



Monitoring report form
(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Point of Use Abatement Device to Reduce SF6 emissions in LCD Manufacturing Operations in the Republic of Korea (South Korea)	
UNFCCC reference number of the project activity	3440	
Version number of the monitoring report	1.0	
Completion date of the monitoring report	26/09/2016	
Monitoring period number and duration of this monitoring period	9 th Monitoring Period 01/01/2013 ~ 02/04/2013 (92days)	
Project participant(s)	LG International Corp. LG Display Co., Ltd. Climate Change Capital Carbon Fund II s.a.r.l.	
Host Party	Republic of Korea	
Sectoral scope(s)	(4) Manufacturing industries (11) Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	
Selected methodology(ies)	AM0078 v.1.1 – "Point of Use Abatement Device to Reduce SF6 emissions in LCD Manufacturing Operations"	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	349,715 tCO ₂ e (This monitoring period is 92days : 1,387,458 tCO ₂ e / 365 *92)	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO ₂ e	327,007 tCO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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LG Display (LGD) currently uses SF₆ in its LCD manufacturing process in Plant 2/3, Plant 4/5, Plant 6 in Gumi, South Korea and Plant 7 in Paju, South Korea. To destroy much of the SF₆ vented from the dry etching process, LG International (LGI) and LGD installed an abatement device at the stack of the dry etching chambers in Plant 6. And additional abatement device which has similar technical specifications with the existing system was installed in the plant 7 in Paju in late January 2012.

The project activities during this monitoring period includes Plant 6 and 7, and the other Plants mentioned in the registered Project Designed Document will be included from the subsequent monitoring period or thereafter depending on the investment timeline of each abatement system. The emission reductions achieved during this monitoring period comes from the abatement system in Plant 6 and 7 and, therefore, all information provided in this report is limited only to those of the existing system in Plant 6 and 7.

To decompose SF₆ gas, high temperature, around 1,200 °C, is necessary and diverse continuous measurements on both inlet and outlet are required to ensure accurate and reliable monitoring outcomes of emission reductions. For this purpose, an end-of-pipe abatement device was selected. And, In order to capture the actual amount of SF₆ entering and subsequently leaving the abatement device, the project participants have been undertaking an extensive ongoing monitoring operation. This monitoring operation includes installing and maintaining Fourier Transform Infrared (FTIR) devices on both the inlet and the outlet of the abatement device to continuously monitor the concentration of SF₆ and calculate the mass of SF₆ destroyed. In addition, two sets of Quadrupole Mass Spectrometer (QMS) were installed to calculate accurate values of dry molecular weights of both the inlet and the outlet gases as the applied methodology requires. This result has been converted into a carbon equivalent value and any emissions resulting from electricity and/or fuel consumption of the abatement device has been subtracted to arrive at the emission reduction value for the project activity.

In conclusion, this monitoring report for the 9th verification was prepared for the period from 01/01/2013 to 02/04/2013. During this period, the project has achieved net anthropogenic GHG removals of 327,007 (tCO₂e).

The following information contains dates of key events of the project in chronological order.

Date	Progress
February 13, 2009	The applied methodology, developed by the project participants, was approved by the CDM EB.
June 1, 2009	An EPC contract for an abatement system to be installed at P6 was signed and construction was commenced.
July 10, 2010	The project was approved by the CDM EB
July 23, 2010	The commissioning of the abatement system at P6 was completed.
August 1, 2010 ~	The crediting period of the project was started and operation was commenced.
May 24, 2011	An EPC contract for a new abatement system to be installed at P7 was signed and construction was commenced.
June 22, 2011	CDM EB approved the 1 st monitoring report and issued CERs. (144,222 CERs)
August 29, 2011	CDM EB approved the 2 nd monitoring report and issued CERs. (214,847 CERs)
January 25, 2012	The commissioning of the abatement system at P7 was completed.
March 1, 2012 ~	The operation at P7 was commenced.
June 15, 2012	CDM EB approved the 3 rd monitoring report and issued CERs. (197,984 CERs)

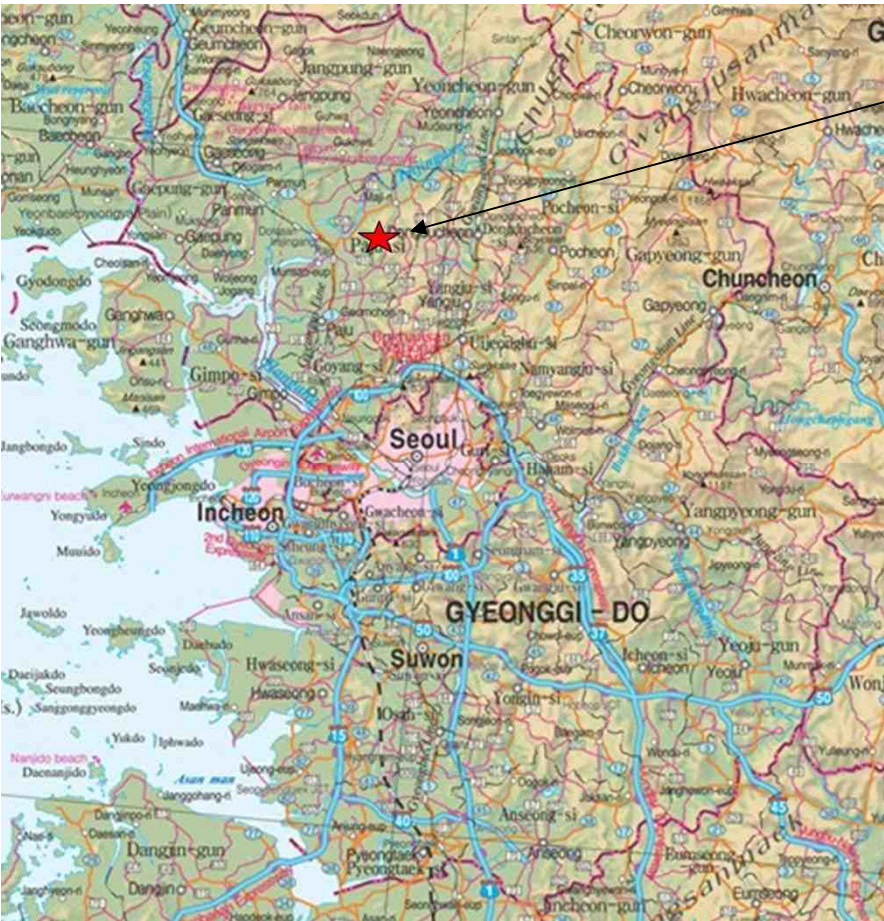
September 27, 2012	CDM EB approved the 4 th monitoring report and issued CERs. (171,600 CERs)
January 10, 2013	CDM EB approved the 5 th monitoring report and issued CERs. (264,637 CERs)
April 12, 2013	CDM EB approved the 6 th monitoring report and issued CERs. (226,806 CERs)
September 13, 2013	CDM EB approved the 7 th monitoring report and issued CERs. (571,100 CERs)
September 13, 2013	CDM EB approved the 8 th monitoring report and issued CERs. (563,386 CERs)

A.2. Location of project activity

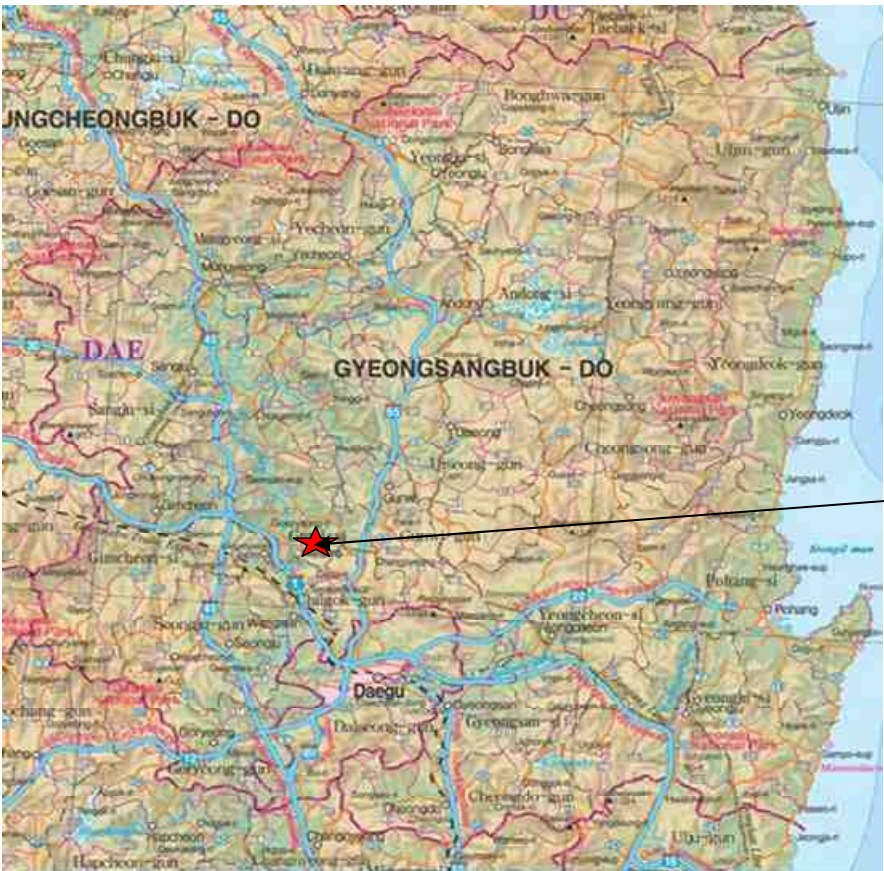
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The Plant 6 is based in Gumi which is located in the western part of Korea's North Gyeongsang Province, 277.5 km. south of Seoul and 167 km. north of Busan and Plant 7 is located in Paju, Gyeonggi Province, 50 km. west of Seoul.





Plant 7
Paju, Gyeonggi-do



Plant 6
Gumi, Gyeongsangbuk-

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Republic of Korea (host)	LG International Corp. LG Display Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Climate Change Capital Carbon Fund II s.a.r.l. LG International Corp.	No

A.4. Reference of applied methodology and standardized baseline

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“Point of Use Abatement Device to Reduce SF6 emissions in LCD Manufacturing Operations”

Approved baseline and monitoring methodology AM0078 v.1.1

“Combined tool to identify the baseline scenario and demonstrate additionality.” v.2.2

“Tool to calculate the emission factor for an electricity system.” v.2

“Tool to calculate baseline, project and/or leakage emissions from electricity consumption.” v.1

“Tool to calculate project or leakage CO2 emissions from fossil fuel combustion.” v.2

“Guidelines for objective demonstration and assessment of barriers” EB50 Annex 13

“Guidelines on the assessment of investment analysis” EB51 Annex 58

A.5. Crediting period of project activity

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01/08/2010 ~ 31/07/2020 (Fixed)

The starting date of the crediting period has been changed from July 10, 2010 to August 1, 2010 following the project participants' request made on July 22, 2010. The request was sent to the UNFCCC secretariat and subsequently accepted.

A.6. Contact information of responsible persons/entities

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Name	Position	Is the person a PP in Appendix 1?	PP which is involved in	E-mail
Myung-min Kim	Consultant	No	ECOEYE Co., Ltd	Ky08715@ecoeye.com

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

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The commissioning of the abatement device installed in Plant 6 was completed on July 23, 2010 and has been operational since August 1, 2010. The second investment for a new SF6 abatement system to be installed in Plant 7 was approved by the executives in March, 2011 and an EPC contract was signed on 24 May, 2011. The construction was completed in January, 2012, and it started to generate ERs from February, 2012. Commercial orders for additional sets of abatement devices to be installed in other than plant 6 and 7 are yet to be made at the time of writing. As the project participants described in the registered PDD, the other plants will be successively invested after the performance of the existing abatement system has been confirmed.

And the followings are information on special events including overhaul times, system-rebooting, and replacement of any equipment. (None of these events happened in a brought-off line manner.)

[Plant 6 in Gumi]

Events	Date	Duration	Effects on emission reduction
Reactor Emergency Shut Down	Feb 17, 2013	(20:48:27~21:32:57)	The reactor was shut-down due to the sudden voltage dip. Data of these period was eliminated from ER calculation.
Re-booting Trend PC	Jan 27, 2013	(04:56:50~04:58:48)	Trend PC error was happened unexpectedly. To response this issue, Trend PC was re-booted. While re-booting Trend PC, temporary loss of data occurred. Data of these period was eliminated from ER calculation.
	Mar 16, 2013	(14:19:21~14:21:43)	
Deviated inlet/outlet volumetric flow rate and its stack gas velocities	Jan 10 2013	(14:30~14:57) (19:49)	Inlet/Outlet volumetric flow rate and stack gas velocities were fluctuated. To response this event, purge was carried out. A normal/stable trend of Inlet/outlet volumetric flow rate and its stack gas velocities were achieved after purge process. When it was off the permitted range, emission reductions were automatically eliminated for ER calculation.
	Jan 23 2013	(14:40~15:16)	
	Mar 22 2013	(10:10:53~10:27:59)	
	Mar 16 2013	(09:52:08~12:30:25)	Inlet/Outlet volumetric flow rate and stack gas velocities were fluctuated. To response this event, purge was carried out. A normal/stable trend of Inlet/outlet volumetric flow rate and its stack gas velocities were achieved after purge process. Data of these period was eliminated from ER calculation.
FTIR Cell Cleaning	Jan 25 2013	(11:03:09~12:27:45)	Inlet FTIR Window was cleaned up. Data of these period was eliminated from ER calculation.
Change of Sight Glass	Feb 14 2013	(13:50:01~13:54:49)	Sight glass of Scrubber(#1) was changed. Data of these period was eliminated from ER calculation.

