



**Monitoring report form for CDM project activity
(Version 06.0)**

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT

Title of the project activity	Sudokwon Landfill Gas Electricity Generation Project (50MW)	
UNFCCC reference number of the project activity	0941	
Version number of the PDD applicable to this monitoring report	8.0	
Version number of this monitoring report	1.0	
Completion date of this monitoring report	19/03/2018	
Monitoring period number	12 th monitoring period	
Duration of this monitoring period	01/07/2016 – 29/04/2017	
Monitoring report number for this monitoring report	-	
Project participants	Sudokwon Landfill Site Management Corporation (SLC) - DASCO Partners LLP - Ecoeye Co.,Ltd.	
Host Party	Republic of Korea	
Sectoral scopes	1, 13	
Applied methodologies and standardized baselines	<ul style="list-style-type: none"> • ACM0001 "Consolidated baseline methodology for landfill gas project activities" (Version 04) and, • ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 06) 	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	-	648,700
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	677,939	

SECTION A. Description of project activity

A.1. General description of 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 25 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 capture efficiency of LFG and utilizing it as a fuel of 50MW power plant.

For enhancing capture 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, renewable energy generation facility (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.

Ecoenergy, operator of 50MW power plant, planned to install the desulfurization system in 2010, due to government policy¹ which is regulation of total emission on SOx. The desulfurization construction has begun in 2011 and it is operated on 08 October 2014. And additional desulfurization system has begun to be constructed in 2015, due to H₂S concentration of LFG was continuously increased. It is expected to be in operation in 2017

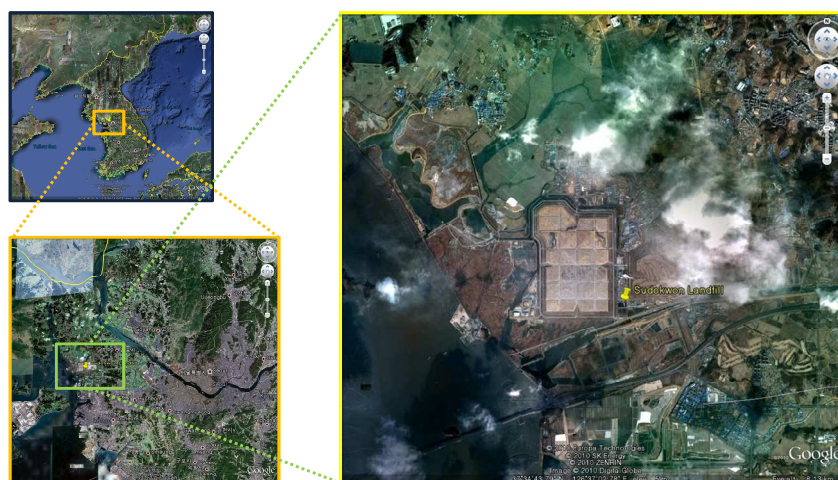
This is the 12th monitoring period covering 10 months from 01/07/2016 to 29/04/2017 (303 days) and monitored emission reductions are 648,700 tCO₂e.

A.2. Location of project activity

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#61 Geowol-Ro, Seo Gu, Incheon, Republic of Korea

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



¹ Enforcement ordinance of Special Act on Seoul Metropolitan Air Quality Improvement (No. 236, enforced as of 1 July. 2007)

Figure 1 Location of the project activity (SLC)

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Korea (host)	Public entity Sudokwon Landfill Site Management Corporation (SLC)	No
United Kingdom of Great Britain and Northern Ireland	Private entity DASCO Partners LLP	No
Switzerland	Private entity Ecoeye Co.,Ltd. ²	No

A.4. Reference to applied methodologies and standardized baselines

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ACM0001 “Consolidated baseline methodology for landfill gas project activities” (Version 04)

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_TX29WGSXE4781NKGQGCDPTHM2F3V3D

ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 06)

http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763
A.5. Crediting period type and duration

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

SECTION B. Implementation of project activity**B.1. Description of implemented 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 2. 2nd landfill site and 50MW LFG power plant

² Ecoeye Co.,Ltd. has joined as a project participant from 01/12/2014.

As part of the enhancement (or expansion) of the LFG collection system, thorough inspection of LFG transferring pipes which installed in the midst of 2nd landfill were made. After the inspection, most of transferring pipes were re-installed at the top of 2nd landfill, intensively.
Detailed enhancement works are as follows;

Table 1 Detailed enhancement of LFG collection system

	Total	1 st site				2 nd site			
		Level 2	Level 4	Level 6	Level 8	Area 1		Area 2	
						Level 1	Level 3	Level 1	Level 3
Transferring pipe	35.0km	6.4km	6.2km	6.0km	-	3.1km	4.5km	3.6km	5.0km
Collection pipe (horizontal)	87ea	-	-	24ea	24ea	39ea	-		
Collection pipe (vertical)	1,088ea	-	2ea	2ea	385ea	-	326ea		373ea
Gas distribution pipes	75ea	-	-	31ea		-	20ea		24ea
Blowers	11sets	100HP×4set, 170HP×2set, 250HP×5set							

※ Current LFG collection system will be used until 2018, the expected reclamation lifetime of 2nd landfill



Figure 3 Installation of check point and additional LFG transferring pipes (exposure type)

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

Table 2 Operational events of 50MW power plant

Date	Duration	Operation events	Note
28/08/2016	146 hours	Due to the periodic maintenance of 50MW power plant, it was stopped	
08/09/2016	8 hours	Due to the lightening damage, 50MW power plant was stopped	
06/11/2016	13 hours	Due to the maintenance of power substation, generation quantity of 50MW power plant was controlled (36MW→19MW→21MW→36MW) *2nd LFG capturing facility and 50MW power plant were operated	
12/11/2016	11 hours	Due to the maintenance of power substation, generation quantity of 50MW power plant was controlled (36MW→19MW→21MW→36MW) *2nd LFG capturing facility and 50MW power plant were operated	
27/11/2016	154 hours	Due to the periodic maintenance of 50MW power plant, it was stopped	
02/12/2016	2 hours	Due to the maintenance of 50MW power plant, it was temporarily	

		operated	
26/01/2017	7 hours	Due to the technical problem by lightening damage, generation of 50MW power plant was stopped	
27/01/2017	2 hours	Due to the technical problem by lightening damage, some data were not recorded (FT-01, 02, 04, GA-01, 02, WH-05, 06, TC-01, PT-02, TT-02)	
12/02/2017	284 hours	Due to the periodic maintenance of 50MW power plant, generation quantity was controlled (35MW→8MW→31MW)	
12/03/2017	15 hours	Due to the periodic safety check by KESCO(Korea Electricity Safety Corporation), generation of 50MW power plant was stopped	
12/03/2017	9 hours	Due to the periodic safety check by KESCO(Korea Electricity Safety Corporation), some data were not recorded	
27/04/2017	11 hours	Due to the maintenance of 50MW power plant, it was stopped	

Table 3 Operational events of monitoring system and corrective actions

Date	Duration	Deviations and its reason	Corrective actions on data and its conservativeness
09/07/2016	1 hour	Due to reboot of monitoring system, some data (FT-01, FT-02, FT-04~09, GA-01, GA-02, PT-02, TT-02, TC-01~06, PT-05, TT-03) were not recorded	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach; - LFG_1st = LFG_50MW + LFG_Flare - LFG_2nd = 0 Nm³ ○ Most conservative values in entire 12th monitoring period were applied - GA-01: 36.26 % - GA-02: 42.15 % - TC-01~06: 0 °C - FT-04~09: 0 Nm³ - TT-02: 27.4 °C - PT-02: 1455 mmAq
12/07/2016	4 hours	Due to the technical problem of PLC, some data (PT-02, TT-02, GA-02) were not recorded	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15 % - TT-02: 27.4 °C - PT-02: 1455 mmAq
12/07/2016	5 hours	Due to the technical problem of PLC, the data (FT-02) was not recorded	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach; - LFG_1st = LFG_50MW + LFG_Flare - LFG_2nd = 0 Nm³ or ○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm³ - LFG_2nd = LFG_50MW + LFG_Flare
15/07/2016	1 hour	Due to the technical problem of PLC, the data (GA-02) was not recorded	<ul style="list-style-type: none"> ○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
17/07/2016	527 hours	Due to the technical problem of	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 1st landfill

		monitoring system, FT-02 recorded extraordinary value	LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach; - LFG_1st = LFG_50MW + LFG_Flare - LFG_2nd = 0 Nm ³ or ○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
29/07/2016	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
10/08/2016	156 hours	Due to the technical problem of monitoring system, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
15/08/2016	72 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value	○ Where CH ₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach; - LFG_1st = LFG_50MW + LFG_Flare - LFG_2nd = 0 Nm ³ or ○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
16/08/2016	1 hour	Due to the maintenance monitoring system, PT-02 and TT-02 recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - TT-02: 27.4 °C - PT-02: 1455 mmAq
18/08/2016	1 hour	Due to the maintenance monitoring system, PT-02 and TT-02 recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - TT-02: 27.4 °C - PT-02: 1455 mmAq
18/08/2016	2 hours	Due to the maintenance of monitoring system, GA-02 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
28/08/2016	140 hours	Due to 3rd party calibration of flow meter, FT-05 was not recorded	○ Most conservative value in entire 12th monitoring period (0 Nm ³) was applied
28/08/2016	25 hours	Due to 3rd party calibration of flow meter, FT-06 was not recorded	○ Most conservative value in entire 12th monitoring period (0 Nm ³) was applied
28/08/2016	140 hours	Due to 3rd party calibration of flow meter, FT-09 was not recorded	○ Most conservative value in entire 12th monitoring period (0 Nm ³) was applied
28/08/2016	135 hours	Due to the periodic maintenance of 50MW power plant, it was stopped	○ Where the 50MW power plant was in maintenance, (0 Nm ³) was applied

		and FT-10 recorded extraordinary value.	for LFG flow of 50MW power plant
28/08/2016	133 hours	Due to the periodic maintenance of 50MW power plant, it was stopped and GA-04 recorded extraordinary value.	○ Where the 50MW power plant was in maintenance, (0 %) was applied for LFG flow of 50MW power plant
31/08/2016	1 hour	Due to the technical problem of monitoring system, WH-06 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period(89.1 kWh) was applied
03/09/2016	1302 hours	Due to the technical problem of Gas analyser, GA-04 recorded extraordinary value and sent to manufacturer for repair.	○ Most conservative value in entire 12th monitoring period(43.5 %) was applied
08/09/2016	7 hours	Due to lightening damage of 50MW power plant and 3 rd party calibration of flow meter, FT-05 was not recorded	○ Most conservative value in entire 12th monitoring period(0 Nm ³) was applied
08/09/2016	8 hours	Due to lightening damage of 50MW power plant and 3 rd party calibration of flow meter, FT-09 was not recorded	○ Most conservative value in entire 12th monitoring period (0 Nm ³) was applied
08/09/2016	3 hours	Due to lightening damage of 50MW power plant, FT-10 and GA-04 recorded extraordinary value.	○ Where the 50MW power plant was in maintenance, (0 Nm ³) was applied for LFG flow of 50MW power and (0 %) was applied for methane fraction of LFG fed to 50MW power plant.
12/09/2016	1 hour	Due to the Zero/Span test, GA-02 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
20/09/2016	3 hour	Due to the technical problem of monitoring system, some data (FT-02, GA-02, PT-02, TT-02) were not recorded	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
21/09/2016	91 hours	Due to the technical problem of PLC, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - GA-02 : 42.15% - TT-02 : 27.4 °C - PT-02 : 1455 mmAq
21/09/2016	92 hours	Due to the technical problem of PLC, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
25/09/2016	6 hour	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative

