.8	343,426.5	5,169.5	2,008.4	1,078.8	611.2	2,619.6
2009-12-15	696,945.8	46.1	321,619.0	4,841.3	1,880.8	1,079.1	611.4	2,492.2
2009-12-16	651,117.7	44.9	292,189.1	4,398.3	1,708.7	1,024.1	580.3	2,289.0
2009-12-17	675,105.4	44.5	300,140.6	4,518.0	1,755.2	1,034.7	586.3	2,341.5
2009-12-18	696,464.7	43.8	304,993.5	4,591.0	1,783.6	1,077.7	610.6	2,394.2
2009-12-19	694,443.5	43.7	303,529.7	4,569.0	1,775.0	1,078.7	611.2	2,386.2
2009-12-20	733,512.9	43.1	316,327.5	4,761.6	1,849.9	1,078.9	611.3	2,461.2
2009-12-21	709,615.1	43.9	311,184.5	4,684.2	1,819.8	1,078.2	610.9	2,430.7
2009-12-22	719,992.6	45.6	328,542.2	4,945.5	1,921.3	1,078.4	611.0	2,532.3
2009-12-23	688,667.0	46.1	317,343.8	4,776.9	1,855.8	1,078.2	610.9	2,466.8
2009-12-24	670,675.8	48.1	322,611.2	4,856.2	1,886.6	1,078.1	610.9	2,497.5
2009-12-25	692,268.7	48.5	335,912.3	5,056.4	1,964.4	1,071.1	606.9	2,571.3
2009-12-26	670,381.1	43.1	288,822.5	4,347.6	1,689.0	1,077.4	610.5	2,299.5
2009-12-27	666,967.4	43.4	289,297.1	4,354.7	1,691.8	1,078.0	610.8	2,302.6
2009-12-28	668,274.7	44.5	297,103.8	4,472.2	1,737.5	1,077.5	610.5	2,348.0
2009-12-29	690,430.0	45.0	310,415.3	4,672.6	1,815.3	1,077.5	610.5	2,425.8
2009-12-30	694,000.3	48.0	333,323.7	5,017.5	1,949.3	1,077.7	610.6	2,559.9
2009-12-31	674,163.9	44.0	296,913.0	4,469.4	1,736.4	1,076.6	610.0	2,346.3

* Above results are only for baseline emissions calculation. BE_{9.88MW} & PE_{LPG} are separately calculated.

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
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