The above events have not had any adverse effects on the applicability of the applied methodology and no other event which may impact the applicability of the methodology has occurred during the monitoring period.

[Plant 7 in Paju]

Events	Date	Duration	Effects on emission reduction
Re-booting Trend PC	Jan 11, 2013	(09:53:04~09:53:47)	Trend PC error was happened unexpectedly. To response this issue, Trend PC was re-booted. While re-booting Trend PC, temporary loss of data occurred. Data of these period was eliminated from ER calculation.
	Jan 18, 2013	(01:54:52~02:01:50)	
	Jan 22 2013	(12:51:57~12:55:50)	
	Feb 06 2013	(02:57:26~03:01:02) (03:02:11~03:02:29)	
	Feb 08 2013	(22:15:21~22:19:05)	
	Mar 03 2013	(01:36:18~01:39:56)	

	Mar 05 2013	(11:14:02~11:16:43)	
	Mar 19 2013	(09:59:25~10:11:49)	
	April 02 2013	(21:29:04~21:30:56)	
Faulty of LNG Signal	Jan 07 2013	(18:07:05~18:08:54)	Due to faulty of LNG signal transaction, The volumetric flow rate is over the baseline. Data of these period was eliminated from ER calculation.
	Feb 08 2013	(06:19:33~06:20:52)	
	Mar 11 2013	(06:23:57~06:25:46)	
Deviated inlet/outlet volumetric flow rate and its stack gas velocities	Jan 09 2013	(08:29:00~08:38:52)	Inlet/Outlet volumetric flow rate and stack gas velocities were fluctuated. To response this event, purge was carried out. A normal/stable trend of Inlet/outlet volumetric flow rate and its stack gas velocities were achieved after purge process. Data of these period was eliminated from ER calculation.
Minor problem of FTIR	Jan 04 2013	(01:54:00~10:11:59)	There was some minor problem of FTIR at these days. One of the problems is icing of FTIR sample line. Data of these period is not sure, PP eliminated the data.
	Jan 10 2013	(18:28:00~18:54:29)	
	Jan 15 2013	(09:05:30~09:12:30)	
	Jan 17 2013	(11:32:45~12:45:30)	
	Feb 01 2013	(10:11:00~10:12:00)	
	Mar 02 2013	(05:29:00~06:46:00)	
	Mar 03 2013	(06:42:05~06:53:10)	
	Mar 05 2013	(05:03:30~06:53:59)	

The above events have not had any adverse effects on the applicability of the applied methodology and no other event which may impact the applicability of the methodology has occurred during the monitoring period.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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N/A

B.2.2. Corrections

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N/A

B.2.3. Changes to start date of crediting period

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N/A

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

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N/A

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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N/A

B.2.6. Changes to project design of registered project activity

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N/A

B.2.7. Types of changes specific to afforestation or reforestation project activity

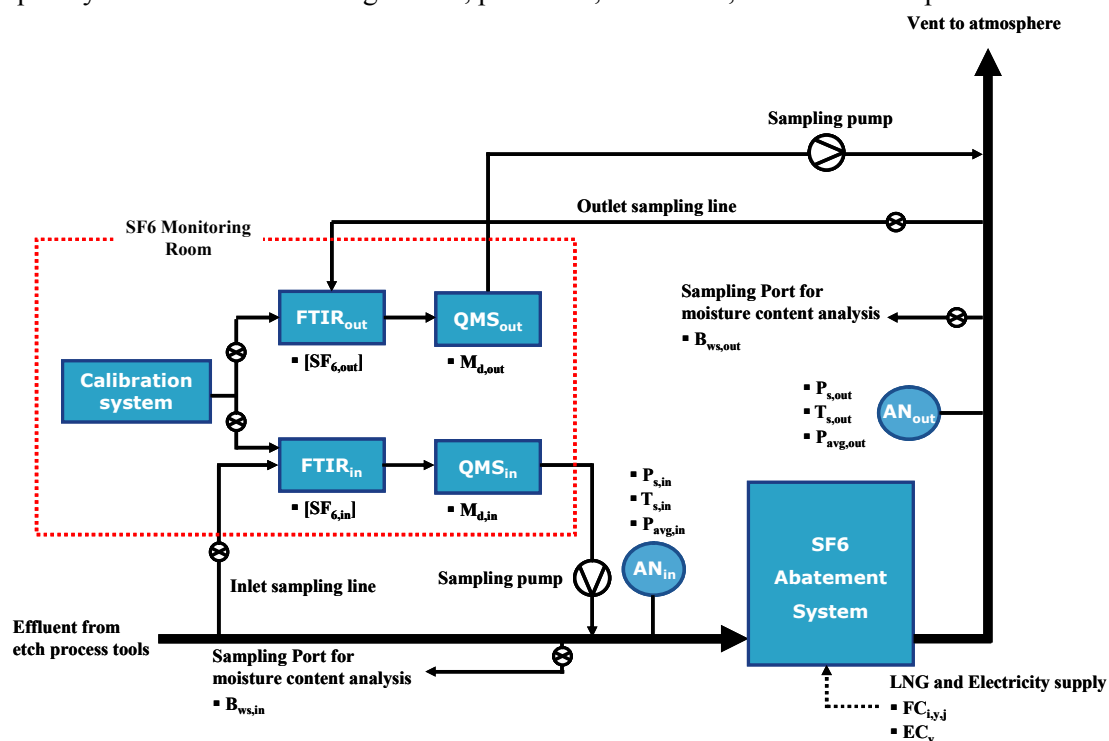
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N/A

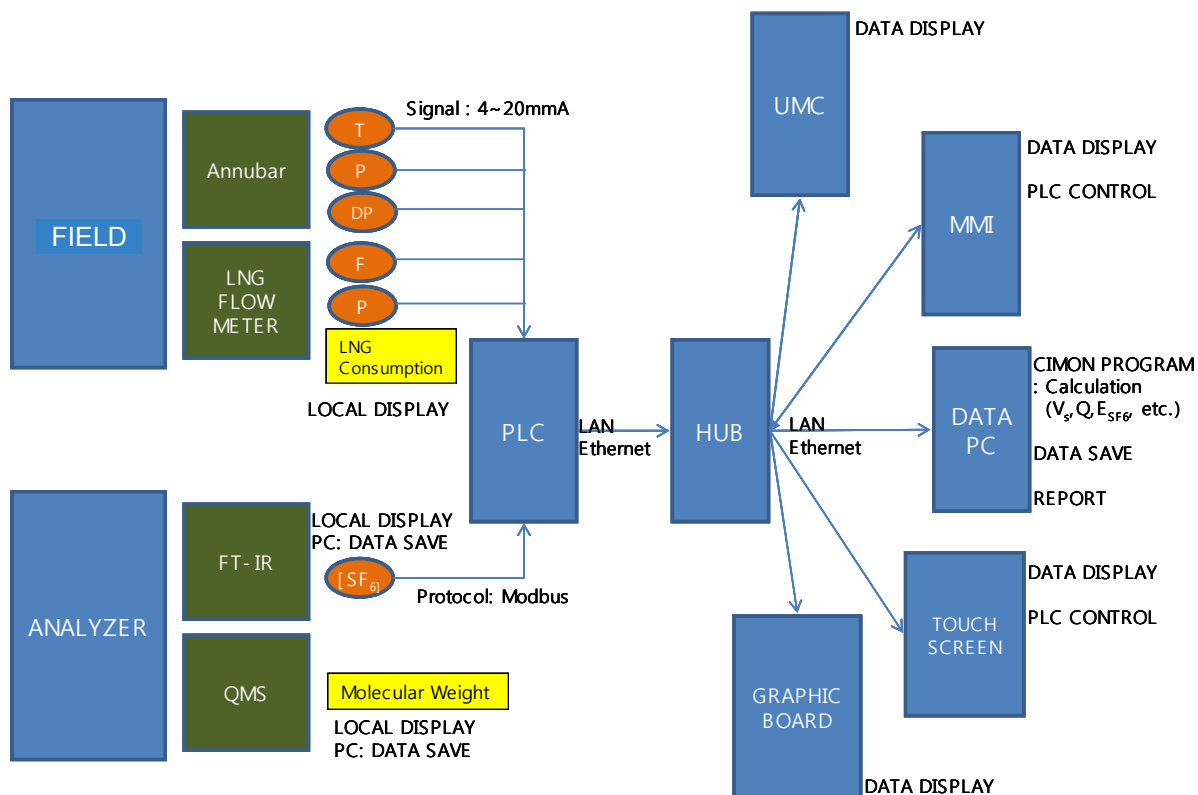
SECTION C. Description of monitoring system

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Parameters used in the emission reductions calculation can be classified into 4 groups – continuously monitored group, frequently monitored group, calculated group and externally provided group. The following diagrams show all relevant monitoring points and how the continuously monitored factors and frequently monitored factors are gathered, processed, calculated, recorded and reported.



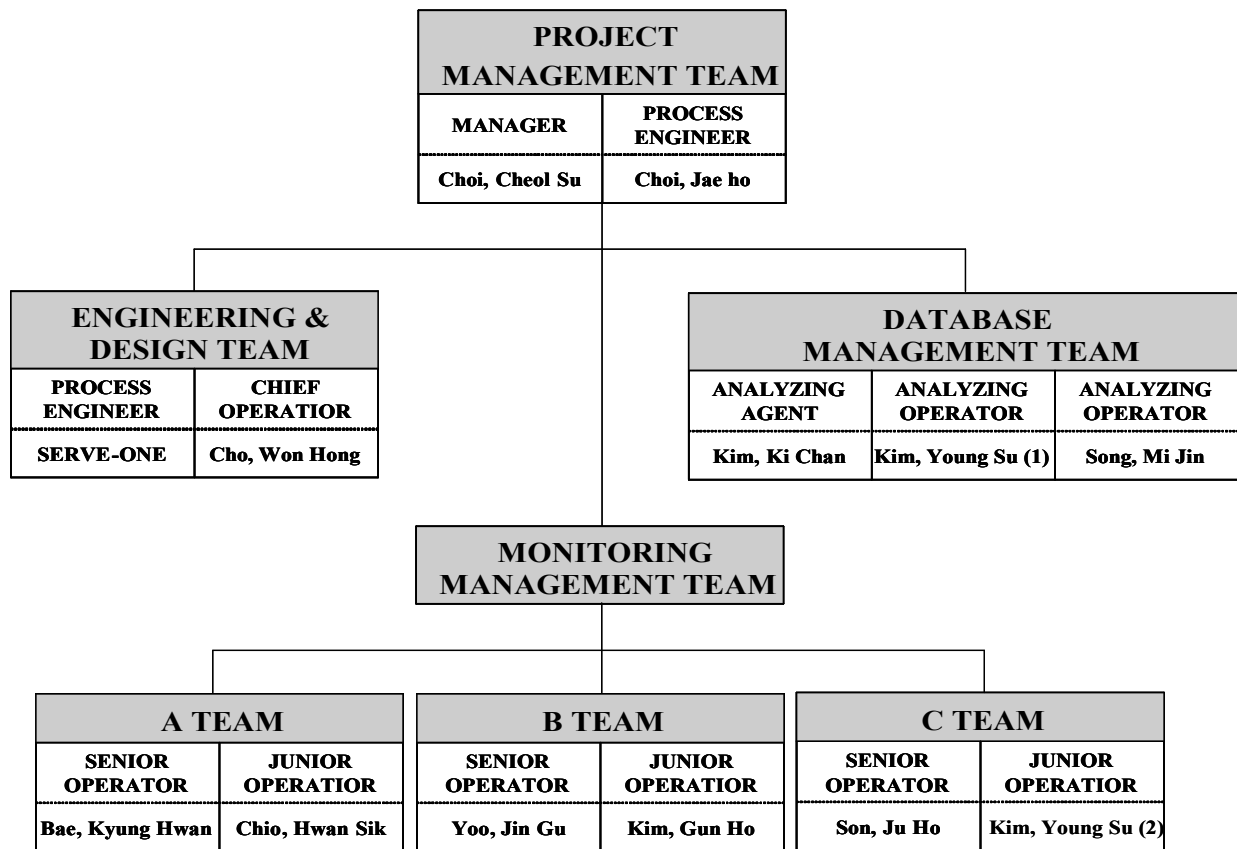
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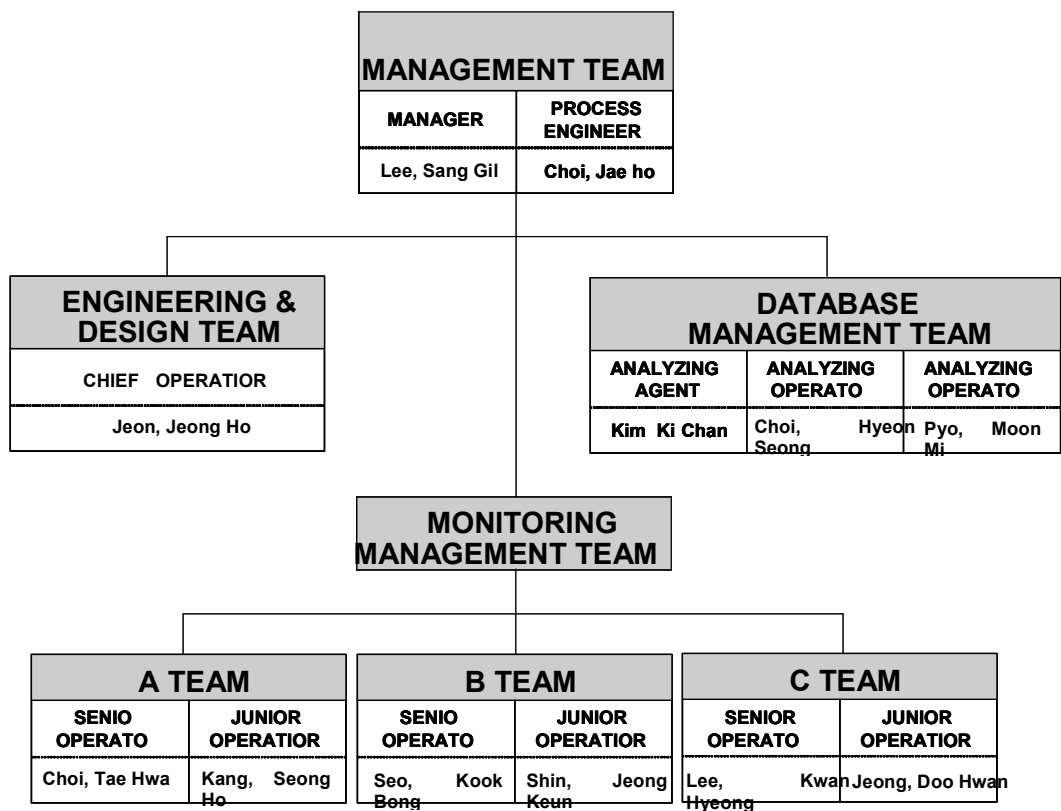
The continuously monitored parameters including temperature, pressure, velocity head and concentration of SF_6 in both inlet and outlet gases are measured by each metering device described in Section D.2. The data is transmitted to PLC through electrical signal and subsequently distributed to other devices such as Main Monitoring Interface (MMI), Utility Monitoring Center (UMC) and computers to control the whole system and to calculate emission reductions. The emission reduction is calculated by the data processing program and the results are recorded along with other raw data on server computers. The result is reported to the project participant by the operation team on daily, weekly and monthly bases. In case of the externally provided group, the project participants secured accuracy and transparency of data through diverse QA/QC activities. The activities include crosschecking with logbook/SAP data, invoice/letter from suppliers and other reliable measures.

