



VALIDATION REPORT

VALIDATION OPINION FOR THE REVISED
MONITORING PLAN:

Samsung Electronics SF₆ abatement project





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VALIDATION REPORT

Date of first issue: 27 May. 2011	Date of this revision 2 November 2011	Project No.: COP-70	Korean Foundation for Quality
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Date : 3 November 2011			
Client: Samsung Electronics Corporation		Client ref.: Gee-Sung Choi	
Summary:			
Project Title : Samsung Electronics SF6 abatement project			
Annex-I Country : -			
Host Country : Republic of Korea			
Project Participants : Samsung Electronics Corporation			
Applied Methodology(Ver.) : AM0078 (Version. 01.1)			
Sectoral Scope : SS 4 - Manufacturing industries SS 11 - Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride			
Technology/Measure to be employed : Thermal abatement of SF ₆ in exhausting gas			
Crediting Period : 10 years fixed crediting period (Starting from 21 st October 2010)			
Estimated ER : 768,215 ton CO ₂ /year			
Project Size : Large Scale			
As the result of the validation for revised monitoring plan of the project, it can be confirmed that <i>Samsung Electronics SF₆ abatement project</i> as described in revised PDD (version 6.0), meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baselines and monitoring methodology AM0078 (version 01.1).			
KFQ, thus, requests the revision of the Monitoring Plan against the registered PDD (version 5.0).			

<p>Work carried out by :</p> <p>Sung Han YOON (Audit team leader, GHG auditor) </p> <p>Yu Shim JEONG (Audit team member, GHG auditor)</p> <p>Sang Yeon PARK (Audit team member, GHG auditor)</p> <p>Jae Hyun KIM (Technical Expert)</p>	<p>Work Verified by :</p> <p>Mi Jung LEE </p> <p>Byung Ho KO </p> <p>Kyoon Duk YOON </p>
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Abbreviations

CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide Equivalent
DOE	Designated Operational Entity
DRE	Destruction Removal Efficiency
EB	Executive Board
ER	Emission Reduction
FTIR	Fourier Transform InfraRed
GHG	Greenhouse gas(es)
KFQ	Korean Foundation for Quality
MP	Monitoring Plan
MR	Monitoring Report
NCV	Net Calorific Value
PDD	Project Design Document
QMS	Quadrupole Mass Spectrometer
SF ₆	Sulphur Hexafluoride
HF	Hydrogen Fluoride
F2	Fluorine
UNFCCC	United Nations Framework Convention for Climate Change

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1 INTRODUCTION

Korean Foundation for Quality (KFQ) has been engaged by Samsung Electronics Corporation to perform a validation of revised MP of the ‘Samsung Electronics SF₆ abatement project (UNFCCC Ref. no. 3333)’ in Republic of Korea. This validation report summarizes the findings and/or opinion for the revised MP validation, performed on the basis of applied methodology (AM0078 version 01.1) and “Procedures for revising MPs in accordance with paragraph 57 of the modalities and procedures for the CDM(version 02)” in annex 28 of EB49 meeting report.

1.1 Objective

Paragraph 57 of the modalities and procedures for the CDM allows project participants to revise MPs in order to improve accuracy and/or completeness of information, subject to the revision being validated by a DOE. The purpose of a validation of revised MP is to have an independent third party assessment of the project's MP revision. In particular, the level of accuracy or completeness in the proposed revision of the MP, and the conformity with approved monitoring methodology applicable to the project activity.

1.2 Scope

The validation scope is defined as an independent and objective review of the revised MP and other relevant documents. The information in these documents is reviewed against the approved methodology (AM0078 version 01.1) and relevant decisions by the CDM Executive Board.

The validation is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 GHG Project Description

As per URL of <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>, the project was registered on 15 July 2010 under UNFCCC (Ref. No. 3333) and the registered PDD was completed on 22 January 2010. In the course of initial and first periodic verification, validation team found that steam generated from the central boiler had been used for specific period since the starting of the project activity. The MP in the registered PDD does not reflect the actual monitoring activity for the emissions from steam use and thus it needs to include the additional monitoring parameters for addressing project emission due to steam use. Hence, PP requests a revision of the MP together with the change of PDD.