			<p>approach;</p> <ul style="list-style-type: none"> - LFG_1st = LFG_50MW + LFG_Flare - LFG_2nd = 0 Nm³ <p>or</p> <ul style="list-style-type: none"> ○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm³ - LFG_2nd = LFG_50MW + LFG_Flare
25/09/2016	1 hour	Due to the technical problem of monitoring system, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
26/09/2016	4 hours	Due to the technical problem of PLC, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
26/09/2016	5 hours	Due to the technical problem of PLC, FT-02 recorded extraordinary value.	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm³ - LFG_2nd = LFG_50MW + LFG_Flare
26/09/2016	2 hours	Due to the technical problem of PLC, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
26/09/2016	1 hours	Due to the technical problem of PLC, FT-02 recorded extraordinary value	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm³ - LFG_2nd = LFG_50MW + LFG_Flare
26/09/2016	2 hours	Due to the technical problem of PLC, some data(GA-02, PT-02, TT-02) were not recorded.	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
26/09/2016	3 hours	Due to the technical problem of PLC, FT-02 recorded extraordinary value	<ul style="list-style-type: none"> ○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm³ - LFG_2nd = LFG_50MW + LFG_Flare
27/09/2016	62 hours	Due to the technical problem of PLC, some data(GA-02, PT-02, TT-02) were not recorded.	<ul style="list-style-type: none"> ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq

27/09/2016	63 hours	Due to the technical problem of PLC, FT-02 recorded extraordinary value	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p> <p>or</p> <p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
06/10/2016	28 hours	Due to the 3rd party calibration of flow meter, FT-10 was not recorded	<p>○ Most conservative value in entire 12th monitoring period was applied. The minimum ratio(methane input per electricity generation in 50MW) in normal operation condition is calculated as 0.240 tCH₄/MWh.</p> <p>LFG_50MW = EL_exp * 0.240 tCH₄/MWh / CH₄ density / wCH₄</p>
12/10/2016	1 hour	Due to the technical problem of monitoring system, GA-01 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
17/10/2016	1 hour	Due to the Zero/Span test of Gas analyser, GA-01 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
29/10/2016	1 hour	Due to the technical problem of monitoring system, the data (FT-01, FT-02, FT-04, GA-01, GA-02, PT-02, TT-02, TC-01, PT-05, TT-03) were not recorded	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p> <p>○ Most conservative values in entire 12th monitoring period were applied</p> <p>- GA-01: 36.26%</p> <p>- GA-02: 42.15%</p> <p>- TC-01: 0 °C</p> <p>- FT-04: 0 Nm³</p> <p>- TT-02: 27.4 °C</p> <p>- PT-02: 1455 mmAq</p>
30/10/2016	687 hours	Due to delayed calibration of TT-10, FT-10 recorded extraordinary value.	<p>○ Most conservative value in entire 12th monitoring period was applied. The minimum ratio(methane input per electricity generation in 50MW) in normal operation condition is calculated as 0.240 tCH₄/MWh.</p> <p>LFG_50MW = EL_exp * 0.240 tCH₄/MWh / CH₄ density / wCH₄</p>
31/10/2016	1 hour	Due to the Zero/Span test of Gas analyser, GA-01 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
03/11/2016	18 hours	Due to the technical problem of monitoring system, some data (GA-02, PT-02, TT-02) recorded	<p>○ Most conservative values in entire 12th monitoring period were applied</p> <p>- GA-02: 42.15%</p>

		extraordinary	- TT-02: 27.4 °C - PT-02: 1455 mmAq
03/11/2016	19 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
04/11/2016	43 hours	Due to the 3rd party calibration of temperature meter(TC-02), the data (temperature of #2 flare) recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
04/11/2016	1 hour	Due to the technical problem of monitoring system, some data (GA-02, PT-02, TT-02) recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
04/11/2016	2 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
05/11/2016	4 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
05/11/2016	5 hours	Due to the technical problem of monitoring system, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
05/11/2016	3 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
06/11/2016	6 hours	Due to the technical problem of monitoring system, some data(GA-02, PT-02, TT-02) recorded extraordinary value.	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare ○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq

06/11/2016	11 hours	Due to blackout of SLC, some data (FT-02, TT-02, PT-02, GA-02) were not recorded	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p> <p>○ Most conservative values in entire 12th monitoring period were applied</p> <p>- GA-02: 42.15%</p> <p>- TT-02: 27.4 °C</p> <p>- PT-02: 1455 mmAq</p>
06/11/2016	66 hours	Due to the technical problem of monitoring system, FT-02 recorded extraordinary value.	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p> <p>or</p> <p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
06/11/2016	65 hours	Due to the technical problem of monitoring system, GA-02 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
06/11/2016	120 hours	Due to the technical problem of temperature meter, the data (temperature of #2 flare) recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
06/11/2016	17 hours	Due to the 3rd party calibration of temperature meter(TC-03), the data (temperature of #3 flare) was not recorded.	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
07/11/2016	1 hour	Due to the Zero/Span Test of Gas analyser, GA-04 recorded extraordinary value	○ Where the 50MW power plant was in maintenance, (43.5 %) applied for LFG flow of 50MW power plant
08/11/2016	72 hours	Due to the technical problem of Gas analyser, GA-01 was not recorded	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
12/11/2016	9 hours	Due to blackout of SLC, some data (TT-02, GA-02) were not recorded	<p>○ Most conservative values in entire 12th monitoring period were applied</p> <p>- GA-02: 42.15%</p> <p>- TT-02: 27.4 °C</p>
12/11/2016	11 hours	Due to blackout of SLC, PT-02 not recorded	○ Most conservative value in entire 12th monitoring period (1,455 mmAq) was applied
12/11/2016	10 hours	Due to blackout of SLC, FT-02 did not recorded	<p>○ In this period, 2nd landfill collection facility & 50MW power plant were only operated.</p> <p>- LFG_1st = LFG_Flare = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW</p>
17/11/2016	7 hours	Due to the maintenance of Gas analyser, GA-01 recorded	○ Most conservative value in entire 12th monitoring period (36.26 %) was

		extraordinary value	applied
21/11/2016	1 hour	Due to the Zero/Span test of Gas analyser, GA-01 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
25/11/2016	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
27/11/2016	24 hours	Due to 3rd party calibration of temperature meters, some data(TC-02, 04, 05, 06) recorded extraordinary value.	○ Most conservative values in entire 12th monitoring period were applied - TC-02,04,05,06 : 0 °C
27/11/2016	24 hours	Due to absent of temperature meter at #1 flare, the data was not recorded (TC-01 was attached to #3 flare)	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
27/11/2016	24 hours	Due to maintenance of 50MW power plant, LFG was not fed to it.	○ Where the 50MW power plant was in maintenance, (0 Nm ³) was applied for LFG flow of 50MW power plant
28/11/2016	93 hours	Due to the 3rd party calibration of temperature meter, TC-01 was not recorded	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
28/11/2016	93 hours	Due to the 3rd party calibration of pressure meter, PT-02 was not recorded	○ Most conservative value in entire 12th monitoring period (1455 mmAq) was applied
28/11/2016	94 hours	Due to the 3rd party calibration of meters, FT-02 and TT-02 were not recorded	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare ○ Most conservative value in entire 12th monitoring period (1455 mmAq) was applied
01/12/2016	3 hours	Due to the technical problem of monitoring system (WH-06), the data was not recorded	○ Most conservative value in entire 12th monitoring period(89.1 kWh) was applied
02/12/2016	14 hours	Due to maintenance of 50MW power plant, LFG was not fed to it.	○ Where the 50MW power plant was in maintenance, (0 Nm ³) applied for LFG flow of 50MW power plant
20/12/2016	2 hours	Due to the technical problem of PLC, some data (GA-02, PT-02, TT-02) were not recorded	○ Most conservative values in entire 12th monitoring period was applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
20/12/2016	3 hours	Due to the technical problem of PLC, FT-02 was not recorded	○ Where CH ₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach - LFG_1st = 0 Nm ³ - LFG_2nd = LFG_50MW + LFG_Flare
26/12/2016	1 hour	Due to the technical problem of monitoring system, some data(GA-02, PT-02, TT-02) were not recorded	○ Most conservative values in entire 12th monitoring period were applied - GA-02: 42.15% - TT-02: 27.4 °C - PT-02: 1455 mmAq
26/12/2016	2 hours	Due to the technical problem of monitoring system, FT-02 was not	○ Where CH ₄ fraction of 1st landfill LFG was lower than that of 2nd landfill

		recorded	<p>LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p> <p>or</p> <p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
27/12/2016	1 hour	Due to the technical problem of monitoring system, some data (GA-02, PT-02, TT-02) were not recorded	<p>○ Most conservative values in entire 12th monitoring period were applied</p> <p>- GA-02: 42.15%</p> <p>- TT-02: 27.4 °C</p> <p>- PT-02: 1455 mmAq</p>
27/12/2016	2 hours	Due to the technical problem of monitoring system, FT-02 was not recorded	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p>
28/12/2016	687 hours	Due to the technical problem of monitoring system, some data (FT-02, GA-02, PT-02, TT-02) were not recorded	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p> <p>or</p> <p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p> <p>○ Most conservative value in entire 12th monitoring period were applied</p> <p>- GA-02: 40.16%</p> <p>- TT-02: 27.4 °C</p> <p>- PT-02: 1455 mmAq</p>
13/01/2017	4 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
14/01/2017	5 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period,</p>