The operation team consists of several sub-teams namely Project Management team, Engineering & Design team, Database Management team and Operation Management team. The following is an organizational structure of the operation team.

[Plant 6 in Gumi]



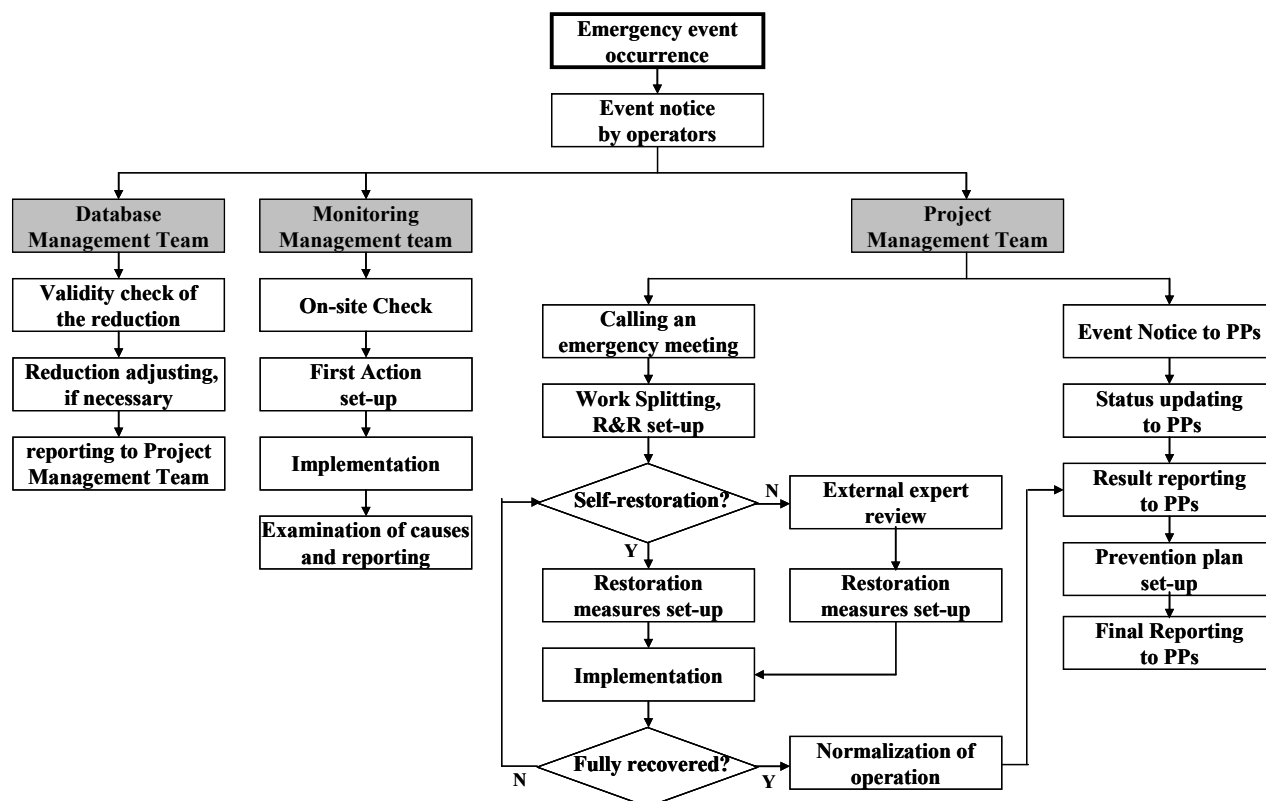
[Plant 7 in Paju]



Each sub team has following roles and responsibilities;

- 1) Project Management team's roles and responsibilities
 - Responsible for the overall legal affairs for SF₆ decomposition facilities
 - Secure operations of the SF₆ decomposition facilities in accordance with the CDM methodology
 - Secure and manage human resources necessary for operations of SF₆ decomposition facilities
 - Training practice and evaluation of each team member necessary for operations
 - Amicable performance over operations of the facilities in cooperation with managers of LG
 - Check and supervision over operating conditions for SF₆ decomposition facilities
 - Responsible supervision for calibrations of metering devices and supervision for suppliers
- 2) Engineering & Design team's roles and responsibilities
 - Designer for the overall operations for SF₆ decomposition facilities
 - Maintain the proper operating conditions and performance for SF₆ decomposition facilities
 - Risk management for operations of SF₆ decomposition facilities
 - System design in accordance with the methodology
 - Improvements on equipments for SF₆ decomposition facilities and system
- 3) Database Management team's roles and responsibilities
 - Actual operator of SF₆ decomposition facilities
 - Data monitoring and record required in the methodology
 - Establish alarm values and monitor them
 - Regular check on SF₆ decomposition facilities
- 4) Monitoring Management team's roles and responsibilities
 - Data measurement and storage necessary for the methodology
 - Store measurement data for 2 years after the last credit period
 - Calibration of metering device and reporting of calibration results
 - Maintenance/repair and report of metering devices
 - Accuracy check and result report for measurements
 - Check and troubleshooting on any alarm from metering devices
 - Daily/weekly/monthly report for measurement data
 - Auditing for calibration works on metering devices

The operation team has set up emergency plans for the main system and metering devices. When emergency events occur, the following emergency procedure will be applied.



More detailed information on monitoring system is included in a Data Management Manual which has been provided to DOE for verification purpose.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	GWP of SF ₆
Unit	tCO ₂ eq/tSF ₆
Description	Global Warming Potential of SF ₆
Source of data	IPCC
Value(s) applied	22,800
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of project emission
Additional comments	Provided by the IPCC 4 th report to calculate the global warming potential of SF ₆

Data/parameter:	Historical SF ₆ consumption (C _{SF 6,hist})
Unit	Tonnes
Description	Historical SF ₆ consumption of Plant 6 & 7, calculated as the three years maximum consumption prior to the implementation of the project activity before 31 January 2009. Consumption is defined as the total SF ₆ purchased in a year, taking into account the change in inventory in a specific year.
Source of data	Record of purchase and inventory

Value(s) applied	<p>P6: 19.161 tonnes, P7: 24.748 tonnes This value is the maximum consumption of SF₆ in Plant 6 & 7 over the three year historic period.</p> <table><tr><th rowspan="2">Fab</th><th colspan="3">Yearly SF₆ consumption (kg)</th></tr><tr><th>'06</th><th>'07</th><th>'08</th></tr><tr><td>P6 (in the PDD)</td><td>55,024</td><td>73,990</td><td>76,226</td></tr><tr><td>P7 (in the PDD)</td><td>24,371</td><td>70,092</td><td>98,453</td></tr><tr><td>P6 (adjusted)</td><td>13,869</td><td>18,650</td><td>19,161</td></tr><tr><td>P7 (adjusted)</td><td>6,143</td><td>17,667</td><td>24,748</td></tr></table> <p>For this monitoring purpose, P6: 92days, P7: 92days of C_{SF6,hist} are necessary. Therefore, the values presented in the PDD are re-calculated on a pro-rata basis.</p>				Fab	Yearly SF ₆ consumption (kg)			'06	'07	'08	P6 (in the PDD)	55,024	73,990	76,226	P7 (in the PDD)	24,371	70,092	98,453	P6 (adjusted)	13,869	18,650	19,161	P7 (adjusted)	6,143	17,667	24,748
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Choice of data or measurement methods and procedures	N/A																										
Purpose of data	Calculation of baseline emission																										
Additional comments	This parameters are used to calculate SF _{6, ratio} .																										

Data/parameter:	Historical production of LCD substrate (SP _{-i})																									
Unit	m ²																									
Description	Historical production of LCD substrate (m ²) of Plant 6 & 7 during year i (where i =-1, -2, -3) prior to the implementation of the project activity before January, 31, 2009 (Values of P6: 92days / P7: 92days, for this monitoring purpose)																									
Source of data	Production record																									
Value(s) applied	<table><tr><th rowspan="2">Fab</th><th colspan="3">Glass input (m²)</th></tr><tr><th>'06</th><th>'07</th><th>'08</th></tr><tr><td>P6 (in the PDD)</td><td>4,078,800</td><td>5,252,354</td><td>5,680,338</td></tr><tr><td>P7 (in the PDD)</td><td>2,438,002</td><td>6,020,234</td><td>7,559,469</td></tr><tr><td>P6 (adjusted)</td><td>1,028,081</td><td>1,323,881</td><td>1,427,845</td></tr><tr><td>P7 (adjusted)</td><td>614,510</td><td>1,517,429</td><td>1,900,194</td></tr></table> <p>For this monitoring purpose, P6: 92days, P7: 92days of SP_{-i} are necessary. Therefore, the values presented in the PDD are re-calculated on a pro-rata basis.</p>			Fab	Glass input (m ²)			'06	'07	'08	P6 (in the PDD)	4,078,800	5,252,354	5,680,338	P7 (in the PDD)	2,438,002	6,020,234	7,559,469	P6 (adjusted)	1,028,081	1,323,881	1,427,845	P7 (adjusted)	614,510	1,517,429	1,900,194
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Choice of data or measurement methods and procedures	N/A																									
Purpose of data	Calculation of baseline emission																									
Additional comments	This parameters are used to calculate SF _{6,ratio} .																									

Data/parameter:	Maintenance schedule for abatement device
Unit	List of maintenance requirements and checking frequency
Description	Complete maintenance schedule for the device
Source of data	Yearly plan of Operation & Maintenance team
Value(s) applied	A summary of this information has been submitted to the DOE for verification purpose.
Choice of data or measurement methods and procedures	N/A

Purpose of data	N/A
Additional comments	This data is not used for calculating emission reduction. However, reporting this data is required by the applied methodology.

Data/parameter:	Maintenance schedule for FTIR measurement devices
Unit	List of maintenance requirements and checking frequency
Description	Complete maintenance schedule for the device
Source of data	Yearly plan of Operation & Maintenance team
Value(s) applied	A summary of this information has been submitted to the DOE for verification purpose.
Choice of data or measurement methods and procedures	N/A
Purpose of data	N/A
Additional comments	This data is not used for calculating emission reduction. However, reporting this data is required by the applied methodology. * Maintenance on the FTIR is regularly conducted in June every year on the occasion of AST (Annual Surveillance Test), even if there is no signal to malfunctioning. At these time, recalibration is carried out. The official supplier, Joowon Industrial Co., of the FTIR, does not request, or recommend cleaning and replacement of FTIR window at regular frequency.