			<p>following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
15/01/2017	3 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
16/01/2017	6 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
16/01/2017	720 hours	Due to the technical problem of monitoring system, WH-06 was not recorded	○ Most conservative value in entire 12th monitoring period(89.1 kWh) was applied
17/01/2017	4 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
23/01/2017	4 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 1st landfill LFG was lower than that of 2nd landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach;</p> <p>- LFG_1st = LFG_50MW + LFG_Flare</p> <p>- LFG_2nd = 0 Nm³</p>
24/01/2017	3 hours	Due to freeze of 1st Landfill LFG pipeline, FT-01 recorded extraordinary values.	<p>○ Where CH₄ fraction of 2nd landfill LFG was lower than that of 1st landfill LFG during the monitoring period, following equation is used to calculate LFG flow in order to keep conservative approach</p> <p>- LFG_1st = 0 Nm³</p> <p>- LFG_2nd = LFG_50MW + LFG_Flare</p>
24/01/2017	515 hours	Due to the maintenance of monitoring system, WH-05 was not recorded	○ Most conservative value in entire 12th monitoring period(363.9 kWh) was applied
26/01/2017	2 hours	Due to the technical problem of transformer, 50MW power plant was stopped and LFG was not fed to it.	○Where the 50MW power plant was in maintenance, (0 Nm ³) applied for LFG flow of 50MW power plant
27/01/2017	2 hours	Due to the technical problem of transformer, WH-05 and WH-06 were not recorded.	○ Where the data of electricity consumption was not recorded due to the blackout, applied (0 kWh)
30/01/2017	6 hours	Due to the technical problem of monitoring system, the extraordinary data (GA-04) was recorded	○Where the 50MW power plant was in maintenance, (43.5 %) applied for LFG flow of 50MW power plant
31/01/2017	1 hour	Due to the technical problem of	○ Most conservative value in entire

		monitoring system, GA-01 recorded extraordinary value.	12th monitoring period (36.26 %) was applied
03/02/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
24/02/2017	2 hours	Due to the technical problem of temperature meter, TC-01 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period (0 °C) was applied
24/02/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
24/02/2017	259 hours	Due to the technical problem of monitoring system, WH-05 recorded extraordinary value.	○ Most conservative value in entire 12th monitoring period(363.9 kWh) was applied
02/03/2017	1 hour	Due to the technical problem of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied.
12/03/2017	10 hours	Due to the periodic safety check by KESCO(Korea Electricity Safety Corporation), 50MW power plant was stopped and LFG was not fed to it.	○Where the 50MW power plant was in maintenance, (0 Nm ³) was applied for LFG flow of 50MW power plant
16/03/2017	1 hour	Due to the technical problem of monitoring system, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
23/03/2017	1 hour	Due to the technical problem of monitoring system, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
31/03/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
10/04/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-01 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied.
12/04/2017	1 hour	Due to the technical problem of monitoring system, WH-05 and WH-06 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (89.1 kWh, 363.9 kWh) were applied
17/04/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-01 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (36.26 %) was applied
21/04/2017	1 hour	Due to the Zero/Span test of Gas analyser, GA-02 recorded extraordinary value	○ Most conservative value in entire 12th monitoring period (42.15 %) was applied
27/04/2017	3 hours	Due to the maintenance of 50MW power plant pipeline, 50MW power plant was stopped and LFG was not fed to it	○Where the 50MW power plant was in maintenance, (0 Nm ³) was applied for LFG flow of 50MW power plant

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

>> PRC-0941-001(It is approved by UNFCCC on 18 Sept. 2013, Applicable period for deviations : 01 Jan 2011~31 Dec 2011), <http://cdm.unfccc.int/PRCContainer/DB/prcp439586594/view>

B.2.2. Corrections

>> Not applicable

B.2.3. Changes to the start date of the crediting period

>> Not applicable

B.2.4. Inclusion of monitoring plan

>> Not applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

>> Not applicable

B.2.6. Changes to project design

>> There were three changes to the project design of a registered project activity

i) PRC-0941-002(It is approved by UNFCCC on 25 Sept. 2013)

<http://cdm.unfccc.int/PRCContainer/DB/prcp831009840/view>

ii) PRC-0941-003(It is approved by UNFCCC on 07 Feb. 2017)

<http://cdm.unfccc.int/PRCContainer/DB/prcp270171230/view>

iii) PRC-0941-004(It is approved by UNFCCC on 15 Nov. 2017)

<http://cdm.unfccc.int/PRCContainer/DB/prcp615800649/view>**SECTION C. Description of monitoring system**

>>

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 4 The control room of 50MW power plant

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. Several temperature and pressure meters were also installed in order to check the system stability and (or) to convert unit from ACM (Actual Cubic Meter) to NCM (Normal Cubic Meter).

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
FT-01	27051601	EPI	1 st landfill	Thermal mass type
FT-02	9C03490109D	Endress Hauser	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	1378	GE Panametrics	50MW power plant	Ultrasonic type
700A	28031703	EPI	Reserve meter for all EPI meters	Thermal mass type
900A	26050201	EPI	Reserve meter for all EPI meters	
FT-03	28012905	EPI	Reserve meter for all EPI meters	
TT-02	WS1025016	WISE	Temperature of LFG captured from 2 nd landfill	For system stability check and (or) unit conversion from ACM(Actual Cubic Meter) to NCM(Normal Cubic Meter), if needed
TT-10	WS1025017	WISE	Temperature of LFG which fed to 50MW power plant	
PT-02	3940244 / ATP-3200-11150308	AUTROL	Pressure of LFG captured from 2 nd landfill	
PT-10	WS1025015 / W1601066	WISE	Pressure of LFG which fed to 50MW power plant	

CH₄ fraction

The fraction of CH₄ in LFG was measured by using continuous NDIR type infrared gas analyzers (total of 3). Data were recorded every hour in electronic method. Only CH₄ is considered as GHG emission in the CDM monitoring procedure.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
GA-03(reserve)	N6E2427T	Fuji Electronics	1 st landfill	
Reserve GA	A4M0708T	Fuji Electronics	2 nd landfill	
GA-04	7MB2111-1DV81-0AA1	SIEMENS	50MW Power plant	

Electricity exported & imported

The amount of imported electricity which used for LFG capturing and flaring was recorded electronically by internal electricity surveillance system of SLC. Imported electricity for 50MW power plant was monitored by watt-hour meter which managed and monthly invoiced by 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 document
WH-05	1104001	NEOPIS	Imported electricity (2 nd landfill blower facility)	
WH-06	10JAJ073(24)	DIK	Imported electricity (LFG mgt. centre)	

Flare efficiency

Applied methodology ACM0001 (Version 04) 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.

Considering the operational condition, the content analysis of each flare's exhaust gas was conducted by 3rd party (Institute of Industrial Pollution Co. Ltd) in 29/03/2016, 19/05/2016, 01/09/2016, 13/12/2016, 10/04/2017 and 18/05/2017.

Table 4 Summary of flare exhaust gas analysis results

	Date of analysis	Result of analysis(ppm CH ₄)	FE application over 600°C
#1 Flare	19/05/2016 (at 600°C)	56.58	99.9%
	01/09/2016 (at 600°C)	33.38	
	18/05/2017 (at 600°C)	4.48	
#2 Flare	19/05/2016 (at 600°C)	23.25	99.9%
	01/09/2016 (at 600°C)	7.91	
	18/05/2017 (at 600°C)	2.91	
#3 Flare	19/05/2016 (at 600°C)	53.85	99.9%
	01/09/2016 (at 600°C)	9.99	
	18/05/2017 (at 600°C)	27.79	
#4 Flare	19/05/2016 (at 600°C)	56.37	99.9%
	01/09/2016 (at 600°C)	16.11	
	18/05/2017 (at 600°C)	8.47	
#5 Flare	19/05/2016 (at 600°C)	11.77	99.9%
	01/09/2016 (at 600°C)	8.46	
	18/05/2017 (at 600°C)	3.02	

#6 Flare	19/05/2016 (at 600°C)	23.60	99.9%
	01/09/2016 (at 600°C)	18.45	
	18/05/2017 (at 600°C)	79.00	

In ACM0001 (Version 04), FE should be calculated by analysing methane contents of the flare emissions at least on a yearly basis for enclosed flares. Considering the frequency stipulated in methodology, above FEs are appropriately applied. 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 conservative approach.

Related meters

ID	Serial Number	Manufacturer	Description	Remarks
TC-01	012902	WOO JIN	Flaring temperature of #1 flare	
TC-02	012905	WOO JIN	Flaring temperature of #2 flare	
TC-03	012908	WOO JIN	Flaring temperature of #3 flare	
TC-04	012910	WOO JIN	Flaring temperature of #4 flare	
TC-05	012912/012911	WOO JIN	Flaring temperature of #5 flare	
TC-06	012915	WOO JIN	Flaring temperature of #6 flare	

Fossil fuel usage

The purchased amount of LPG, which evidenced by invoices from 2013 to 2017, was regarded as LPG usage.

Data Management

The accumulated data from control station was analysed for the verification of this project. All required guides were stated in SLC's internal procedure. These include data handling protocol and monitoring procedure, etc.

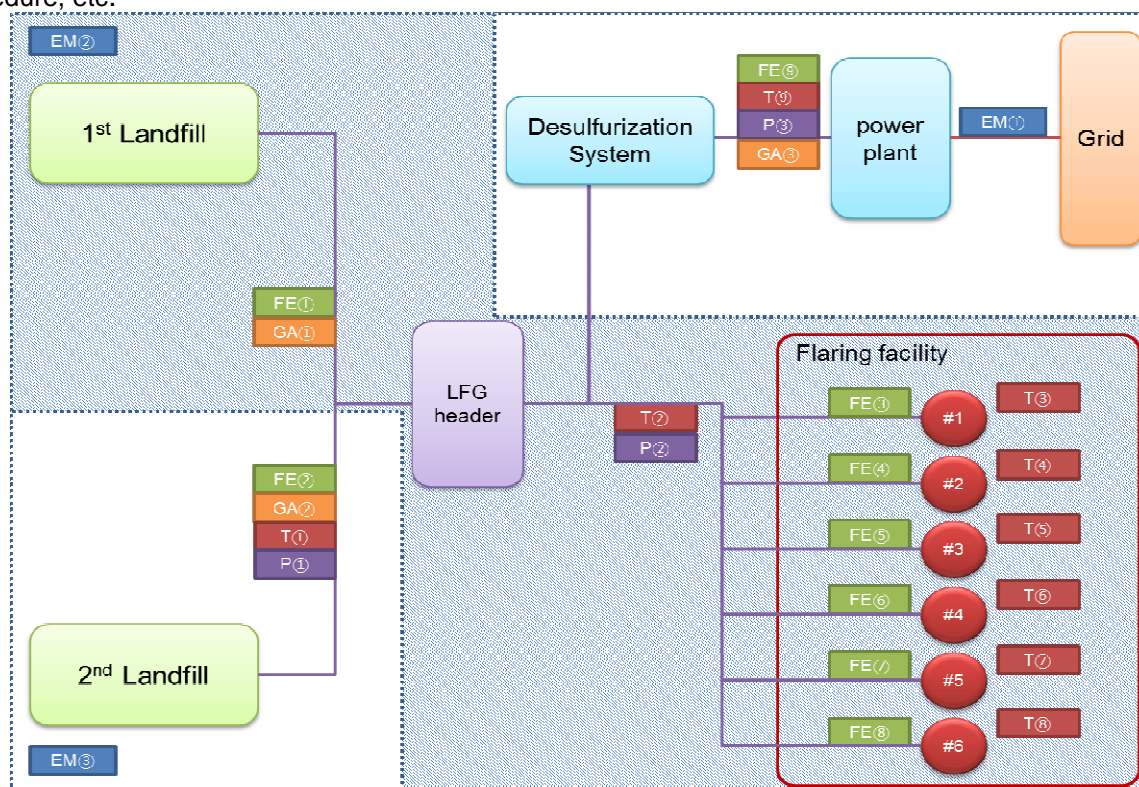


Figure 5 Line Diagram of Monitoring Points

Monitoring Point		Monitoring Equipment	Monitoring Point		Monitoring Equipment
FE	①	FT-01 or 900A	T	①	TT-02
	②	FT-02		②	TT-03
	③	FT-04 or FT-05		③	TC-01
	④	FT-05		④	TC-02
	⑤	FT-06		⑤	TC-01 or TC-03
	⑥	FT-07 or 700A		⑥	TC-04
	⑦	FT-08 or FT-09		⑦	TC-05
	⑧	FT-06 or FT-09		⑧	TC-06
	⑨	FT-10		⑨	TT-10
GA	①	GA-03(reserve)	P	①	PT-02
	②	Reserve GA		②	PT-05
	③	GA-04		③	PT-10
EM	①	WH-01	EM	③	WH-05
	②	WH-06			

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

Table 5 Major responsible personnel and its rules

Organization	Department	Position	Name	Roles
SLC	President		Jae Hyun Lee	Approval of monthly calculation result & monitoring report
	Executive Director (Project Development)		Nak Bin Kim	Approval calculation result & monitoring report
	Climate Change Business Division	General Manager	Lae Bong Han	Approval calculation result & monitoring report (11/01/2016~30/06/2017)
		Staff	WonGu Hwang	Data analysis, calculation & arrangement of monitoring report
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	YongMin Kim	Management & operation of central flaring facility

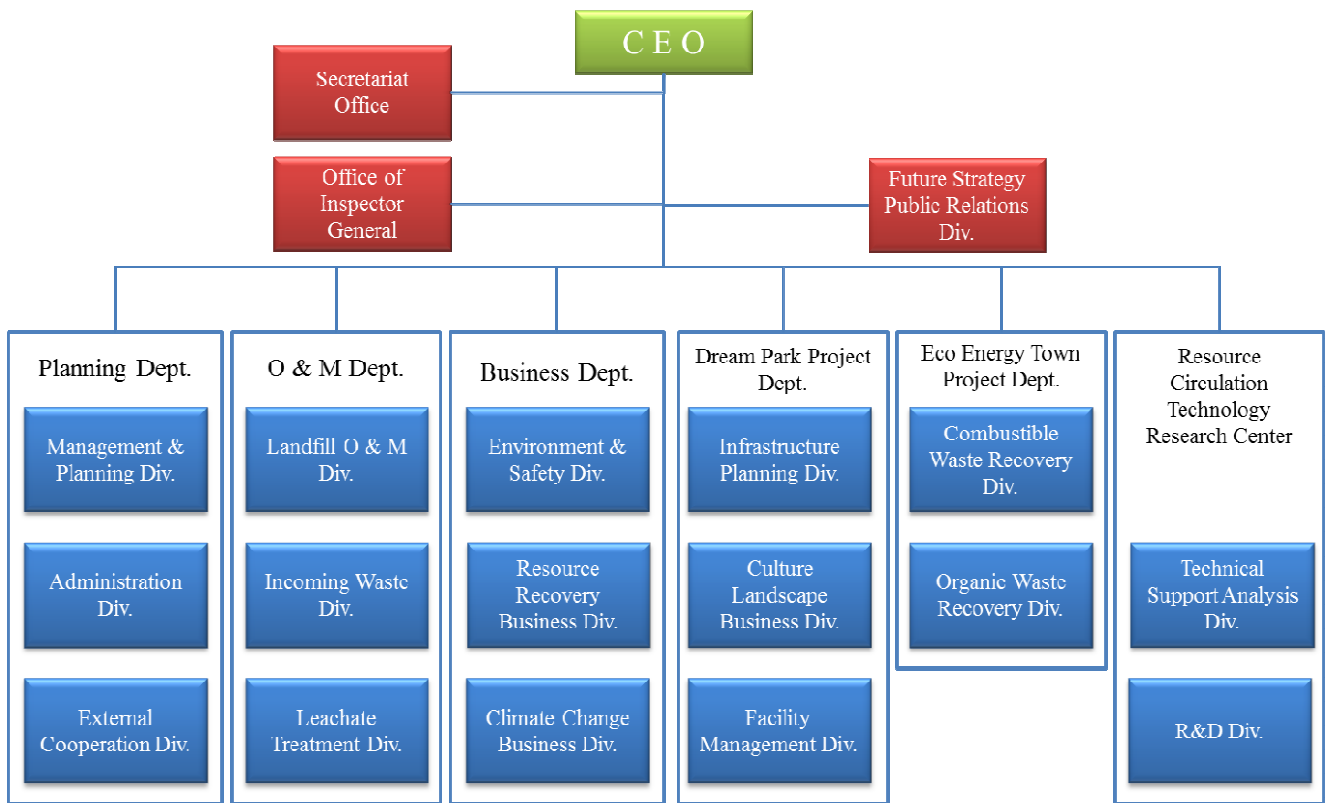


Figure 6 Organization Chart of SLC

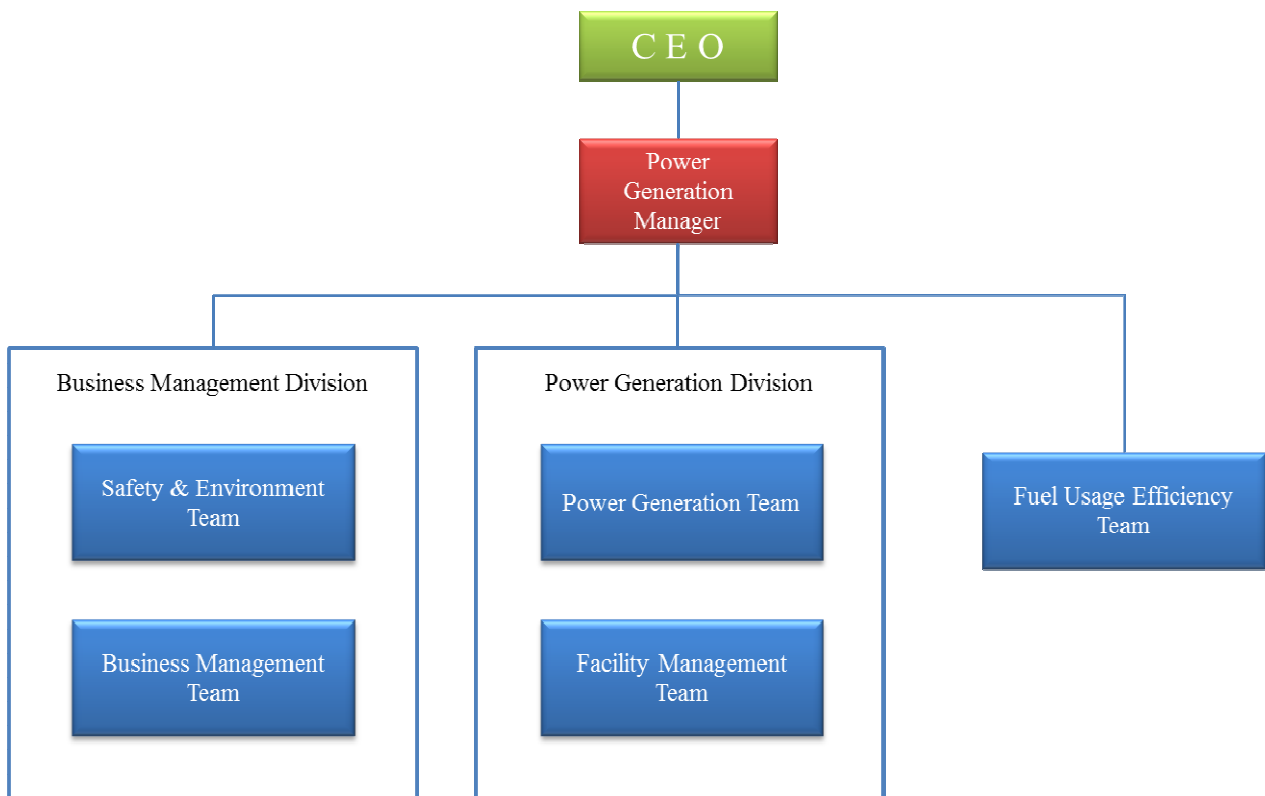


Figure 7 Organization Chart of Ecoenergy

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

Table 3 Typical emergency cases and its countermeasures

	Fire	LFG leakage
Duty	Prevent fire expansion and extinguishing	Prevent fire and (or) explosion
Report system	Discoverer -> Managing partner -> General manager -> President	Discoverer -> General manager -> Executive Director -> President
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 (Geom 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 (Geom am 032-568-7119, Seo bu 032-565-8119) if needed
Check frequency	Per day	Per month

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante***(Copy this table for each piece of data and parameter)*

Data/parameter:	GWP_{CH₄}
Unit	tCO ₂ /tCH ₄
Description	Global warming potential for methane (CH ₄)
Source of data	Default value in IPCC & ACM0001 (Version 04)
Value(s) applied)	25
Choice of data or measurement methods and procedures	From IPCC GWP data
Purpose of data	Calculation of emission reductions
Additional comments	25 for the second commitment period.

Data/parameter:	AF
Unit	%
Description	Adjustment factor for calculating baseline emission.
Source of data	PDD
Value(s) applied)	61.15
Choice of data or measurement methods and procedures	This value was calculated in PDD and fixed during entire crediting period.
Purpose of data	Calculation of emission reductions
Additional comments	Ex-ante calculation in accordance with ACM0001 (Version 04) for entire crediting period

Data/parameter:	EF
Unit	tCO ₂ /MWh
Description	Grid CO ₂ emission factor
Source of data	PDD
Value(s) applied)	0.5666
Choice of data or measurement methods and procedures	This value was calculated in PDD and fixed during entire crediting period.
Purpose of data	Calculation of baseline emissions
Additional comments	Ex-ante calculation in accordance with ACM0002 (Version 06) for entire crediting period.

Data/parameter:	D_{CH4}
Unit	tCH₄/Nm³
Description	Density of methane
Source of data	Default value in ACM0001 (Version 04)
Value(s) applied)	0.0007168
Choice of data or measurement methods and procedures	CH ₄ density at 0°C, 1 atmospheric pressure.
Purpose of data	Calculation of baseline emissions
Additional comments	N/A

D.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data / Parameter:	LFG _{total,y}		
Unit:	Nm ³		
Description:	Total amount of landfill gas captured in year y		
Measured/calculated/default:	Measured by flow meters (total of 2)		
Source of data:	MMI data; The two flow meters, FT-01, 900A and FT-02 are continuously measure the captured LFG from 1 st and 2 nd landfill.		
Value(s) of monitored parameter:		LFG _{total,y}	Remarks
	Jul 2016	19,119,625.9	
	Aug	19,273,781.2	
	Sep	18,682,093.0	
	Oct	20,767,491.8	
	Nov	18,424,275.4	
	Dec	19,343,633.0	
	Jan 2017	18,979,694.0	
	Feb	17,281,309.0	
	Mar	18,994,869.0	
	Apr	17,623,724.0	
	Total	188,490,496.3	
	For applied value, please refer to the worksheet of ‘04_LFG’ of ‘SLC CDM Data Workbook Phase 12’.		
	For measured value, please refer to the worksheet of ‘04_0_LFG(Raw data)’ of ‘SLC CDM Data Workbook Phase 12’		
Monitoring equipment:	Item name	FT-01	
	Coverage	LFG flow of 1 st landfill from 29/08/2016 to 29/04/2017	
	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	22/07/2015, 24/08/2016	
	Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017	