Data/parameter:	Maintenance schedule for QMS measurement devices
Unit	List of maintenance requirements and checking frequency
Description	Complete maintenance schedule for the device
Source of data	Yearly plan of Operation & Maintenance team
Value(s) applied	A summary of this information has been submitted to the DOE for verification purpose.
Choice of data or measurement methods and procedures	N/A
Purpose of data	N/A
Additional comments	This data is not used for calculating emission reduction. However, reporting this data is required by the applied methodology.

Data/parameter:	Maintenance schedule for Annubar devices
Unit	List of maintenance requirements and checking frequency
Description	Complete maintenance schedule for the device
Source of data	Yearly plan of Operation & Maintenance team
Value(s) applied	A summary of this information has been submitted to the DOE for verification purpose.
Choice of data or measurement methods and procedures	N/A
Purpose of data	N/A
Additional comments	This data is not used for calculating emission reduction. However, reporting this data is required by the applied methodology.

Data/parameter:	EF _{grid,CM,y}
Unit	tCO ₂ /MWh

Description	Combined margin CO ₂ emission factor for grid connected power generation using ex-ante option of three most recent years of available data for the OM and the most recent information available at the time of submission for validation to the DOE for BM.
Source of data	Values have been calculated using the “Tool to calculate the emission factor for an electricity system v.2”
Value(s) applied	0.5708
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of project emission
Additional comments	This data has been verified by the DOE which validated the project and will be used for the whole crediting period of the project.

Data/parameter:	$C_{p.in}$
Unit	dimensionless
Description	Pitot tubes or Averaging Pitot Tube coefficient of the inlet Annubar device
Source of data	Annubar device manufacturer specification
Value(s) applied	1
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of baseline emission
Additional comments	N/A

Data/parameter:	$C_{p.out}$
Unit	dimensionless
Description	Pitot tubes or Averaging Pitot Tube coefficient of the outlet Annubar device
Source of data	Annubar device manufacturer specification
Value(s) applied	1
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of project emission
Additional comments	N/A

Data/parameter:	Cross sectional area of the inlet stack (A_{in})
Unit	m ²
Description	The cross sectional of the circular inlet stack, which should be greater than 0.3 m in diameter.
Source of data	Supplier's specification
Value(s) applied	0.0961625
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of baseline emission
Additional comments	0.175m * 0.175m*3.14 (Diameter of the inlet stack is 0.35m)

Data/parameter:	Cross sectional area of the outlet stack (A_{out})
Unit	m ²

Description	The cross sectional of the circular outlet stack, which should be greater than 0.3 m in diameter.
Source of data	Supplier's specification
Value(s) applied	0.2826
Choice of data or measurement methods and procedures	N/A
Purpose of data	Calculation of project emission
Additional comments	0.3m * 0.3m*3.14 (Diameter of the outlet stack is 0.6m)

D.2. Data and parameters monitored

[Plant 6 in Gumi]

Data/parameter:	$E_{SF6,in,y}$
Unit	Tonnes
Description	Mass of SF ₆ gas entering the abatement device in year y
Measured/calculated/default	Calculated
Source of data	Data processing program and Daily/weekly/monthly logs
Value(s) of monitored parameter	5.698
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	Sum of daily $E_{SF6,in}$
QA/QC procedures:	Daily sum of $E_{SF6,in}$ value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	$C_{SF6,y}$
Unit	Tonnes
Description	Annual consumption of SF ₆ during the project year y, defined as the total SF ₆ purchased in a specific project year y taking into account the change in inventory in the same year.
Measured/calculated/default	Calculated
Source of data	Purchase records, monthly records on SF ₆ inventory change and cylinder replacement records.
Value(s) of monitored parameter	12.150
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	(Total SF ₆ purchase Amount – Inventory change) * (100%-10% of heel value)

QA/QC procedures:	This data is cross-checked with official purchase records and inventory data is measured and recorded at the beginning and end of each month. Residual gas quantity (Heel value), which is smaller than 10%, is measured and recorded every replacement. The average value of the residual gas quantity during the monitoring period is 6.0%. However, for more conservative calculation, 10% of heel value is applied in the emission reduction calculation.
Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	SP _{project,y}
Unit	m ²
Description	Production of LCD substrate during the project year y
Measured/calculated/default	Measured
Source of data	Manufacturing Execution system of LG Display
Value(s) of monitored parameter	913,937
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check with LGD's monthly & annual production summary reports
Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	ESF _{6,in}
Unit	g/sec
Description	Emissions of SF ₆ gas measured at the inlet of the SF ₆ abatement system
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.74
Monitoring equipment	Inlet QMS, FTIR and Annubar devices
Measuring/reading/recording frequency:	Once per second
Calculation method (if applicable):	Equation 14 in the applied methodology $ESF_{6in} = 65.18Q_{in} [SF_{6in}]$
QA/QC procedures:	Daily sum of ESF _{6,in} value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor "continuously", actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of V _{s,in} , V _{s,out} , Q _{in} , Q _{out} , ESF _{6,in} and ESF _{6,out} using each real-time value of P _{s,in} , P _{s,out} , T _{s,in} , T _{s,out} , P _{avg,in} , P _{avg,out} and SF ₆ concentration and fixed values of M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} which were determined with separated investigation called "experimental setup" in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$E_{SF6,out}$
Unit	g/sec
Description	Emissions of SF_6 gas measured at the outlet of the SF_6 abatement system
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.01
Monitoring equipment	Outlet QMS, FTIR and Annubar devices
Measuring/reading/recording frequency:	Once per second
Calculation method (if applicable):	Equation 15 in the applied methodology $E_{SF6,out} = 65.18Q_{out} [SF_{6out}]$
QA/QC procedures:	Daily sum of $E_{SF6,out}$ value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$M_{s,in}$
Unit	g/mole
Description	Maximum molecular weight of inlet stack gas, wet basis
Measured/calculated/default	Calculated
Source of data	Data processing program, inlet QMS and water vapour measurement report
Value(s) of monitored parameter	28.341
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year, at least
Calculation method (if applicable):	Equation 8 in the applied methodology $M_{s,in} = M_{d,in} \cdot (100 - B_{ws,in}) / 100 + 0.18B_{ws,in}$
QA/QC procedures:	This is a calculated data through measured $M_{d,in}$ and $B_{ws,in}$. Therefore, QA/QC procedures for $M_{s,in}$ follow those of $M_{d,in}$ and $B_{ws,in}$.
Purpose of data:	Calculation of baseline emission
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$ and $B_{ws,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$M_{s,out}$
Unit	g/mole
Description	Minimum molecular weight of outlet stack gas, wet basis
Measured/calculated/default	Calculated

Source of data	Data processing program, outlet QMS and a water vapour measurement report
Value(s) of monitored parameter	27.407
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year, at least
Calculation method (if applicable):	Equation 9 in the applied methodology $M_{s,out} = M_{d,out} \cdot (100 - B_{ws,out}) / 100 + 0.18B_{ws,out}$
QA/QC procedures:	This is a calculated data through measured $M_{d,out}$ and $B_{ws,out}$. Therefore, QA/QC procedures for $M_{s,out}$ follow those of $M_{d,out}$ and $B_{ws,out}$.
Purpose of data:	Calculation of project emission
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$ and $B_{ws,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	M _{d,in}														
Unit	g/mole														
Description	Molecular weight of inlet stack gas (dry basis)														
Measured/calculated/default	Calculated														
Source of data	From inlet QMS and an analyzing result report														
Value(s) of monitored parameter	28.840														
Monitoring equipment	<table><tr><td colspan="2">Inlet QMS</td></tr><tr><td>Type</td><td>Quadruple Mass spectrometry</td></tr><tr><td>Accuracy class</td><td>±3%</td></tr><tr><td>Serial number</td><td>2X31131</td></tr><tr><td>Calibration frequency</td><td>Once a year</td></tr><tr><td>Date of last Calibration</td><td>07/06/2012</td></tr><tr><td>Validity</td><td>06/06/2013</td></tr></table>	Inlet QMS		Type	Quadruple Mass spectrometry	Accuracy class	±3%	Serial number	2X31131	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Inlet QMS															
Type	Quadruple Mass spectrometry														
Accuracy class	±3%														
Serial number	2X31131														
Calibration frequency	Once a year														
Date of last Calibration	07/06/2012														
Validity	06/06/2013														
Measuring/reading/recording frequency:	Once per year, at least														
Calculation method (if applicable):	Equation 6 in the applied methodology and relevant clauses thereof. M _{d,in} = 1.460[SF _{6in}] + 0.440[CO _{2in}] + 0.320[O _{2in}] + 0.280[N _{2in}] + 0.399[Ar _{in}] + 1.021[SO ₂ F _{2in}] + 0.040[He _{in}]														
QA/QC procedures:	QMS was calibrated with all components having more than 100 ppmv concentrations in inlet gas, which include SF ₆ , CO ₂ , O ₂ , N ₂ , Ar, SO ₂ F ₂ and He. And the applied value of M _{d,in} is higher than the actual maximum value of M _{d,in} (rounded up) during the 6 hours measuring period and this makes the emission reduction result more conservative. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	M _{d,in} , M _{d,out} , B _{ws,in} and B _{ws,out} were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.														

Data/parameter:	$M_{d,out}$
Unit	g/mole
Description	Molecular weight of outlet stack gas (dry basis)
Measured/calculated/default	Calculated
Source of data	From outlet QMS and an analyzing result report
Value(s) of monitored parameter	29.080

Monitoring equipment	Outlet QMS	
	Type	Quadruple Mass spectrometry
	Accuracy class	±3%
	Serial number	2X31132
	Calibration frequency	Once a year
	Date of last Calibration	07/06/2012
	Validity	06/06/2013
Measuring/reading/recording frequency:	Once per year, at least	
Calculation method (if applicable):	Equation 7 in the applied methodology and relevant clauses thereof. $M_{d,out} = 1.460[SF_{6in}] + 0.440[CO_{2out}] + 0.320[O_{2out}] + 0.280[N_{2out}] + 0.399[Ar_{out}] + 0.040[He_{out}]$	
QA/QC procedures:	QMS was calibrated with all components having more than 100 ppmv concentrations in outlet gas, which include CO ₂ , O ₂ , N ₂ , Ar and He. And the applied value of M _{d,out} is lower than the actual maximum value of M _{d,out} (rounded down) during the 6 hours measuring period and this makes the emission reduction result more conservative More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.	
Purpose of data:	Calculation of project emission	
Additional comments:	M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.	

Data/parameter:	B _{ws,in}												
Unit	dimensionless (percentage volume fraction)												
Description	The proportion of water in the inlet gas stream measured using EPA method 4, and used to calculate the inlet gas molecular weight.												
Measured/calculated/default	Measured												
Source of data	a measurement report												
Value(s) of monitored parameter	4.6												
Monitoring equipment	<div>This data was measured by an independent measurement company in accordance with the EPA method.</div> <div>Inlet water proportion analyser</div> <table><tr><td>Type</td><td>Gas Sampling Analyzer</td></tr><tr><td>Accuracy class</td><td>±5%</td></tr><tr><td>Serial number</td><td>80-091100-1</td></tr><tr><td>Calibration frequency</td><td>Once per 2 years</td></tr><tr><td>Date of last Calibration</td><td>13/12/2010</td></tr><tr><td>Validity</td><td>12/12/2012</td></tr></table>	Type	Gas Sampling Analyzer	Accuracy class	±5%	Serial number	80-091100-1	Calibration frequency	Once per 2 years	Date of last Calibration	13/12/2010	Validity	12/12/2012
Type	Gas Sampling Analyzer												
Accuracy class	±5%												
Serial number	80-091100-1												
Calibration frequency	Once per 2 years												
Date of last Calibration	13/12/2010												
Validity	12/12/2012												
Measuring/reading/recording frequency:	Once per year, at least												
Calculation method (if applicable):	This value was measured by an independent measuring and analyzing company and the entire measurement procedure followed EPA method 4.												
QA/QC procedures:	<div>This measurement was done for 6 hours during normal manufacturing conditions. The averaged proportion of water during the 6 hours period is used to calculate the inlet gas stream density.</div> <div>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</div>												
Purpose of data:	Calculation of baseline emission												
Additional comments:	M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.												

Data/parameter:	$B_{ws,out}$												
Unit	dimensionless (percentage volume fraction)												
Description	The proportion of water in the outlet gas stream measured using EPA method 4, and used to calculate the outlet gas molecular weight.												
Measured/calculated/default	Measured												
Source of data	a measurement report												
Value(s) of monitored parameter	15.1												
Monitoring equipment	<p>This data was measured by an independent measurement company in accordance with the EPA method.</p> <p>Outlet water proportion analyser</p> <table border="1"> <tr> <td>Type</td><td>Gas Sampling Analyzer</td></tr> <tr> <td>Accuracy class</td><td>±5%</td></tr> <tr> <td>Serial number</td><td>601023</td></tr> <tr> <td>Calibration frequency</td><td>Once per 2 years</td></tr> <tr> <td>Date of last Calibration</td><td>29/05/2012</td></tr> <tr> <td>Validity</td><td>28/05/2014</td></tr> </table>	Type	Gas Sampling Analyzer	Accuracy class	±5%	Serial number	601023	Calibration frequency	Once per 2 years	Date of last Calibration	29/05/2012	Validity	28/05/2014
Type	Gas Sampling Analyzer												
Accuracy class	±5%												
Serial number	601023												
Calibration frequency	Once per 2 years												
Date of last Calibration	29/05/2012												
Validity	28/05/2014												
Measuring/reading/recording frequency:	Once per year, at least												
Calculation method (if applicable):	This value was measured by an independent measuring and analyzing company and the entire measurement procedure followed EPA method 4.												
QA/QC procedures:	<p>This measurement was done for 6 hours during normal manufacturing conditions. The averaged proportion of water during the 6 hours period is used to calculate the inlet gas stream density.</p> <p>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</p>												
Purpose of data:	Calculation of project emission												
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.												