Monitoring equipment:	<table border="1"> <tr> <td>Item name</td> <td>900A</td> </tr> <tr> <td>Coverage</td> <td>LFG flow of 1st landfill(reserve) from 01/07/2016 to 29/08/2016</td> </tr> <tr> <td>Type</td> <td>Thermal mass type flow meter</td> </tr> <tr> <td>Accuracy class</td> <td>$\pm[1\% \text{ RDG} + (0.5\% \text{FS} + 0.02\% / ^\circ\text{C})]$</td> </tr> <tr> <td>Serial number</td> <td>26050201</td> </tr> <tr> <td>Calibration frequency</td> <td>1 year</td> </tr> <tr> <td>Date of last calibration</td> <td>22/07/2015, 19/10/2016</td> </tr> <tr> <td>Validity</td> <td>Valid from 22/07/2015 to 21/07/2016 and from 19/10/2016 to 18/10/2017 In order to deal with the uncertainty caused by delayed calibration, -1% RDG+(0.5%FS + 0.02%/°C) of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)” and the temperature applied in this equation was 58.8°C which is the maximum value(TT-03) measured from 22/07/2016 to 29/08/2016.</td> </tr> </table>	Item name	900A	Coverage	LFG flow of 1 st landfill(reserve) from 01/07/2016 to 29/08/2016	Type	Thermal mass type flow meter	Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{FS} + 0.02\% / ^\circ\text{C})]$	Serial number	26050201	Calibration frequency	1 year	Date of last calibration	22/07/2015, 19/10/2016	Validity	Valid from 22/07/2015 to 21/07/2016 and from 19/10/2016 to 18/10/2017 In order to deal with the uncertainty caused by delayed calibration, -1% RDG+(0.5%FS + 0.02%/°C) of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)” and the temperature applied in this equation was 58.8°C which is the maximum value(TT-03) measured from 22/07/2016 to 29/08/2016.
	Item name	900A															
Coverage	LFG flow of 1 st landfill(reserve) from 01/07/2016 to 29/08/2016																
Type	Thermal mass type flow meter																
Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{FS} + 0.02\% / ^\circ\text{C})]$																
Serial number	26050201																
Calibration frequency	1 year																
Date of last calibration	22/07/2015, 19/10/2016																
Validity	Valid from 22/07/2015 to 21/07/2016 and from 19/10/2016 to 18/10/2017 In order to deal with the uncertainty caused by delayed calibration, -1% RDG+(0.5%FS + 0.02%/°C) of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)” and the temperature applied in this equation was 58.8°C which is the maximum value(TT-03) measured from 22/07/2016 to 29/08/2016.																
<table border="1"> <tr> <td>Item name</td> <td>FT-02</td> </tr> <tr> <td>Coverage</td> <td>LFG flow of 2nd landfill from 02/11/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017</td> </tr> <tr> <td>Type</td> <td>V-cone type flow meter</td> </tr> <tr> <td>Accuracy class</td> <td>$\pm 0.075\%$</td> </tr> <tr> <td>Serial number</td> <td>9C03490109D</td> </tr> <tr> <td>Calibration frequency</td> <td>1 year</td> </tr> <tr> <td>Date of last calibration</td> <td>29/10/2015, 30/11/2016</td> </tr> <tr> <td>Validity</td> <td>Valid from 29/10/2015 to 28/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -0.075% of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)” from 29/10/2016 to 28/11/2016.</td> </tr> </table>	Item name	FT-02	Coverage	LFG flow of 2 nd landfill from 02/11/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017	Type	V-cone type flow meter	Accuracy class	$\pm 0.075\%$	Serial number	9C03490109D	Calibration frequency	1 year	Date of last calibration	29/10/2015, 30/11/2016	Validity	Valid from 29/10/2015 to 28/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -0.075% of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)” from 29/10/2016 to 28/11/2016.	
Item name	FT-02																
Coverage	LFG flow of 2 nd landfill from 02/11/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017																
Type	V-cone type flow meter																
Accuracy class	$\pm 0.075\%$																
Serial number	9C03490109D																
Calibration frequency	1 year																
Date of last calibration	29/10/2015, 30/11/2016																
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Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording																
Calculation method (if applicable):	(FT-01) or (900A) + (FT-02)																
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority or manufacturer																
Purpose of data:	Calculation of baseline emissions																
Additional comment:																	

Data/parameter:	LFG_{flare,y}																																				
Unit	Nm³																																				
Description	Amount of landfill gas which flared in year y																																				
Measured/calculated/default	Measured by flow meters (total of 6)																																				
Source of data	MMI data : The six flow meters, FT-04 to FT-09 and 700A are continuously measure the LFG flow of each flare																																				
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th></th><th>LFG_{flare,y}</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>5,150,434.4</td><td></td></tr> <tr><td>Aug</td><td>2,732,236.0</td><td></td></tr> <tr><td>Sep</td><td>2,529,055.4</td><td></td></tr> <tr><td>Oct</td><td>1,623,953.4</td><td></td></tr> <tr><td>Nov</td><td>2,776,625.5</td><td></td></tr> <tr><td>Dec</td><td>3,160,799.0</td><td></td></tr> <tr><td>Jan 2017</td><td>1,620,599.7</td><td></td></tr> <tr><td>Feb</td><td>3,985,149.8</td><td></td></tr> <tr><td>Mar</td><td>1,549,221.2</td><td></td></tr> <tr><td>Apr</td><td>1,453,002.5</td><td></td></tr> <tr><td>Total</td><td>26,581,103.9</td><td></td></tr> </tbody> </table> <p>For applied value, please refer to the worksheet of '07_LFG_flare' of 'SLC CDM Data Workbook Phase 12'</p> <p>For measured value, please refer to the worksheet of '07_0_LFG_flare(Raw data)' of 'SLC CDM Data Workbook Phase 12'</p>		LFG _{flare,y}	Remarks	Jul 2016	5,150,434.4		Aug	2,732,236.0		Sep	2,529,055.4		Oct	1,623,953.4		Nov	2,776,625.5		Dec	3,160,799.0		Jan 2017	1,620,599.7		Feb	3,985,149.8		Mar	1,549,221.2		Apr	1,453,002.5		Total	26,581,103.9	
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Apr	1,453,002.5																																				
Total	26,581,103.9																																				
Monitoring equipment:	<table border="1"> <tr><td>Item name</td><td>FT-04</td></tr> <tr><td>Coverage</td><td>LFG flow of #1 flare from 29/08/2016 to 29/04/2017</td></tr> <tr><td>Type</td><td>Thermal mass type flow meter</td></tr> <tr><td>Accuracy class</td><td>±[1% RDG +(0.5%FS + 0.02%/°C)]</td></tr> <tr><td>Serial number</td><td>28031701</td></tr> <tr><td>Calibration frequency</td><td>1 year</td></tr> <tr><td>Date of last calibration</td><td>22/07/2015, 24/08/2016</td></tr> <tr><td>Validity</td><td>Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017</td></tr> </table> <table border="1"> <tr><td>Item name</td><td>FT-05</td></tr> <tr><td>Coverage</td><td>LFG flow of #1 flare (reserve) from 01/07/2016 to 29/08/2016</td></tr> <tr><td>Type</td><td>Thermal mass type flow meter</td></tr> <tr><td>Accuracy class</td><td>±[1% RDG +(0.5%FS + 0.02%/°C)]</td></tr> <tr><td>Serial number</td><td>28012903</td></tr> <tr><td>Calibration frequency</td><td>1 year</td></tr> <tr><td>Date of last calibration</td><td>01/09/2015, 19/10/2016</td></tr> <tr><td>Validity</td><td>Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017</td></tr> </table>	Item name	FT-04	Coverage	LFG flow of #1 flare from 29/08/2016 to 29/04/2017	Type	Thermal mass type flow meter	Accuracy class	±[1% RDG +(0.5%FS + 0.02%/°C)]	Serial number	28031701	Calibration frequency	1 year	Date of last calibration	22/07/2015, 24/08/2016	Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017	Item name	FT-05	Coverage	LFG flow of #1 flare (reserve) from 01/07/2016 to 29/08/2016	Type	Thermal mass type flow meter	Accuracy class	±[1% RDG +(0.5%FS + 0.02%/°C)]	Serial number	28012903	Calibration frequency	1 year	Date of last calibration	01/09/2015, 19/10/2016	Validity	Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017				
Item name	FT-04																																				
Coverage	LFG flow of #1 flare from 29/08/2016 to 29/04/2017																																				
Type	Thermal mass type flow meter																																				
Accuracy class	±[1% RDG +(0.5%FS + 0.02%/°C)]																																				
Serial number	28031701																																				
Calibration frequency	1 year																																				
Date of last calibration	22/07/2015, 24/08/2016																																				
Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017																																				
Item name	FT-05																																				
Coverage	LFG flow of #1 flare (reserve) from 01/07/2016 to 29/08/2016																																				
Type	Thermal mass type flow meter																																				
Accuracy class	±[1% RDG +(0.5%FS + 0.02%/°C)]																																				
Serial number	28012903																																				
Calibration frequency	1 year																																				
Date of last calibration	01/09/2015, 19/10/2016																																				
Validity	Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017																																				

Monitoring equipment:

Item name	FT-05
Coverage	LFG flow of #2 flare from 26/10/2016 to 29/04/2017
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	01/09/2015, 19/10/2016
Validity	Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017

Item name	FT-06
Coverage	LFG flow of #3 flare from 29/08/2016 to 29/04/2017
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	22/07/2015, 24/08/2016
Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017

Item name	FT-07
Coverage	LFG flow of #4 flare from 01/07/2016 to 29/08/2016 and from 26/10/2016 to 29/04/2017
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	01/09/2015, 19/10/2016
Validity	Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017

Item name	700A
Coverage	LFG flow of #4 flare (reserve) from 29/08/2016 to 26/10/2016
Type	Thermal mass type flow meter
Accuracy class	$\pm[1\% \text{ RDG} + (0.5\% \text{FS} + 0.02\% / ^\circ\text{C})]$
Serial number	28031703
Calibration frequency	1 year
Date of last calibration	22/07/2015, 24/08/2016
Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017

Item name	FT-08
Coverage	LFG flow of #5 flare from 29/08/2016 to 29/04/2017
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	22/07/2015, 24/08/2016
Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017

Monitoring equipment:	Item name	FT-09
	Coverage	LFG flow of #5 flare (reserve) from 01/07/2016 to 29/08/2016
	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	01/09/2015, 19/10/2016
	Validity	Valid from 08/10/2014 to 31/08/2016 and from 19/10/2016 to 18/10/2017
	Item name	FT-09
	Coverage	LFG flow of #6 flare from 26/10/2016 to 29/04/2017
	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	01/09/2015, 19/10/2016
	Validity	Valid from 01/09/2015 to 31/08/2016 and from 19/10/2016 to 18/10/2017
	Item name	FT-06
	Coverage	LFG flow of #6 flare (reserve)
	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	22/07/2015, 24/08/2016
	Validity	Valid from 22/07/2015 to 21/07/2016 and from 24/08/2016 to 23/08/2017
Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording	
Calculation method (if applicable):	(FT-04 or FT-05) + (FT-05) + (FT-06) + (FT-07 or 700A) + (FT-08 or FT-09) + (FT-09 or FT-06)	
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority or manufacturer	
Purpose of data:	Calculation of baseline emissions	
Additional comments:		

Data/parameter:	LFG_{electricity,y}																																				
Unit	Nm³																																				
Description	Amount of landfill gas which fed to 50MW power plant in year y																																				
Measured/calculated/default	Measured by flow meter																																				
Source of data	DCS data : The flow meter, FT-10 is continuously measure the LFG flow of the 50MW power plant																																				
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th></th><th>LFG_{electricity,y}</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>13,635,904.0</td><td></td></tr> <tr><td>Aug</td><td>14,429,440.0</td><td></td></tr> <tr><td>Sep</td><td>14,038,080.0</td><td></td></tr> <tr><td>Oct</td><td>17,267,921.6</td><td></td></tr> <tr><td>Nov</td><td>13,233,795.3</td><td></td></tr> <tr><td>Dec</td><td>15,546,304.0</td><td></td></tr> <tr><td>Jan 2017</td><td>17,082,112.0</td><td></td></tr> <tr><td>Feb</td><td>12,320,640.0</td><td></td></tr> <tr><td>Mar</td><td>16,485,568.0</td><td></td></tr> <tr><td>Apr</td><td>15,492,992.0</td><td></td></tr> <tr><td>Total</td><td>149,532,756.9</td><td></td></tr> </tbody> </table> <p>For applied value, please refer to the worksheet of '04_LFG' of 'SLC CDM Data Workbook Phase 12'.</p> <p>For measured value, please refer to the worksheet of '04_0_LFG(Raw data)' of 'SLC CDM Data Workbook Phase 12'</p>		LFG _{electricity,y}	Remarks	Jul 2016	13,635,904.0		Aug	14,429,440.0		Sep	14,038,080.0		Oct	17,267,921.6		Nov	13,233,795.3		Dec	15,546,304.0		Jan 2017	17,082,112.0		Feb	12,320,640.0		Mar	16,485,568.0		Apr	15,492,992.0		Total	149,532,756.9	
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Monitoring equipment:	<table border="1"> <tr><td>Item name</td><td>FT-10</td></tr> <tr><td>Coverage</td><td>LFG flow of 50MW power plant from 01/07/2016 to 06/10/2016 and from 07/10/2016 to 29/04/2017</td></tr> <tr><td>Type</td><td>Ultrasonic type flow meter</td></tr> <tr><td>Accuracy class</td><td>±1%</td></tr> <tr><td>Serial number</td><td>1378</td></tr> <tr><td>Calibration frequency</td><td>1 year</td></tr> <tr><td>Date of last calibration</td><td>22/10/2015, 07/10/2016</td></tr> <tr><td>Validity</td><td>Valid from 22/10/2015 to 21/10/2016 and from 07/10/2016 to 06/10/2017</td></tr> </table>	Item name	FT-10	Coverage	LFG flow of 50MW power plant from 01/07/2016 to 06/10/2016 and from 07/10/2016 to 29/04/2017	Type	Ultrasonic type flow meter	Accuracy class	±1%	Serial number	1378	Calibration frequency	1 year	Date of last calibration	22/10/2015, 07/10/2016	Validity	Valid from 22/10/2015 to 21/10/2016 and from 07/10/2016 to 06/10/2017																				
Item name	FT-10																																				
Coverage	LFG flow of 50MW power plant from 01/07/2016 to 06/10/2016 and from 07/10/2016 to 29/04/2017																																				
Type	Ultrasonic type flow meter																																				
Accuracy class	±1%																																				
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Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording																																				
Calculation method (if applicable):	Not applicable																																				
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority																																				
Purpose of data:	Calculation of baseline emissions																																				
Additional comments:																																					

Data/parameter:	$W_{CH_4,y}$																																																																								
Unit	% (Nm³ CH₄ / Nm³ LFG)																																																																								
Description	Average methane fraction of LFG in year y																																																																								
Measured/calculated/default	Measured by methane gas analyzers (total of 3)																																																																								
Source of data	MMI data: methane gas analyzers, GA-03(reserve) and Reserve GA are continuously measure the methane concentration of LFG from 1 st and 2 nd landfill DCS data: methane gas analyzers, GA-04 is continuously measure the methane concentration of LFG fed to 50MW power plant																																																																								
Value(s) of monitored parameter	<p>GA-03(reserve) & Reserve GA : 0~59.89</p> <table border="1"> <thead> <tr> <th></th><th>$W_{CH_4,y}$</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>48.25</td><td></td></tr> <tr><td>Aug</td><td>47.43</td><td></td></tr> <tr><td>Sep</td><td>46.61</td><td></td></tr> <tr><td>Oct</td><td>47.47</td><td></td></tr> <tr><td>Nov</td><td>46.50</td><td></td></tr> <tr><td>Dec</td><td>46.69</td><td></td></tr> <tr><td>Jan 2017</td><td>42.97</td><td></td></tr> <tr><td>Feb</td><td>46.00</td><td></td></tr> <tr><td>Mar</td><td>46.79</td><td></td></tr> <tr><td>Apr</td><td>47.21</td><td></td></tr> <tr><td>Total</td><td>46.59</td><td></td></tr> </tbody> </table> <p>GA-04 : 0~64.17</p> <table border="1"> <thead> <tr> <th></th><th>$W_{CH_4,y}$</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>48.16</td><td></td></tr> <tr><td>Aug</td><td>49.56</td><td></td></tr> <tr><td>Sep</td><td>43.50</td><td></td></tr> <tr><td>Oct</td><td>44.23</td><td></td></tr> <tr><td>Nov</td><td>49.81</td><td></td></tr> <tr><td>Dec</td><td>48.52</td><td></td></tr> <tr><td>Jan 2017</td><td>47.58</td><td></td></tr> <tr><td>Feb</td><td>47.64</td><td></td></tr> <tr><td>Mar</td><td>47.45</td><td></td></tr> <tr><td>Apr</td><td>48.30</td><td></td></tr> <tr><td>Total</td><td>47.45</td><td></td></tr> </tbody> </table> <p>For applied value, please refer to the worksheet of '05_wCH4' of 'SLC CDM Data Workbook Phase 12'</p>		$W_{CH_4,y}$	Remarks	Jul 2016	48.25		Aug	47.43		Sep	46.61		Oct	47.47		Nov	46.50		Dec	46.69		Jan 2017	42.97		Feb	46.00		Mar	46.79		Apr	47.21		Total	46.59			$W_{CH_4,y}$	Remarks	Jul 2016	48.16		Aug	49.56		Sep	43.50		Oct	44.23		Nov	49.81		Dec	48.52		Jan 2017	47.58		Feb	47.64		Mar	47.45		Apr	48.30		Total	47.45	
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Apr	48.30																																																																								
Total	47.45																																																																								
Monitoring equipment	<table border="1"> <tr><td>Item name</td><td>GA-03(reserve)</td></tr> <tr><td>Coverage</td><td>CH₄ fraction of LFG at 1st landfill from 01/07/2016 to 29/04/2017</td></tr> <tr><td>Type</td><td>Infrared gas analyser</td></tr> <tr><td>Accuracy class</td><td>Linearity: ±1% of FS Repeatability: ±0.5% of FS</td></tr> <tr><td>Serial number</td><td>N6E2427T</td></tr> <tr><td>Calibration frequency</td><td>1 year</td></tr> <tr><td>Date of last calibration</td><td>16/10/2015, 12/10/2016</td></tr> <tr><td>Validity</td><td>Valid from 16/10/2015 to 15/10/2016 and from 12/10/2016 to 11/10/2017</td></tr> </table>	Item name	GA-03(reserve)	Coverage	CH ₄ fraction of LFG at 1 st landfill from 01/07/2016 to 29/04/2017	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	16/10/2015, 12/10/2016	Validity	Valid from 16/10/2015 to 15/10/2016 and from 12/10/2016 to 11/10/2017																																																								
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Accuracy class	Linearity: ±1% of FS Repeatability: ±0.5% of FS																																																																								
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Date of last calibration	16/10/2015, 12/10/2016																																																																								
Validity	Valid from 16/10/2015 to 15/10/2016 and from 12/10/2016 to 11/10/2017																																																																								

Monitoring equipment:	Item name	Reverse GA	
	Coverage	CH ₄ fraction of LFG at 2 nd landfill from 01/07/2016 to 29/04/2017	
	Type	Infrared gas analyzer	
	Accuracy class	Linearity: ±1% of FS Repeatability: ±0.5% of FS	
	Serial number	A4M0708T	
	Calibration frequency	1 year	
	Date of last calibration	16/10/2015, 12/10/2016	
	Validity	Valid from 16/10/2015 to 15/10/2016 and from 12/10/2016 to 11/10/2017	
	Item name	GA-04	
	Coverage	CH ₄ fraction of LFG fed to 50MW Power Plant from 01/07/2016 to 29/04/2017	
	Type	Infrared gas analyzer	
	Accuracy class	Linearity: ±0.5% of FS Repeatability: ±1.0%	
	Serial number	7MB2111-1DV81-0AA1	
	Calibration frequency	1 year	
	Date of last calibration	16/10/2015, 28/10/2016	
	Validity	Valid from 16/10/2015 to 15/10/2016 and from 28/10/2016 to 27/10/2017 In order to deal with the uncertainty caused by delayed calibration, -1.000% of maximum permissible error applied in accordance with “Validation and Verification Standard(version 09.0)”, 28/10/2017. → Delayed calibration is from 16/10/2016 to 28/10/2016. But delayed calibration is only applied in 28/10/2017. The reason is as below; 1. The total period(16/10/2016~28/10/2016) : the gas analyser was unequipped since it was under repair. 2. The period(16/10/2016~26/10/2016) : There is no reason to apply the accuracy mentioned in gas analyser manual since it was not attached. So most conservative value(43.5%) was applied. 3. 27/10/2016 : It can be impossible to apply the accuracy and most conservative value since two events were happened same day and could not apply the two value in one sheet in Workbook Sheet (05_wCH4 and 05-3_wCH4_50MW_LF). And at 11:00, the gas analyser sent for repair was back to SLC. So most conservative value was applied at 00:00~11:00 and the accuracy was applied at 11:00~24:00. 4. 28/10/2016 : The 3 rd party calibration was done in the field. So, the accuracy was applied.	
	Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording	
	Calculation method (if applicable):	$\frac{(FT - 01) \times (GA - 03) + (FT - 02) \times (Reverse\ GA)}{LFG_{total}}$	

QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority
Purpose of data:	Calculation of baseline emissions
Additional comments:	