Data/parameter:	Absolute inlet stack pressure ($P_{s,in}$)												
Unit	mmHg												
Description	The inlet stack pressure measured during manufacturing operations												
Measured/calculated/default	Measured												
Source of data	From inlet Annubar												
Value(s) of monitored parameter	825												
Monitoring equipment	<p>Inlet Annubar</p> <table border="1"> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td></tr> <tr> <td>Accuracy class</td><td>±3%</td></tr> <tr> <td>Serial number</td><td>72742A</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Date of last Calibration</td><td>07/06/2012</td></tr> <tr> <td>Validity</td><td>06/06/2013</td></tr> </table>	Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	72742A	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Type	Differential Pressure-Pitot tube												
Accuracy class	±3%												
Serial number	72742A												
Calibration frequency	Once a year												
Date of last Calibration	07/06/2012												
Validity	06/06/2013												
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.												
Calculation method (if applicable):	N/A												
QA/QC procedures:	This value is measured in accordance with the EPA guideline.												
Purpose of data:	Calculation of baseline emission												

Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.
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Data/parameter:	Absolute outlet stack pressure ($P_{s,out}$)	
Unit	mmHg	
Description	The outlet stack pressure measured during manufacturing operations	
Measured/calculated/default	Measured	
Source of data	From outlet Annubar	
Value(s) of monitored parameter	760	
Monitoring equipment	Outlet Annubar	
	Type	Differential Pressure-Pitot tube
	Accuracy class	$\pm 3\%$
	Serial number	69453B
	Calibration frequency	Once a year
	Date of last Calibration	07/06/2012
	Validity	06/06/2013
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.	
Calculation method (if applicable):	N/A	
QA/QC procedures:	This value is measured in accordance with the EPA guideline.	
Purpose of data:	Calculation of project emission	
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.	

Data/parameter:	Absolute inlet stack temperature ($T_{s,in}$)	
Unit	K	
Description	The inlet stack temperature measured during manufacturing operations	
Measured/calculated/default	Measured	
Source of data	From inlet Annubar	
Value(s) of monitored parameter	305K (32 °C + 273 °C)	

Monitoring equipment	Inlet Annubar	
	Type	Differential Pressure-Pitot tube
	Accuracy class	±3%
	Serial number	72742A
	Calibration frequency	Once a year
	Date of last Calibration	07/06/2012
	Validity	06/06/2013
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.	
Calculation method (if applicable):	N/A	
QA/QC procedures:	This value is measured in accordance with the EPA guideline.	
Purpose of data:	Calculation of baseline emission	
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $ESF6_{in}$ and $ESF6_{out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>	

Data/parameter:	Absolute outlet stack temperature ($T_{s,out}$)	
Unit	K	
Description	The outlet stack temperature measured during manufacturing operations	
Measured/calculated/default	Measured	
Source of data	From outlet Annubar	
Value(s) of monitored parameter	331K (58 °C+273 °C)	
Monitoring equipment	Outlet Annubar	
	Type	Differential Pressure-Pitot tube
	Accuracy class	±3%
	Serial number	69453B
	Calibration frequency	Once a year
	Date of last Calibration	07/06/2012
	Validity	06/06/2013
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.	
Calculation method (if applicable):	N/A	
QA/QC procedures:	This value is measured in accordance with the EPA guideline.	
Purpose of data:	Calculation of project emission	
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.	

Data/parameter:	Velocity head measurement by inlet Annubar device ($p_{avg,in}$)														
Unit	mmH ₂ O														
Description	The averaged velocity head measurement used to calculate the inlet gas velocity														
Measured/calculated/default	Measured														
Source of data	From inlet Annubar														
Value(s) of monitored parameter	1.29														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Inlet Annubar</td> </tr> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td> </tr> <tr> <td>Accuracy class</td><td>±3%</td> </tr> <tr> <td>Serial number</td><td>72742A</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>07/06/2012</td> </tr> <tr> <td>Validity</td><td>06/06/2013</td> </tr> </table>	Inlet Annubar		Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	72742A	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Inlet Annubar															
Type	Differential Pressure-Pitot tube														
Accuracy class	±3%														
Serial number	72742A														
Calibration frequency	Once a year														
Date of last Calibration	07/06/2012														
Validity	06/06/2013														
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.														
Calculation method (if applicable):	N/A														
QA/QC procedures:	This value is measured in accordance with the EPA guideline.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>														

Data/parameter:	Velocity head measurement by outlet Annubar device ($p_{avg,out}$)														
Unit	mmH ₂ O														
Description	The averaged velocity head measurement used to calculate the outlet gas velocity														
Measured/calculated/default	Measured														
Source of data	From outlet Annubar														
Value(s) of monitored parameter	0.81														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Outlet Annubar</td> </tr> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td> </tr> <tr> <td>Accuracy class</td><td>±3%</td> </tr> <tr> <td>Serial number</td><td>69453B</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>07/06/2012</td> </tr> <tr> <td>Validity</td><td>06/06/2013</td> </tr> </table>	Outlet Annubar		Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	69453B	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Outlet Annubar															
Type	Differential Pressure-Pitot tube														
Accuracy class	±3%														
Serial number	69453B														
Calibration frequency	Once a year														
Date of last Calibration	07/06/2012														
Validity	06/06/2013														
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.														
Calculation method (if applicable):	N/A														
QA/QC procedures:	This value is measured in accordance with the EPA guideline.														
Purpose of data:	Calculation of project emission														

Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>
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Data/parameter:	Inlet gas velocity ($v_{s,in}$)
Unit	m/sec
Description	Inlet gas velocity
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	4.54
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,in}$.
Calculation method (if applicable):	<p>Equation 10 in the applied methodology</p> $v_{s,in} = K_p \cdot C_{p,in} \sqrt{P_{avg,in}} \sqrt{\frac{T_{s,in}}{P_{s,in} \cdot M_{s,in}}}$
QA/QC procedures:	<p>Any SF_6 emitted during periods of times where the gas velocity measured at the inlet decreases by more than 5%, compared to the averaged velocity, is completely discounted from the baseline emission.</p> <p>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</p>
Purpose of data:	Calculation of baseline emission
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>

Data/parameter:	Outlet gas velocity ($v_{s,out}$)
Unit	m/sec
Description	Outlet gas velocity
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	3.96
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,out}$
Calculation method (if applicable):	<p>Equation 11 in the applied methodology</p> $v_{s,out} = K_p \cdot C_{p,out} \sqrt{P_{avg,out}} \sqrt{\frac{T_{s,out}}{P_{s,out} \cdot M_{s,out}}}$

QA/QC procedures:	Any SF ₆ emitted during periods of times where the gas velocity measured at the outlet increases by more than 5%, compared to the averaged velocity, is completely discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF ₆ concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Inlet stack volumetric flow rate (Q_{in})
Unit	m ³ /sec
Description	Inlet volumetric flow rate
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.43
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,in}$.
Calculation method (if applicable):	Equation 12 in the applied methodology $Q_{in} = \{(100 - B_{ws,in}) \div 100\} V_{s,in} \cdot A_{in} \left[\frac{T_{std} \cdot P_{s,in}}{T_{s,in} \cdot P_{std}} \right]$
QA/QC procedures:	Any SF ₆ emissions measured when the value of the gas flow measured at the inlet of the abatement system during the monitoring period decreases by more than 5%, compared to the baseline flow rate measured, is discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF ₆ concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Outlet stack volumetric flow rate (Q_{out})
Unit	m ³ /sec
Description	Outlet volumetric flow rate
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.84

Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,out}$.
Calculation method (if applicable):	Equation 13 in the applied methodology $Q_{out} = \{(100 - B_{ws,out}) \div 100\} V_{s,out} \cdot A_{out} \left[\frac{T_{std} \cdot P_{s,out}}{T_{s,out} \cdot P_{std}} \right]$
QA/QC procedures:	Any SF6 emissions measured when the value of the gas flow measured at the outlet of the abatement system during the monitoring period increases by more than 5%, compared to the baseline flow rate measured, is discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Inlet SF6 concentration														
Unit	ppm														
Description	Inlet SF6 concentration measured by FTIR														
Measured/calculated/default	Measured														
Source of data	From inlet FTIR														
Value(s) of monitored parameter	260.7														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Inlet FTIR</td></tr> <tr> <td>Type</td><td>FT-IR spectrometry</td></tr> <tr> <td>Accuracy class</td><td>±2%</td></tr> <tr> <td>Serial number</td><td>580</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Date of last Calibration</td><td>07/06/2012</td></tr> <tr> <td>Validity</td><td>06/06/2013</td></tr> </table>	Inlet FTIR		Type	FT-IR spectrometry	Accuracy class	±2%	Serial number	580	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Inlet FTIR															
Type	FT-IR spectrometry														
Accuracy class	±2%														
Serial number	580														
Calibration frequency	Once a year														
Date of last Calibration	07/06/2012														
Validity	06/06/2013														
Measuring/reading/recording frequency:	Once per 40 seconds														
Calculation method (if applicable):	N/A														
QA/QC procedures:	FTIR shall be calibrated in accordance with the Methodology requirement. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.														

Data/parameter:	Outlet SF6 concentration														
Unit	ppm														
Description	Outlet SF6 concentration measured by FTIR														
Measured/calculated/default	Measured														
Source of data	From outlet FTIR														
Value(s) of monitored parameter	2.0														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Outlet FTIR</td> </tr> <tr> <td>Type</td><td>FT-IR spectrometry</td> </tr> <tr> <td>Accuracy class</td><td>±2%</td> </tr> <tr> <td>Serial number</td><td>581</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>07/06/2012</td> </tr> <tr> <td>Validity</td><td>06/06/2013</td> </tr> </table>	Outlet FTIR		Type	FT-IR spectrometry	Accuracy class	±2%	Serial number	581	Calibration frequency	Once a year	Date of last Calibration	07/06/2012	Validity	06/06/2013
Outlet FTIR															
Type	FT-IR spectrometry														
Accuracy class	±2%														
Serial number	581														
Calibration frequency	Once a year														
Date of last Calibration	07/06/2012														
Validity	06/06/2013														
Measuring/reading/recording frequency:	Once per 40 seconds														
Calculation method (if applicable):	N/A														
QA/QC procedures:	<p>FTIR shall be calibrated in accordance with the Methodology requirement.</p> <p>The average SF6 concentration in the outlet of the abatement system is lower than 0.1 ppm which is confirmed by sampling & analyzing result implemented through more sensitive FTIR that can detect 0.1ppm of SF6. However, considering that the SF6 detection range of the installed outlet FTIR is 2 ppm, any values below 2 ppm in outlet is counted as 2 ppm for more conservative calculation.</p> <p>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</p>														
Purpose of data:	Calculation of project emission														
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>														

Data/parameter:	$FC_{i,j,y}$ volume unit per year of natural gas consumed by the abatement device.
Unit	Nm ³
Description	Quantity of natural gas combusted in the abatement process during the year y
Measured/calculated/default	Measured
Source of data	LNG flow-meter
Value(s) of monitored parameter	295,071 Nm ³

Monitoring equipment	LNG flow meter	
	Type	LNG flow meter
	Accuracy class	±2% (Grade 2, certified by Youngnam Energy Service)
	Serial number	606920
	Calibration frequency	Once per 8years
	Date of last Calibration	21/07/2010
	Validity	20/07/2018
Measuring/reading/recording frequency:	Monitored continuously and recorded once per minute. Calculating Frequency: Once per the given monitoring period	
Calculation method (if applicable):	N/A	
QA/QC procedures:	The flow meter will be maintained by Korea Gas Corporation (a public enterprise). The value recorded in the system is 295,071 Nm ³ and the applied value comes from daily log book manually recorded by operators. The latter data recorded by operators has human errors as checking time of the meter cannot be exactly same for everyday. Nevertheless, the latter value is applied as it is higher than the system value. This is one of conservative approaches made for the emission reductions calculation.	
Purpose of data:	Calculation of project emission	
Additional comments:	-	

Data/parameter:	$W_{C,i,y}$
Unit	tC/tLNG
Description	Weighted average mass fraction of carbon in natural gas in year y
Measured/calculated/default	Default
Source of data	Information provided by Korea Gas Corporation
Value(s) of monitored parameter	0.751
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year
Calculation method (if applicable):	N/A
QA/QC procedures:	This is a standard value provided by Korea Gas Corporation and an official letter from Korean Gas Corporation regarding the above value has been provided to the DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	N/A