Data/parameter:	FE																																										
Unit	%																																										
Description	Efficiency of flare																																										
Measured/calculated/default	Calculated based on laboratory analysis result																																										
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% or 99.9% <ul style="list-style-type: none"> - 0%, in case flaring temperature is below 600°C - 99.9%, in case flaring temperature is above 600°C and the result of exhaust gas analysis is appropriate (below 250 ppm CH₄). 																																										
Monitoring equipment:	<table border="1"> <tr> <td>Item name</td><td>FE</td></tr> <tr> <td>Coverage</td><td>Flaring efficiency of each flares</td></tr> <tr> <td>Type</td><td>Accredited 3rd party laboratory analysis result</td></tr> <tr> <td>Accuracy class</td><td>-</td></tr> <tr> <td>Serial number</td><td>Certification No. AI1603140~1, AI1605037~42, AI1609011~16, AI1705015~20 * For detailed results, please refer to Table 5 in Section C</td></tr> </table> <table border="1"> <tr> <td>Item name</td><td>TC-01</td></tr> <tr> <td>Coverage</td><td>Flaring temperature of #1 flare from 01/07/2016 to 07/11/2016 and 02/12/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>Thermocouple, k-type</td></tr> <tr> <td>Accuracy class</td><td>± 0.4 %</td></tr> <tr> <td>Serial number</td><td>012902</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>26/10/2015, 30/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 26/10/2015 to 25/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -2.2°C of maximum permissible error (applied in accordance with “Validation and Verification Standard(version 09.0)” from 26/10/2016 to 07/11/2016</td></tr> </table> <table border="1"> <tr> <td>Item name</td><td>TC-02</td></tr> <tr> <td>Coverage</td><td>Flaring temperature of #2 flare from 01/07/2016 to 04/11/2016 and 28/11/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>Thermocouple, k-type</td></tr> <tr> <td>Accuracy class</td><td>± 0.4 %</td></tr> <tr> <td>Serial number</td><td>012905</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>26/10/2015, 11/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017</td></tr> </table>	Item name	FE	Coverage	Flaring efficiency of each flares	Type	Accredited 3 rd party laboratory analysis result	Accuracy class	-	Serial number	Certification No. AI1603140~1, AI1605037~42, AI1609011~16, AI1705015~20 * For detailed results, please refer to Table 5 in Section C	Item name	TC-01	Coverage	Flaring temperature of #1 flare from 01/07/2016 to 07/11/2016 and 02/12/2016 to 29/04/2017	Type	Thermocouple, k-type	Accuracy class	± 0.4 %	Serial number	012902	Calibration frequency	1 year	Date of last calibration	26/10/2015, 30/11/2016	Validity	Valid from 26/10/2015 to 25/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -2.2°C of maximum permissible error (applied in accordance with “Validation and Verification Standard(version 09.0)” from 26/10/2016 to 07/11/2016	Item name	TC-02	Coverage	Flaring temperature of #2 flare from 01/07/2016 to 04/11/2016 and 28/11/2016 to 29/04/2017	Type	Thermocouple, k-type	Accuracy class	± 0.4 %	Serial number	012905	Calibration frequency	1 year	Date of last calibration	26/10/2015, 11/11/2016	Validity	Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017
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Serial number	Certification No. AI1603140~1, AI1605037~42, AI1609011~16, AI1705015~20 * For detailed results, please refer to Table 5 in Section C																																										
Item name	TC-01																																										
Coverage	Flaring temperature of #1 flare from 01/07/2016 to 07/11/2016 and 02/12/2016 to 29/04/2017																																										
Type	Thermocouple, k-type																																										
Accuracy class	± 0.4 %																																										
Serial number	012902																																										
Calibration frequency	1 year																																										
Date of last calibration	26/10/2015, 30/11/2016																																										
Validity	Valid from 26/10/2015 to 25/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -2.2°C of maximum permissible error (applied in accordance with “Validation and Verification Standard(version 09.0)” from 26/10/2016 to 07/11/2016																																										
Item name	TC-02																																										
Coverage	Flaring temperature of #2 flare from 01/07/2016 to 04/11/2016 and 28/11/2016 to 29/04/2017																																										
Type	Thermocouple, k-type																																										
Accuracy class	± 0.4 %																																										
Serial number	012905																																										
Calibration frequency	1 year																																										
Date of last calibration	26/10/2015, 11/11/2016																																										
Validity	Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017																																										

Item name	TC-03
Coverage	Flaring temperature of #3 flare from 01/07/2016 to 04/11/2016 and 28/11/2016 to 29/04/2017
Type	Thermocouple, k-type
Accuracy class	± 0.4 %
Serial number	012908
Calibration frequency	1 year
Date of last calibration	26/10/2015, 11/11/2016
Validity	Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017

Item name	TC-01
Coverage	Flaring temperature of #3 flare(reserve) from 07/11/2016 to 28/11/2016
Type	Thermocouple, k-type
Accuracy class	± 0.4 %
Serial number	012902
Calibration frequency	1 year
Date of last calibration	26/10/2015, 30/11/2016
Validity	Valid from 26/10/2015 to 25/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, -2.2°C of maximum permissible error (applied in accordance with “Validation and Verification Standard(version 09.0)” from 07/11/2016 to 28/11/2016

Item name	TC-04
Coverage	Flaring temperature of #4 flare from 01/07/2016 to 04/11/2016 and 28/11/2016 to 29/04/2017
Type	Thermocouple, k-type
Accuracy class	± 0.4 %
Serial number	012910
Calibration frequency	1 year
Date of last calibration	26/10/2015, 11/11/2016
Validity	Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017

Item name	TC-05
Coverage	Flaring temperature of #5 flare from 01/07/2016 to 04/11/2016
Type	Thermocouple, k-type
Accuracy class	± 0.4 %
Serial number	012912
Calibration frequency	1 year
Date of last calibration	29/10/2015
Validity	Valid from 29/10/2015 to 28/10/2016 The start date of delayed calibration is 29/10/2016. But during the 3rd party calibration which was done from 04/11/2016 to 28/11/2016, there was a technical problem and calibration was not possible. So, TC-05 was replaced to other sensor. (S/N:012912→012911)

Monitoring equipment:	Item name	TC-05
	Coverage	Flaring temperature of #5 flare(reserve) from 28/11/2016 to 29/04/2017
	Type	Thermocouple, k-type
	Accuracy class	± 0.4 %
	Serial number	012911
	Calibration frequency	1 year
	Date of last calibration	11/11/2016
	Validity	Valid from 11/11/2016 to 10/11/2017 Due to the malfunction of TC-05 (S/N:012912), the sensor was changed. After the 3rd party calibration, the data of #5 flare was recorded since 28/11/2016.
	Item name	TC-06
	Coverage	Flaring temperature of #6 flare from 01/07/2016 to 04/11/2016 and from 28/11/2016 to 29/04/2017
	Type	Thermocouple, k-type
	Accuracy class	± 0.4 %
	Serial number	012915
	Calibration frequency	1 year
	Date of last calibration	26/10/2015, 11/11/2016
	Validity	Valid from 26/10/2015 to 25/10/2016 and from 11/11/2016 to 10/11/2017.
	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:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority	
Purpose of data:	Calculation of baseline emissions	
Additional comments:	Due to the technical problem of calibration of TC-05(S/N: 012912), it was changed to another(S/N: 012911).	

Data/parameter:	T																																
Unit	°C																																
Description	Temperature of LFG																																
Measured/calculated/default	Measured																																
Source of data	MMI / DCS data The temperature transmitters, TT-02 and TT-10 are continuously measure the temperature of LFG for the flow normalization.																																
Value(s) of monitored parameter	0.0 ~ 60.0 For applied value, please refer to the worksheet of '08-1_T_2nd_LF' of 'SLC CDM Data Workbook Phase 11'																																
Monitoring equipment:	<table border="1"> <tr> <td>Item name</td><td>TT-02</td></tr> <tr> <td>Coverage</td><td>Temperature of LFG captured from 2nd landfill from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>PT 100Ω</td></tr> <tr> <td>Accuracy class</td><td>±0.2%</td></tr> <tr> <td>Serial number</td><td>WS1025016</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>30/10/2015, 30/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 30/10/2015 to 29/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, 0.2°C of maximum permissible error applied in accordance with "Validation and Verification Standard(version 09.0)" from 30/10/2016 to 28/11/2016.</td></tr> </table> <table border="1"> <tr> <td>Item name</td><td>TT-10</td></tr> <tr> <td>Coverage</td><td>Temperature of LFG which fed to 50MW power plant from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>PT 100Ω</td></tr> <tr> <td>Accuracy class</td><td>±0.2%</td></tr> <tr> <td>Serial number</td><td>WS1025017</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>30/10/2015, 30/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 30/10/2015 to 29/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, data of TT-10 did not applied from 30/10/2016 to 28/11/2016</td></tr> </table>	Item name	TT-02	Coverage	Temperature of LFG captured from 2 nd landfill from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017	Type	PT 100Ω	Accuracy class	±0.2%	Serial number	WS1025016	Calibration frequency	1 year	Date of last calibration	30/10/2015, 30/11/2016	Validity	Valid from 30/10/2015 to 29/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, 0.2°C of maximum permissible error applied in accordance with "Validation and Verification Standard(version 09.0)" from 30/10/2016 to 28/11/2016.	Item name	TT-10	Coverage	Temperature of LFG which fed to 50MW power plant from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017	Type	PT 100Ω	Accuracy class	±0.2%	Serial number	WS1025017	Calibration frequency	1 year	Date of last calibration	30/10/2015, 30/11/2016	Validity	Valid from 30/10/2015 to 29/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, data of TT-10 did not applied from 30/10/2016 to 28/11/2016
Item name	TT-02																																
Coverage	Temperature of LFG captured from 2 nd landfill from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017																																
Type	PT 100Ω																																
Accuracy class	±0.2%																																
Serial number	WS1025016																																
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Serial number	WS1025017																																
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Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording																																
Calculation method (if applicable):	Not applicable																																
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority																																
Purpose of data:	Calculation of baseline emissions																																
Additional comments:																																	

Data/parameter:	P																																
Unit	mmAq																																
Description	Pressure of LFG																																
Measured/calculated/default	Measured																																
Source of data	MMI / DCS data The pressure transmitters, PT-02 and PT-10 are continuously measure the pressure of LFG for the flow normalization.																																
Value(s) of monitored parameter	-2,868.0 ~ 838.0 For applied value, please refer to the worksheet of '09-1_P_2nd_LF' and '09-2_P_Flares' of 'SLC CDM Data Workbook Phase 12'																																
Monitoring equipment:	<table border="1"> <tr> <td>Item name</td><td>PT-02</td></tr> <tr> <td>Coverage</td><td>Pressure of LFG captured from 2nd landfill from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>Smart gauge pressure transmitter</td></tr> <tr> <td>Accuracy class</td><td>±0.075% at span</td></tr> <tr> <td>Serial number</td><td>11150308</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>16/10/2015, 30/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 16/10/2015 to 15/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, 0.075% of maximum permissible error applied in accordance with "Validation and Verification Standard(version 09.0)" from 16/11/2016 to 28/11/2016</td></tr> </table> <table border="1"> <tr> <td>Item name</td><td>PT-10</td></tr> <tr> <td>Coverage</td><td>Pressure of LFG which fed to 50MW power plant from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017</td></tr> <tr> <td>Type</td><td>Absolute pressure transmitter</td></tr> <tr> <td>Accuracy class</td><td>±0.5%</td></tr> <tr> <td>Serial number</td><td>WS1601066</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of last calibration</td><td>08/01/2016, 30/11/2016</td></tr> <tr> <td>Validity</td><td>Valid from 08/01/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, data of PT-10 did not applied from 29/11/2016 to 01/12/2016</td></tr> </table>	Item name	PT-02	Coverage	Pressure of LFG captured from 2 nd landfill from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017	Type	Smart gauge pressure transmitter	Accuracy class	±0.075% at span	Serial number	11150308	Calibration frequency	1 year	Date of last calibration	16/10/2015, 30/11/2016	Validity	Valid from 16/10/2015 to 15/10/2016 and from 30/11/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, 0.075% of maximum permissible error applied in accordance with "Validation and Verification Standard(version 09.0)" from 16/11/2016 to 28/11/2016	Item name	PT-10	Coverage	Pressure of LFG which fed to 50MW power plant from 01/07/2016 to 28/11/2016 and from 02/12/2016 to 29/04/2017	Type	Absolute pressure transmitter	Accuracy class	±0.5%	Serial number	WS1601066	Calibration frequency	1 year	Date of last calibration	08/01/2016, 30/11/2016	Validity	Valid from 08/01/2016 to 29/11/2017 In order to deal with the uncertainty caused by delayed calibration, data of PT-10 did not applied from 29/11/2016 to 01/12/2016
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Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording																																
Calculation method (if applicable):	Not applicable																																
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority																																
Purpose of data:	Calculation of baseline emissions																																
Additional comments:																																	