Data/parameter:	$\rho_{i,y}$
Unit	t natural gas/ m ³ natural gas
Description	Weighted average density of natural gas in year y
Measured/calculated/default	Default
Source of data	Korea Gas Corporation
Value(s) of monitored parameter	0.7934×10^{-3} t natural gas/ m ³ natural gas
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year
Calculation method (if applicable):	N/A

QA/QC procedures:	This is a standard value provided by Korea Gas Corporation and an official letter from Korean Gas Corporation regarding the above value has been provided to the DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	N/A

Data/parameter:	EC _y
Unit	kWh
Description	Electricity Consumption in year y
Measured/calculated/default	Measured
Source of data	Logbooks and 6 electricity meters
Value(s) of monitored parameter	281,063 kWh

Monitoring equipment	Electricity meter #1	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	97001891
	Calibration frequency	Once per 7 years
	Date of last Calibration	20/12/2009
	Validity	19/12/2016
	Electricity meter #2	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	90064842
	Calibration frequency	Once per 10 years
	Date of last Calibration	10/12/2009
	Validity	09/12/2019
	Electricity meter #3	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	98001026
	Calibration frequency	Once per 7 years
	Date of last Calibration	30/09/2009
	Validity	29/09/2016
	Electricity meter #4	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	9084449
	Calibration frequency	Once per 7 years
	Date of last Calibration	13/01/2009
Validity	12/01/2016	
Electricity meter #5		
Type	Electricity meter	
Accuracy class	±2% (Grade 2, Certified by KEPCO)	
Serial number	90064836	
Calibration frequency	Once per 10 years	
Date of last Calibration	10/12/2009	
Validity	09/12/2019	
Electricity meter #6		
Type	Electricity meter	
Accuracy class	±2% (Grade 2, Certified by KEPCO)	
Serial number	90064868	
Calibration frequency	Once per 10 years	
Date of last Calibration	10/10/2009	
Validity	09/10/2019	
Measuring/reading/recording frequency:	Recording Frequency: Once per second Calculating Frequency: Once per the given monitoring period	
Calculation method (if applicable):	N/A	

QA/QC procedures:	Data from logbooks and electrically gathered data from each electricity meter may be different from each other due to communication noise or transmission errors. If both data do not perfectly match, higher value shall be applied for more conservative outcome. The value recorded in the system 281,063 kWh is greater than daily log book data (281,063 kWh) manually recorded by operators. The greater value is applied for conservativeness.
Purpose of data:	Calculation of project emission
Additional comments:	N/A

[Plant 7 in Paju]

Data/parameter:	$E_{SF6,in,y}$
Unit	Tonnes
Description	Mass of SF ₆ gas entering the abatement device in year y
Measured/calculated/default	Calculated
Source of data	Data processing program and Daily/weekly/monthly logs
Value(s) of monitored parameter	15.247
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	Sum of daily $E_{SF6,in}$
QA/QC procedures:	Daily sum of $E_{SF6,in}$ value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	$C_{SF6,y}$
Unit	Tonnes
Description	Annual consumption of SF ₆ during the project year y, defined as the total SF ₆ purchased in a specific project year y taking into account the change in inventory in the same year.
Measured/calculated/default	Calculated
Source of data	Purchase records, monthly records on SF ₆ inventory change and cylinder replacement records.
Value(s) of monitored parameter	33.924
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	(Total SF ₆ purchase Amount – Inventory change) * (100%-10% of heel value)
QA/QC procedures:	This data is cross-checked with official purchase records and inventory data is measured and recorded at the beginning and end of each month. Residual gas quantity (Heel value), which is smaller than 10%, is measured and recorded every replacement. The average value of the residual gas quantity during the monitoring period is 6.0%. However, for more conservative calculation, 10% of heel value is applied in the emission reduction calculation.

Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	SP _{project,y}
Unit	m ²
Description	Production of LCD substrate during the project year y
Measured/calculated/default	Measured
Source of data	Manufacturing Execution system of LG Display
Value(s) of monitored parameter	2,540,525
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year or a monitoring period, whichever is shorter.
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check with LGD's monthly & annual production summary reports
Purpose of data:	Calculation of baseline emission
Additional comments:	N/A

Data/parameter:	E _{SF6,in}
Unit	g/sec
Description	Emissions of SF ₆ gas measured at the inlet of the SF ₆ abatement system
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	1.95
Monitoring equipment	Inlet QMS, FTIR and Annubar devices
Measuring/reading/recording frequency:	Once per second
Calculation method (if applicable):	Equation 14 in the applied methodology $E_{SF6,in} = 65.18Q_{in} [SF_{6in}]$
QA/QC procedures:	Daily sum of E _{SF6,in} value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor "continuously", actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of V _{s,in} , V _{s,out} , Q _{in} , Q _{out} , E _{SF6,in} and E _{SF6,out} using each real-time value of P _{s,in} , P _{s,out} , T _{s,in} , T _{s,out} , P _{avg,in} , P _{avg,out} and SF ₆ concentration and fixed values of M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} which were determined with separated investigation called "experimental setup" in AM0078. Please see more details in the spreadsheet.

Data/parameter:	E _{SF6,out}
Unit	g/sec
Description	Emissions of SF ₆ gas measured at the outlet of the SF ₆ abatement system
Measured/calculated/default	Calculated

Source of data	Data processing program
Value(s) of monitored parameter	0.01
Monitoring equipment	Outlet QMS, FTIR and Annubar devices
Measuring/reading/recording frequency:	Once per second
Calculation method (if applicable):	Equation 15 in the applied methodology $E_{SF6,out} = 65.18Q_{out} [SF_{6,out}]$
QA/QC procedures:	Daily sum of $E_{SF6,out}$ value is automatically calculated by a data processing program and recorded in a daily log by operators. The log is double-checked by the head of O&M team and sum of weekly and monthly data are reported to the project participants periodically. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$M_{s,in}$
Unit	g/mole
Description	Maximum molecular weight of inlet stack gas, wet basis
Measured/calculated/default	Calculated
Source of data	Data processing program, inlet QMS and water vapour measurement report
Value(s) of monitored parameter	29.205
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year, at least
Calculation method (if applicable):	Equation 8 in the applied methodology $M_{s,in} = M_{d,in} \cdot (100 - B_{ws,in}) / 100 + 0.18B_{ws,in}$
QA/QC procedures:	This is a calculated data through measured $M_{d,in}$ and $B_{ws,in}$. Therefore, QA/QC procedures for $M_{s,in}$ follow those of $M_{d,in}$ and $B_{ws,in}$.
Purpose of data:	Calculation of baseline emission
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$ and $B_{ws,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$M_{s,out}$
Unit	g/mole
Description	Minimum molecular weight of outlet stack gas, wet basis
Measured/calculated/default	Calculated
Source of data	Data processing program, outlet QMS and a water vapour measurement report
Value(s) of monitored parameter	27.697

Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year, at least
Calculation method (if applicable):	Equation 9 in the applied methodology $M_{s,out} = M_{d,out} \cdot (100 - B_{ws,out}) / 100 + 0.18B_{ws,out}$
QA/QC procedures:	This is a calculated data through measured $M_{d,out}$ and $B_{ws,out}$. Therefore, QA/QC procedures for $M_{s,out}$ follow those of $M_{d,out}$ and $B_{ws,out}$.
Purpose of data:	Calculation of project emission
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$ and $B_{ws,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	$M_{d,in}$														
Unit	g/mole														
Description	Molecular weight of inlet stack gas (dry basis)														
Measured/calculated/default	Calculated														
Source of data	From inlet QMS and an analyzing result report														
Value(s) of monitored parameter	29.820														
Monitoring equipment	<table border="1"> <tr><td colspan="2">Inlet QMS</td></tr> <tr><td>Type</td><td>Quadruple Mass spectrometry</td></tr> <tr><td>Accuracy class</td><td>±3%</td></tr> <tr><td>Serial number</td><td>60321</td></tr> <tr><td>Calibration frequency</td><td>Once a year</td></tr> <tr><td>Date of last Calibration</td><td>26/06/2012</td></tr> <tr><td>Validity</td><td>25/06/2013</td></tr> </table>	Inlet QMS		Type	Quadruple Mass spectrometry	Accuracy class	±3%	Serial number	60321	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Inlet QMS															
Type	Quadruple Mass spectrometry														
Accuracy class	±3%														
Serial number	60321														
Calibration frequency	Once a year														
Date of last Calibration	26/06/2012														
Validity	25/06/2013														
Measuring/reading/recording frequency:	Once per year, at least														
Calculation method (if applicable):	Equation 6 in the applied methodology and relevant clauses thereof. $M_{d,in} = 1.460[SF_{6in}] + 0.440[CO_{2in}] + 0.320[O_{2in}] + 0.280[N_{2in}] + 0.399[Ar_{in}] + 1.021[SO_2F_{2in}] + 0.040[He_{in}]$														
QA/QC procedures:	QMS was calibrated with all components having more than 100 ppmv concentrations in inlet gas, which include SF ₆ , CO ₂ , O ₂ , N ₂ , Ar, SO ₂ F ₂ and He. And the applied value of $M_{d,in}$ is higher than the actual maximum value of $M_{d,in}$ (rounded up) during the 6 hours measuring period and this makes the emission reduction result more conservative. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$ and $B_{ws,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.														

Data/parameter:	$M_{d,out}$
Unit	g/mole
Description	Molecular weight of outlet stack gas (dry basis)
Measured/calculated/default	Calculated
Source of data	From outlet QMS and an analyzing result report
Value(s) of monitored parameter	28.970

Monitoring equipment	Outlet QMS	
	Type	Quadruple Mass spectrometry
	Accuracy class	±3%
	Serial number	60320
	Calibration frequency	Once a year
	Date of last Calibration	26/06/2012
	Validity	25/06/2013
Measuring/reading/recording frequency:	Once per year, at least	
Calculation method (if applicable):	Equation 7 in the applied methodology and relevant clauses thereof. $M_{d,out} = 1.460[SF_{6in}] + 0.440[CO_{2out}] + 0.320[O_{2out}] + 0.280[N_{2out}] + 0.399[Ar_{out}] + 0.040[He_{out}]$	
QA/QC procedures:	QMS was calibrated with all components having more than 100 ppmv concentrations in outlet gas, which include CO ₂ , O ₂ , N ₂ , Ar and He. And the applied value of M _{d,out} is lower than the actual maximum value of M _{d,out} (rounded down) during the 6 hours measuring period and this makes the emission reduction result more conservative More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.	
Purpose of data:	Calculation of project emission	
Additional comments:	M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.	

Data/parameter:	B _{ws,in}												
Unit	dimensionless (percentage volume fraction)												
Description	The proportion of water in the inlet gas stream measured using EPA method 4, and used to calculate the inlet gas molecular weight.												
Measured/calculated/default	Measured												
Source of data	a measurement report												
Value(s) of monitored parameter	5.2												
Monitoring equipment	<div>This data was measured by an independent measurement company in accordance with the EPA method.</div> <div>Inlet water proportion analyser</div> <table><tr><td>Type</td><td>Gas Sampling Analyzer</td></tr><tr><td>Accuracy class</td><td>±5%</td></tr><tr><td>Serial number</td><td>80-091100-1</td></tr><tr><td>Calibration frequency</td><td>Once per 2 years</td></tr><tr><td>Date of last Calibration</td><td>13/12/2010</td></tr><tr><td>Validity</td><td>12/12/2012</td></tr></table>	Type	Gas Sampling Analyzer	Accuracy class	±5%	Serial number	80-091100-1	Calibration frequency	Once per 2 years	Date of last Calibration	13/12/2010	Validity	12/12/2012
Type	Gas Sampling Analyzer												
Accuracy class	±5%												
Serial number	80-091100-1												
Calibration frequency	Once per 2 years												
Date of last Calibration	13/12/2010												
Validity	12/12/2012												
Measuring/reading/recording frequency:	Once per year, at least												
Calculation method (if applicable):	This value was measured by an independent measuring and analyzing company and the entire measurement procedure followed EPA method 4.												
QA/QC procedures:	<div>This measurement was done for 6 hours during normal manufacturing conditions. The averaged proportion of water during the 6 hours period is used to calculate the inlet gas stream density.</div> <div>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</div>												
Purpose of data:	Calculation of baseline emission												
Additional comments:	M _{d,in} , M _{d,out} , B _{ws,in} , B _{ws,out} , M _{s,in} and M _{s,out} were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.												

Data/parameter:	$B_{ws,out}$												
Unit	dimensionless (percentage volume fraction)												
Description	The proportion of water in the outlet gas stream measured using EPA method 4, and used to calculate the outlet gas molecular weight.												
Measured/calculated/default	Measured												
Source of data	a measurement report												
Value(s) of monitored parameter	11.6												
Monitoring equipment	<p>This data was measured by an independent measurement company in accordance with the EPA method.</p> <p>Outlet water proportion analyser</p> <table border="1"> <tr> <td>Type</td><td>Gas Sampling Analyzer</td></tr> <tr> <td>Accuracy class</td><td>±5%</td></tr> <tr> <td>Serial number</td><td>601023</td></tr> <tr> <td>Calibration frequency</td><td>Once per 2 years</td></tr> <tr> <td>Date of last Calibration</td><td>29/05/2012</td></tr> <tr> <td>Validity</td><td>28/05/2014</td></tr> </table>	Type	Gas Sampling Analyzer	Accuracy class	±5%	Serial number	601023	Calibration frequency	Once per 2 years	Date of last Calibration	29/05/2012	Validity	28/05/2014
Type	Gas Sampling Analyzer												
Accuracy class	±5%												
Serial number	601023												
Calibration frequency	Once per 2 years												
Date of last Calibration	29/05/2012												
Validity	28/05/2014												
Measuring/reading/recording frequency:	Once per year, at least												
Calculation method (if applicable):	This value was measured by an independent measuring and analyzing company and the entire measurement procedure followed EPA method 4.												
QA/QC procedures:	<p>This measurement was done for 6 hours during normal manufacturing conditions. The averaged proportion of water during the 6 hours period is used to calculate the inlet gas stream density.</p> <p>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</p>												
Purpose of data:	Calculation of project emission												
Additional comments:	$M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.												

Data/parameter:	Absolute inlet stack pressure ($P_{s,in}$)												
Unit	mmHg												
Description	The inlet stack pressure measured during manufacturing operations												
Measured/calculated/default	Measured												
Source of data	From inlet Annubar												
Value(s) of monitored parameter	849												
Monitoring equipment	<p>Inlet Annubar</p> <table border="1"> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td></tr> <tr> <td>Accuracy class</td><td>±3%</td></tr> <tr> <td>Serial number</td><td>069453A</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Date of last Calibration</td><td>26/06/2012</td></tr> <tr> <td>Validity</td><td>25/06/2013</td></tr> </table>	Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	069453A	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Type	Differential Pressure-Pitot tube												
Accuracy class	±3%												
Serial number	069453A												
Calibration frequency	Once a year												
Date of last Calibration	26/06/2012												
Validity	25/06/2013												
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.												
Calculation method (if applicable):	N/A												
QA/QC procedures:	This value is measured in accordance with the EPA guideline.												
Purpose of data:	Calculation of baseline emission												

Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.
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Data/parameter:	Absolute outlet stack pressure ($P_{s,out}$)															
Unit	mmHg															
Description	The outlet stack pressure measured during manufacturing operations															
Measured/calculated/default	Measured															
Source of data	From outlet Annubar															
Value(s) of monitored parameter	757															
Monitoring equipment	<table><tr><td colspan="2">Outlet Annubar</td></tr><tr><td>Type</td><td>Differential Pressure-Pitot tube</td></tr><tr><td>Accuracy class</td><td>$\pm 3\%$</td></tr><tr><td>Serial number</td><td>69453B</td></tr><tr><td>Calibration frequency</td><td>Once a year</td></tr><tr><td>Date of last Calibration</td><td>26/06/2012</td></tr><tr><td>Validity</td><td>25/06/2013</td></tr></table>		Outlet Annubar		Type	Differential Pressure-Pitot tube	Accuracy class	$\pm 3\%$	Serial number	69453B	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Outlet Annubar																
Type	Differential Pressure-Pitot tube															
Accuracy class	$\pm 3\%$															
Serial number	69453B															
Calibration frequency	Once a year															
Date of last Calibration	26/06/2012															
Validity	25/06/2013															
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.															
Calculation method (if applicable):	N/A															
QA/QC procedures:	This value is measured in accordance with the EPA guideline.															
Purpose of data:	Calculation of project emission															
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>															

Data/parameter:	Absolute inlet stack temperature ($T_{s,in}$)	
Unit	K	
Description	The inlet stack temperature measured during manufacturing operations	
Measured/calculated/default	Measured	
Source of data	From inlet Annubar	
Value(s) of monitored parameter	321K (48°C+273°C)	

Monitoring equipment	Inlet Annubar	
	Type	Differential Pressure-Pitot tube
	Accuracy class	±3%
	Serial number	069453A
	Calibration frequency	Once a year
	Date of last Calibration	26/06/2012
	Validity	25/06/2013
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.	
Calculation method (if applicable):	N/A	
QA/QC procedures:	This value is measured in accordance with the EPA guideline.	
Purpose of data:	Calculation of baseline emission	
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $ESF6_{in}$ and $ESF6_{out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>	

Data/parameter:	Absolute outlet stack temperature ($T_{s,out}$)	
Unit	K	
Description	The outlet stack temperature measured during manufacturing operations	
Measured/calculated/default	Measured	
Source of data	From outlet Annubar	
Value(s) of monitored parameter	308K (35 °C+273 °C)	
Monitoring equipment	Outlet Annubar	
	Type	Differential Pressure-Pitot tube
	Accuracy class	±3%
	Serial number	076132A
	Calibration frequency	Once a year
	Date of last Calibration	26/06/2012
	Validity	25/06/2013
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.	
Calculation method (if applicable):	N/A	
QA/QC procedures:	This value is measured in accordance with the EPA guideline.	
Purpose of data:	Calculation of project emission	
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>	

Data/parameter:	Velocity head measurement by inlet Annubar device ($p_{avg,in}$)														
Unit	mmH ₂ O														
Description	The averaged velocity head measurement used to calculate the inlet gas velocity														
Measured/calculated/default	Measured														
Source of data	From inlet Annubar														
Value(s) of monitored parameter	1.45														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Inlet Annubar</td> </tr> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td> </tr> <tr> <td>Accuracy class</td><td>±3%</td> </tr> <tr> <td>Serial number</td><td>069453A</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>26/06/2012</td> </tr> <tr> <td>Validity</td><td>25/06/2013</td> </tr> </table>	Inlet Annubar		Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	069453A	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Inlet Annubar															
Type	Differential Pressure-Pitot tube														
Accuracy class	±3%														
Serial number	069453A														
Calibration frequency	Once a year														
Date of last Calibration	26/06/2012														
Validity	25/06/2013														
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,in}$.														
Calculation method (if applicable):	N/A														
QA/QC procedures:	This value is measured in accordance with the EPA guideline.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>														

Data/parameter:	Velocity head measurement by outlet Annubar device ($p_{avg,out}$)														
Unit	mmH ₂ O														
Description	The averaged velocity head measurement used to calculate the outlet gas velocity														
Measured/calculated/default	Measured														
Source of data	From outlet Annubar														
Value(s) of monitored parameter	0.97														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Outlet Annubar</td> </tr> <tr> <td>Type</td><td>Differential Pressure-Pitot tube</td> </tr> <tr> <td>Accuracy class</td><td>±3%</td> </tr> <tr> <td>Serial number</td><td>076132A</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>26/06/2012</td> </tr> <tr> <td>Validity</td><td>25/06/2013</td> </tr> </table>	Outlet Annubar		Type	Differential Pressure-Pitot tube	Accuracy class	±3%	Serial number	076132A	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Outlet Annubar															
Type	Differential Pressure-Pitot tube														
Accuracy class	±3%														
Serial number	076132A														
Calibration frequency	Once a year														
Date of last Calibration	26/06/2012														
Validity	25/06/2013														
Measuring/reading/recording frequency:	This value is monitored for every second and used to calculate $E_{SF6,out}$.														
Calculation method (if applicable):	N/A														
QA/QC procedures:	This value is measured in accordance with the EPA guideline.														
Purpose of data:	Calculation of project emission														

Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.
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Data/parameter:	Inlet gas velocity ($v_{s,in}$)
Unit	m/sec
Description	Inlet gas velocity
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	4.78
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,in}$.
Calculation method (if applicable):	Equation 10 in the applied methodology $v_{s,in} = K_p \cdot C_{p,in} \sqrt{P_{avg,in}} \sqrt{\frac{T_{s,in}}{P_{s,in} \cdot M_{s,in}}}$
QA/QC procedures:	Any SF_6 emitted during periods of times where the gas velocity measured at the inlet decreases by more than 5%, compared to the averaged velocity, is completely discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF_6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Outlet gas velocity ($v_{s,out}$)
Unit	m/sec
Description	Outlet gas velocity
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	4.18
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,out}$
Calculation method (if applicable):	Equation 11 in the applied methodology $v_{s,out} = K_p \cdot C_{p,out} \sqrt{P_{avg,out}} \sqrt{\frac{T_{s,out}}{P_{s,out} \cdot M_{s,out}}}$

QA/QC procedures:	Any SF ₆ emitted during periods of times where the gas velocity measured at the outlet increases by more than 5%, compared to the averaged velocity, is completely discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF ₆ concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Inlet stack volumetric flow rate (Q_{in})
Unit	m ³ /sec
Description	Inlet volumetric flow rate
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.45
Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,in}$.
Calculation method (if applicable):	Equation 12 in the applied methodology $Q_{in} = \{(100 - B_{ws,in}) \div 100\} V_{s,in} \cdot A_{in} \left[\frac{T_{std} \cdot P_{s,in}}{T_{s,in} \cdot P_{std}} \right]$
QA/QC procedures:	Any SF ₆ emissions measured when the value of the gas flow measured at the inlet of the abatement system during the monitoring period decreases by more than 5%, compared to the baseline flow rate measured, is discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of baseline emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF ₆ concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Outlet stack volumetric flow rate (Q_{out})
Unit	m ³ /sec
Description	Outlet volumetric flow rate
Measured/calculated/default	Calculated
Source of data	Data processing program
Value(s) of monitored parameter	0.99

Monitoring equipment	N/A
Measuring/reading/recording frequency:	This value is calculated for every second and used to calculate $E_{SF6,out}$.
Calculation method (if applicable):	Equation 13 in the applied methodology $Q_{out} = \{(100 - B_{ws,out}) \div 100\} V_{s,out} \cdot A_{out} \left[\frac{T_{std} \cdot P_{s,out}}{T_{s,out} \cdot P_{std}} \right]$
QA/QC procedures:	Any SF6 emissions measured when the value of the gas flow measured at the outlet of the abatement system during the monitoring period increases by more than 5%, compared to the baseline flow rate measured, is discounted from the baseline emission. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.

Data/parameter:	Inlet SF6 concentration														
Unit	ppm														
Description	Inlet SF6 concentration measured by FTIR														
Measured/calculated/default	Measured														
Source of data	From inlet FTIR														
Value(s) of monitored parameter	673.3														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Inlet FTIR</td> </tr> <tr> <td>Type</td><td>FT-IR spectrometry</td></tr> <tr> <td>Accuracy class</td><td>±2%</td></tr> <tr> <td>Serial number</td><td>M620</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Date of last Calibration</td><td>26/06/2012</td></tr> <tr> <td>Validity</td><td>25/06/2013</td></tr> </table>	Inlet FTIR		Type	FT-IR spectrometry	Accuracy class	±2%	Serial number	M620	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Inlet FTIR															
Type	FT-IR spectrometry														
Accuracy class	±2%														
Serial number	M620														
Calibration frequency	Once a year														
Date of last Calibration	26/06/2012														
Validity	25/06/2013														
Measuring/reading/recording frequency:	Once per 40 seconds														
Calculation method (if applicable):	N/A														
QA/QC procedures:	FTIR shall be calibrated in accordance with the Methodology requirement. More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.														
Purpose of data:	Calculation of baseline emission														
Additional comments:	This is the average value during the monitoring period. To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in} , Q_{out} , $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.														

Data/parameter:	Outlet SF6 concentration														
Unit	ppm														
Description	Outlet SF6 concentration measured by FTIR														
Measured/calculated/default	Measured														
Source of data	From outlet FTIR														
Value(s) of monitored parameter	2.0														
Monitoring equipment	<table border="1"> <tr> <td colspan="2">Outlet FTIR</td> </tr> <tr> <td>Type</td><td>FT-IR spectrometry</td> </tr> <tr> <td>Accuracy class</td><td>±2%</td> </tr> <tr> <td>Serial number</td><td>M619</td> </tr> <tr> <td>Calibration frequency</td><td>Once a year</td> </tr> <tr> <td>Date of last Calibration</td><td>26/06/2012</td> </tr> <tr> <td>Validity</td><td>25/06/2013</td> </tr> </table>	Outlet FTIR		Type	FT-IR spectrometry	Accuracy class	±2%	Serial number	M619	Calibration frequency	Once a year	Date of last Calibration	26/06/2012	Validity	25/06/2013
Outlet FTIR															
Type	FT-IR spectrometry														
Accuracy class	±2%														
Serial number	M619														
Calibration frequency	Once a year														
Date of last Calibration	26/06/2012														
Validity	25/06/2013														
Measuring/reading/recording frequency:	Once per 40 seconds														
Calculation method (if applicable):	N/A														
QA/QC procedures:	<p>FTIR shall be calibrated in accordance with the Methodology requirement.</p> <p>The average SF6 concentration in the outlet of the abatement system is lower than 0.1 ppm which is confirmed by sampling & analyzing result implemented through more sensitive FTIR that can detect 0.1ppm of SF6. However, considering that the SF6 detection range of the installed outlet FTIR is 2 ppm, any values below 2 ppm in outlet is counted as 2 ppm for more conservative calculation.</p> <p>More detailed information on QA/QC procedure is included in the Data Management Manual which has been provided to DOE for verification purpose.</p>														
Purpose of data:	Calculation of project emission														
Additional comments:	<p>This is the average value during the monitoring period.</p> <p>To comply precisely with US EPA Methods required in both AM0078 and registered PDD and also to monitor “continuously”, actual monitoring was done every second and monitored values were immediately converted by the algorithm in the program of the monitoring system for real-time determination of $V_{s,in}$, $V_{s,out}$, Q_{in}, Q_{out}, $E_{SF6,in}$ and $E_{SF6,out}$ using each real-time value of $P_{s,in}$, $P_{s,out}$, $T_{s,in}$, $T_{s,out}$, $P_{avg,in}$, $P_{avg,out}$ and SF6 concentration and fixed values of $M_{d,in}$, $M_{d,out}$, $B_{ws,in}$, $B_{ws,out}$, $M_{s,in}$ and $M_{s,out}$ which were determined with separated investigation called “experimental setup” in AM0078. Please see more details in the spreadsheet.</p>														