Data/parameter:	EL_{EX,LFG}																																				
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.																																				
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th></th><th>EL_{EX,LFG}</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>18,282.3</td><td></td></tr> <tr><td>Aug</td><td>20,961.1</td><td></td></tr> <tr><td>Sep</td><td>20,170.7</td><td></td></tr> <tr><td>Oct</td><td>24,419.5</td><td></td></tr> <tr><td>Nov</td><td>19,676.7</td><td></td></tr> <tr><td>Dec</td><td>20,979.7</td><td></td></tr> <tr><td>Jan 2017</td><td>23,030.0</td><td></td></tr> <tr><td>Feb</td><td>15,206.7</td><td></td></tr> <tr><td>Mar</td><td>21,702.0</td><td></td></tr> <tr><td>Apr</td><td>20,764.1</td><td></td></tr> <tr><td>Total</td><td>205,192.7</td><td></td></tr> </tbody> </table> <p>For applied value and measured value, please refer to the worksheet of '06-1_EL_exp' of 'SLC CDM Data Workbook Phase 12'</p>		EL _{EX,LFG}	Remarks	Jul 2016	18,282.3		Aug	20,961.1		Sep	20,170.7		Oct	24,419.5		Nov	19,676.7		Dec	20,979.7		Jan 2017	23,030.0		Feb	15,206.7		Mar	21,702.0		Apr	20,764.1		Total	205,192.7	
	EL _{EX,LFG}	Remarks																																			
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Apr	20,764.1																																				
Total	205,192.7																																				
Monitoring equipment:	<table border="1"> <tr><td>Item name</td><td>WH-01</td></tr> <tr><td>Coverage</td><td>Electricity exported from 50MW power plant</td></tr> <tr><td>Type</td><td>Electronic watt-hour meter</td></tr> <tr><td>Accuracy class</td><td>0.2 class</td></tr> <tr><td>Serial number</td><td>PR-0411A055-02</td></tr> <tr><td>Calibration frequency</td><td>3.5 ± 0.5 years (according to the Operational Directive of Korean Electricity Market controlled by KPX)</td></tr> <tr><td>Date of last calibration</td><td>09/04/2014</td></tr> <tr><td>Validity</td><td>Valid from 09/04/2014 to 08/04/2018</td></tr> </table>	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	09/04/2014	Validity	Valid from 09/04/2014 to 08/04/2018																				
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Calculation method (if applicable):	Not applicable																																				
QA/QC procedures:	State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority																																				
Purpose of data:	Calculation of baseline emissions																																				
Additional comments:																																					

Data/parameter:	EL_{IMP}																																				
Unit	MWh																																				
Description	Total amount of electricity imported to the project boundary																																				
Measured/calculated/default	Measured																																				
Source of data	SLC's internal electricity surveillance system & KEPCO data Total of 2 watt-hour meters are installed to monitor electricity imported. WH-05 is for LFG blower of 2 nd landfill and WH-06 is for central flaring facility. The data of KEPCO Invoice is for imported electricity in 50MW power plant.																																				
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th></th><th>EL_{IMP}</th><th>Remarks</th></tr> </thead> <tbody> <tr><td>Jul 2016</td><td>260.3</td><td></td></tr> <tr><td>Aug</td><td>355.0</td><td></td></tr> <tr><td>Sep</td><td>372.3</td><td></td></tr> <tr><td>Oct</td><td>262.7</td><td></td></tr> <tr><td>Nov</td><td>355.0</td><td></td></tr> <tr><td>Dec</td><td>363.3</td><td></td></tr> <tr><td>Jan 2017</td><td>350.1</td><td></td></tr> <tr><td>Feb</td><td>291.9</td><td></td></tr> <tr><td>Mar</td><td>306.8</td><td></td></tr> <tr><td>Apr</td><td>260.7</td><td></td></tr> <tr><td>Total</td><td>3,178.1</td><td></td></tr> </tbody> </table> <p>For applied value and measured value, please refer to the worksheet of '06-2_EL_imp_50MW', '06-3_EL_imp_LFG_mgt_centre' and '06-4_EL_imp_2nd_LF' of 'SLC CDM Data Workbook Phase 12'</p>		EL _{IMP}	Remarks	Jul 2016	260.3		Aug	355.0		Sep	372.3		Oct	262.7		Nov	355.0		Dec	363.3		Jan 2017	350.1		Feb	291.9		Mar	306.8		Apr	260.7		Total	3,178.1	
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Item name	WH-05																																				
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Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording																																				
Calculation method (if applicable):	(WH-05) + (WH-06) + (KEPCO data)																																				
QA/QC procedures:	WH-05 and WH-06; State-check is made by responsible staff of SLC on a daily basis Regular maintenance is made by staff of Ecoenergy Periodically calibrated by approved 3 rd party authority KEPCO data : Under control of KEPCO																																				
Purpose of data:	Calculation of baseline emissions																																				
Additional comments:																																					

Data/parameter:	Regulatory requirements relating to landfill gas project
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 (Ki Yeong Park)
Value(s) of monitored parameter	Not applicable
Monitoring equipment:	Not applicable
Measuring/reading/recording frequency:	Annually recorded
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Not applicable
Purpose of data:	Not applicable
Additional comments:	

Data/parameter:	Hours
Unit	Hours
Description	Operation of the energy plant (50MW power plant)
Measured/calculated/default	On site measurement
Source of data	Generated (exported) amount of electricity by 50MW power plant
Value(s) of monitored parameter	6,957
Monitoring equipment:	Same as above 'EL _{EXLFG} '
Measuring/reading/recording frequency:	Continuous measuring & reading, hourly recording
Calculation method (if applicable):	Electricity exported to grid > 0 kWh
QA/QC procedures:	Not applicable
Purpose of data:	Not applicable
Additional comments:	

Data/parameter:	LPG
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 data and invoices
Value(s) of monitored parameter	50 Kg Please refer to the worksheet of '10_PE_LPG' of 'SLC CDM Data Workbook Phase 12'.
Monitoring equipment:	Not applicable
Measuring/reading/recording frequency:	Monthly recorded
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Not applicable
Purpose of data:	Calculation of project emissions
Additional comments:	

D.3. Implementation of sampling plan

>> Not applicable

SECTION E. Calculation of emission reductions or net anthropogenic removals**E.1. Calculation of baseline emissions or baseline net removals**

>>

According to applied methodology ACM0001 (Version 04), 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 be 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 8 Emission reduction equation in ACM0001 (Version 04) (page 2)

As there are no consideration about project emissions and leakage in ACM0001 (Version 04), above equation can be used to calculate baseline emissions;

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

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;

$$BE = (MD_{project} \times (1 - AF) \times GWP_{CH4} + (EL_{exp} - EL_{imp}) \times EF$$

Baseline emissions from methane avoidance

In accordance with applied methodology ACM0001 (Version 04), captured amount of methane and treated amount of methane should be compared and smaller value(CH₄ selected) should be used to determine the amount of methane destruction.

Next, weighted average of methane fraction from 1st and 2nd landfill and methane fraction fed to 50MW power plant multiplied in order to calculate methane content and global warming potential and AF applied to calculate baseline emissions.

$$BE_{methane_avoidance} = (LFG_{selected} \times W_{CH4} \times D_{CH4} \times (1 - AF) \times GWP_{CH4})$$

$$= CH_{4\,selected} \times D_{CH4} \times (1 - AF) \times GWP_{CH4}$$

$$MD_{project} = LFG_{selected} \times W_{CH4} \times D_{CH4} = CH_{4\,selected} \times D_{CH4}$$

	CH ₄ selected (Nm ³)	MD _{project} (tCH ₄)	AF applied BE (tCH ₄)	BE from CH ₄ avoidance (tCO ₂ e)
Jul 2016	9,035,969.7	6,476.9	2,516.3	62,906
Aug	8,358,774.5	5,991.5	2,327.7	58,192
Sep	7,246,277.7	5,194.1	2,017.9	50,447
Oct	8,403,970.8	6,023.9	2,340.3	58,506
Nov	7,744,621.2	5,551.3	2,156.6	53,916
Dec	8,820,273.7	6,322.3	2,456.2	61,404
Jan 2017	8,066,852.1	5,782.3	2,246.4	56,159
Feb	7,702,019.1	5,520.8	2,144.8	53,620
Mar	8,540,442.8	6,121.7	2,378.3	59,456
Apr	8,142,743.7	5,836.7	2,267.5	56,688
Total	82,061,945.3	58,821.5	22,852.0	571,293

* 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 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)
Jul 2016	18,282.3	260.3	18,022.0	10,210
Aug	20,961.1	355.0	20,606.1	11,675
Sep	20,170.7	372.3	19,798.4	11,217
Oct	24,419.5	262.7	24,156.8	13,687
Nov	19,676.7	355.0	19,321.7	10,947
Dec	20,979.7	363.3	20,616.4	11,681
Jan 2017	23,030.0	350.1	22,679.9	12,850
Feb	15,206.7	291.9	14,914.8	8,450
Mar	21,702.0	306.8	21,395.2	12,122
Apr	20,764.1	260.7	20,503.4	11,617
Total	205,192.7	3,178.1	202,014.6	114,456

* 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 for more detailed calculation

Baseline emissions from 9.88MW power plant

The 9.88MW power plants had not been operated since 03/2007 due to the technical problem. Therefore, the rest of LFG which is not treated in 50MW power plants was destroyed by central flaring facility only. Emissions from the electricity generated by the existing 9.88MW power plants are regarded as baseline emissions and should be deducted from calculated baseline emissions.

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 (366 days), total of 37,047 tCO₂ (215.79MWh × 303 days × 0.5666tCO₂/MWh) is deducted from emission reductions.

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

	Maximum theoretical output of 9.88MW (MWh)	Monitoring period (days)	EF (tCO ₂ /MWh)	BE _{9.88MW} (tCO ₂)
Total	215.79	303	0.5666	37,047

E.2. Calculation of project emissions or actual net removals

>>

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 and central flaring facility (Kg)	PE _{LPG} (tCO ₂ e)
2013	90	0.19612
2014	60	0.13075
2015	100	0.21791
2016	0	-
2017	50	0.10896
Total	300	0.65374

For conservativeness, 1 tCO₂e applied though calculated project emissions from LPG usage were 0.65374 tCO₂e.

E.3. Calculation of leakage emissions

>>

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

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	648,701	1	0	0	648,700	648,700

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
648,700	677,939

E.6. Remarks on increase in achieved emission reductions

>>

Claimed actual emission reductions are about 82.45% 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).

Recently, due to supplementation of calculation method for LFG monitoring, the issuance success ratio was increased compare to estimated value in registered PDD. Compared to other landfill projects listed in CDM Pipeline(dated 01/03/2018), the performance of this project is not extraordinary

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Sudokwon Landfill Site Management Corp.
Street/P.O. Box	#61 Geowol-Ro, Seo Gu
Building	
City	Incheon
State/region	
Postcode	22688
Country	Republic of Korea
Telephone	+82-32-560-9600
Fax	+82-32-560-9615
E-mail	parkland@slc.or.kr
Website	www.slc.or.kr
Contact person	Ki Yeong Park
Title	Director
Salutation	-
Last name	Park
Middle name	
First name	Ki Yeong
Department	Climate Change Business Division
Mobile	+82-10-2306-1813
Direct fax	-
Direct tel.	+82-32-560-9600
Personal e-mail	parkland@slc.or.kr

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Sudokwon Landfill Site Management Corp.
Street/P.O. Box	#61 Geowol-Ro, Seo Gu
Building	
City	Incheon
State/Region	
Postcode	404-706
Country	Republic of Korea
Telephone	+82-32-560-9605
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		