Data/parameter:	$FC_{i,j,y}$ volume unit per year of natural gas consumed by the abatement device.
Unit	Nm ³
Description	Quantity of natural gas combusted in the abatement process during the year y
Measured/calculated/default	Measured
Source of data	LNG flow-meter
Value(s) of monitored parameter	344,504 Nm ³

Monitoring equipment	LNG flow meter	
	Type	LNG flow meter
	Accuracy class	±2% (Grade 2, certified by Youngnam Energy Service)
	Serial number	A037-1206083-021
	Calibration frequency	Once per 8 years
	Date of last Calibration	22/11/2011
	Validity	21/11/2019
Measuring/reading/recording frequency:	Monitored continuously and recorded once per minute. Calculating Frequency: Once per the given monitoring period	
Calculation method (if applicable):	N/A	
QA/QC procedures:	The flow meter will be maintained by Korea Gas Corporation (a public enterprise). The value recorded in the system is 344,054 Nm ³ and the applied value comes from daily log book manually recorded by operators. The latter data recorded by operators has human errors as checking time of the meter cannot be exactly same for everyday. Nevertheless, the latter value is applied as it is higher than the system value. This is one of conservative approaches made for the emission reductions calculation.	
Purpose of data:	Calculation of project emission	
Additional comments:	N/A	

Data/parameter:	$W_{C,i,y}$
Unit	tC/tLNG
Description	Weighted average mass fraction of carbon in natural gas in year y
Measured/calculated/default	Default
Source of data	Information provided by Korea Gas Corporation
Value(s) of monitored parameter	0.751
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year
Calculation method (if applicable):	N/A
QA/QC procedures:	This is a standard value provided by Korea Gas Corporation and an official letter from Korean Gas Corporation regarding the above value has been provided to the DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	N/A

Data/parameter:	$\rho_{i,y}$
Unit	t natural gas/ m ³ natural gas
Description	Weighted average density of natural gas in year y
Measured/calculated/default	Default
Source of data	Korea Gas Corporation
Value(s) of monitored parameter	0.7934×10^{-3} t natural gas/ m ³ natural gas
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Once per year
Calculation method (if applicable):	N/A

QA/QC procedures:	This is a standard value provided by Korea Gas Corporation and an official letter from Korean Gas Corporation regarding the above value has been provided to the DOE for verification purpose.
Purpose of data:	Calculation of project emission
Additional comments:	N/A

Data/parameter:	EC _y
Unit	kWh
Description	Electricity Consumption in year y
Measured/calculated/default	Measured
Source of data	Logbooks and 5 electricity meters
Value(s) of monitored parameter	739,812 kWh

Monitoring equipment	Electricity meter #1	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	10960476
	Calibration frequency	Once per 7 years
	Date of last Calibration	14/04/2010
	Validity	13/04/2017
	Electricity meter #2	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	10809210
	Calibration frequency	Once per 7 years
	Date of last Calibration	04/10/2010
	Validity	03/10/2017
	Electricity meter #3	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	18601432
	Calibration frequency	Once per 7 years
	Date of last Calibration	20/07/2011
	Validity	19/07/2018
	Electricity meter #4	
	Type	Electricity meter
	Accuracy class	±2% (Grade 2, Certified by KEPCO)
	Serial number	18002831
Calibration frequency	Once per 7 years	
Date of last Calibration	04/11/2011	
Validity	03/11/2018	
Electricity meter #5		
Type	Electricity meter	
Accuracy class	±2% (Grade 2, Certified by KEPCO)	
Serial number	18002824	
Calibration frequency	Once per 7years	
Date of last Calibration	04/11/2011	
Validity	03/11/2018	
Measuring/reading/recording frequency:	Recording Frequency: Once per second Calculating Frequency: Once per the given monitoring period	
Calculation method (if applicable):	N/A	
QA/QC procedures:	<p>Data from logbooks and electrically gathered data from each electricity meter may be different from each other due to communication noise or transmission errors. If both data do not perfectly match, higher value shall be applied for more conservative outcome.</p> <p>The value recorded in the system 739,812 kWh is greater than daily log book data (739,812 kWh) manually recorded by operators. The greater value is applied for conservativeness.</p>	
Purpose of data:	Calculation of project emission	
Additional comments:	N/A	

D.3. Implementation of sampling plan

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N/A

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

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The Baseline emissions calculation is as follows ;

$$BE_{in,y} = k \cdot E_{SF6,y} \cdot GWP_{SF6} \quad ; \text{Equation (1) in the methodology}$$

Facility	$E_{SF6,y}$	k	GWP_{SF6}	$BE_{in,y}$
P6	5.698	1.000	22,800	129,914
P7	11.878	0.748	22,800	202,572

where

;Equation (4) in the methodology

$$k = \begin{cases} 1 & ; SF_{6,ratio} \geq C_{SF6,y} \div SP_{project,y} \\ \frac{SF_{6,ratio}}{C_{SF6,y} \div SP_{project,y}} & ; SF_{6,ratio} < C_{SF6,y} \div SP_{project,y} \end{cases}$$

Facility	$SF_{6,ratio}$	$C_{SF6,y}$	$SP_{project,y}$	k
P6	0.0000134193	12.150	913,937	1.000
P7	0.0000099963	33.924	2,540,525	0.748

where

$$SF_{6,ratio} = \min(C_{SF6,-1} \div SP_{-1}; C_{SF6,-2} \div SP_{-2}; C_{SF6,-3} \div SP_{-3}) \quad ; \text{Equation (3) in the methodology}$$

Facility	$C_{SF6,-3}$	$C_{SF6,-2}$	$C_{SF6,-1}$	SP_{-3}	SP_{-2}	SP_{-1}	$SF_{6,ratio}$
P6	13.869	18.650	19.161	1,028,081	1,323,881	1,427,845	0.0000134193
P7	6.143	17.667	24.748	614,510	1,517,429	1,900,194	0.0000099963

And

$$E_{SF6,y} = \min\{E_{SF6,in,y}; 0.48 \times C_{SF6,y}; 0.48 \times C_{SF6,hist}\} \quad ; \text{Equation (2) in the methodology}$$

Facility	$E_{SF6,in,y}$	$0.48 \times C_{SF6,y}$	$C_{SF6,y}$	$0.48 \times C_{SF6,hist}$	$C_{SF6,hist}$	$E_{SF6,y}$
P6	5.698	5.832	12.150	9.197	19.161	5.698
P7	15.247	16.284	33.924	11.878	24.748	11.878

where

$$E_{SF6,in,y} = \text{annual(periodic) sum of } E_{SF6,in}$$

$E_{SF6,in}$ is automatically calculated for every second by the data processing program in accordance with the methodology and daily sum of $E_{SF6,in}$ is also recorded in a form of electronic files along with other values of key parameters used in the $E_{SF6,in}$ calculation. The O&M team records the daily sum in a logbook and periodically reports a weekly and a monthly sums of $E_{SF6,in}$ to the project participants. The followings are the formulas used in the calculation.

$$M_{d,in} = 1.460[SF_{6in}] + 0.440[CO_{2in}] + 0.320[O_{2in}] + 0.280[N_{2in}] + 0.399[Ar_{in}] + 1.021[SO_2F_{2in}] + 0.040[He_{in}]$$

;Equation (6) in the methodology modified in accordance with the relevant clauses thereof

$$M_{s,in} = M_{d,in} \cdot (100 - B_{ws,in}) \div 100 + 0.18B_{ws,in} \quad ;\text{Equation (8) in the methodology}$$

$$v_{s,in} = K_p \cdot C_{p,in} \sqrt{P_{avg,in}} \sqrt{\frac{T_{s,in}}{P_{s,in} \cdot M_{s,in}}} \quad ;\text{Equation (10) in the methodology}$$

$$Q_{in} = \{(100 - B_{ws,in}) \div 100\} V_{s,in} \cdot A_{in} \left[\frac{T_{std} \cdot P_{s,in}}{T_{s,in} \cdot P_{std}} \right] \quad ;\text{Equation (12) in the methodology}$$

$$E_{SF6in} = 65.18 Q_{in} [SF_{6in}] \quad ;\text{Equation (14) in the methodology}$$

E.2. Calculation of project emissions or actual net GHG removals by sinks

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The Project emissions calculation is as follows ;

$$PE_y = BE_y (1 - DRE_y) + C_{CO2,y} \quad ;\text{Equation (17) in the methodology}$$

Facility	BE _y	DRE _y	C _{CO2,y}	PE _y
P6	129,914	0.984	806	2,885
P7	202,572	0.993	1,176	2,594

Where

$$DRE_y = 1 - \frac{E_{SF6,out,y}}{E_{SF6,in,y}} \quad ;\text{Equation (16) in the methodology}$$

Facility	ESF6 _{in,y}	ESF6 _{out,y}	DRE _y
P6	5.698	0.0870	0.984
P7	15.247	0.103	0.993

where

$$E_{SF6out,y} = \text{annual(periodic) sum of } E_{SF6,out}$$

As well as E_{SF6,in}, E_{SF6,out} is automatically calculated for every second by the data processing program in accordance with the methodology and daily sum of E_{SF6,out} is also recorded in a form of electronic files along with other values of key parameters used in the E_{SF6,out} calculation. The O&M team records the daily sum in a logbook and periodically reports a weekly and a monthly sum of E_{SF6,out} to the project participants. The followings are the formulas used in the calculation.

$$M_{d,out} = 0.440[CO_{2out}] + 0.320[O_{2out}] + 0.280[N_{2out}] + 0.399[Ar_{out}] + 0.040[He_{out}]$$

;Equation (7) in the methodology modified in accordance with the relevant clauses thereof

$$M_{s,out} = M_{d,out} \cdot (100 - B_{ws,out}) \div 100 + 0.18B_{ws,out} \quad ;\text{Equation (9) in the methodology}$$

$$v_{s,out} = K_p \cdot C_{p,out} \sqrt{P_{avg,out}} \sqrt{\frac{T_{s,out}}{P_{s,out} \cdot M_{s,out}}}$$

;Equation (11) in the methodology

$$Q_{out} = \{(100 - B_{ws,out}) \div 100\} V_{s,out} \cdot A_{out} \left[\frac{T_{std} \cdot P_{s,out}}{T_{s,out} \cdot P_{std}} \right]$$

;Equation (13) in the methodology

$$E_{SF6out} = 65.18 Q_{out} [SF_{6out}]$$

;Equation (15) in the methodology

And $C_{CO2,y}$ (for the period beginning from January 1, 2013 and ending at April 02, 2013) is calculated as follows;

$$C_{CO2,y} = tCO2_{electricity,y} + tCO2_{LNG,y}$$

Where,

$tCO2_{electricity,y}$: GHG emission from electricity consumption by the abatement system during the monitoring period (tCO2)

$tCO2_{LNG,y}$: GHG emission from LNG consumption by the abatement system during the monitoring period (tCO2)

Facility	$tCO2_{electricity,y}$	$tCO2_{LNG,y}$	$C_{CO2,y}$
P6	161	645	806
P7	423	753	1,176

where

$$tCO2_{electricity,y} = EC_y \cdot EF_{grid,CM,y}$$

Facility	EC_y	$EF_{grid,CM,y}$	$tCO2_{electricity,y}$
P6	281.063	0.5708	161
P7	739.812	0.5708	423

And where

$$tCO2_{LNG,y} = FC_{i,j,y} \cdot wc_{i,y} \cdot \rho_{i,y}$$

Facility	$FC_{i,j,y}$	$wc_{i,y}$	$\rho_{i,y}$	$tCO2_{LNG,y}$
P6	295,071	0.751	0.0007934	645
P7	344,504	0.751	0.0007934	753

E.3. Calculation of leakage

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N/A

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	332,486	5,479	0	0	327,007	327,007
P6	129,914	2,885	0	0	127,029	127,029
P7	202,572	2,594	0	0	199,978	199,978

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	349,715 tCO ₂ e	327,007 tCO ₂ e

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

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N/A

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

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	LG International Corp.
Street/P.O. Box	128, Yeouido-dong, Yeongdeungpo-gu
Building	LG Twin Tower
City	Seoul
State/region	-
Postcode	07336
Country	Republic of Korea
Telephone	+82-2-3773-5949
Fax	+82-2-3773-5832
E-mail	Jerry.park@lgi.co.kr
Website	http://www.lgicorp.com/
Contact person	Sangwoo-Park
Title	Manager
Salutation	
Last name	Park
Middle name	
First name	Sangwoo
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	