1.4 Validation Team

The validation team consisted as follows:

Sung Han YOON (Audit team Leader, GHG auditor)
Yu Shim JEONG (Audit team member, GHG auditor)
Sang Yeon PARK (Audit team member, GHG auditor)
Jae Hyun KIM (Technical Expert)

The qualification of each individual validation team member is detailed in Appendix to this report.

2 METHODOLOGY

2.1 Desk review of the Documents

The MR (version 01, dated 17 March 2011) was submitted by the PP and additional background documents related to further monitoring aspects were reviewed as initial step of the first periodic verification process. During the initial document review and on-site assessment, validation team found that the MP in the registered PDD (version 05) does not reflect the actual monitoring activity and it needs to change some wording mistakes in the registered PDD. Hence, validation team reviewed additional documents related to revision of MP and the revised MP in the revised PDD (version 06, dated 31 May 2011).

2.2 Follow-up Interviews with Project Stakeholders

In the period of 13 April 2011, KFQ performed interviews with the project stakeholders to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized under table.

Interviewed organisation	Interview topics
Samsung Electronics Corporation (Project Participant) - Jongsung SONG - Hyeong geol LEE - Seung-youp SHIN	➤ Revised MP ➤ Project Implementation ➤ Monitoring parameters listed in the PDD and revised MP ➤ Installed equipment(include boiler for steam generation and measuring equipment) specification ➤ The location of monitoring equipment ➤ Responsibility and authority
Samsung Engineering Corporation (Abatement facility construction & operating company) - Hyunho LEE	
Green Contech Co., Ltd (Consulting Company) - Hyun KWAK	
Mitsubishi UFJ Morgan Stanley (Consulting Company) - Takeshi MIYATA	
EI Co., Ltd (QMS analysis company) - Seok-Rae YOON	
TAEHUNG M&C (Annubar distributor/analysis company) - Sang Tae PARK - Hyung Il KIM	

2.3 Internal Quality Control

According to KFQ's Procedure for deciding whether proceed a request for revising MP, the validation report and validation findings underwent a technical review before being submitted a request for revising MP. The technical review was performed by a technical reviewer qualified in accordance with KFQ's qualification scheme for CDM validation and verification.

3 VALIDATION FINDINGS

3.1 Participation Requirements

As per the validation report by JQA, dated 12nd May 2010 available on UNFCCC webpage <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. No changes have been made.

3.2 Project Design

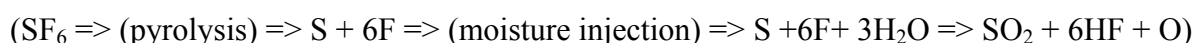
As per the validation report by JQA, dated 12nd May 2010 available on UNFCCC webpage <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. In the course of initial and first verification for the project activity, the validation team found that the implementation of the project does not in accordance with the description contained in the registered PDD.

Hence, as per the Annex 66, EB 48, "Procedure for notifying and requesting approval of changes from the project activity as described in the registered PDD", KFQ has identified that the applied change from the registered project activity is applicable under the situation of paragraph 7(a) which states – 'The project has never been implemented in accordance with description in the registered PDD' and assessed for the notification on *permanent changes* from project activity as described in the registered PDD.

The change of project design is summarized as follows;

In the pilot test stage of project activity, the SF₆ removal efficiency was not reach to the planned efficiency. The main reason of this phenomenon was corrosion of abatement system due to F₂ and other fluorine compounds which are by-products generated after the pyrolysis of SF₆.

If some moisture is injected in the abatement system, it would be expected that SF₆ would be mainly decomposed as HF which has a characteristic of weaker acid than F₂.



Thus, PP determined to install the pre wet-scrubber and steam piping for prevention of corrosion and accordingly improve DRE in order to achieve the planned efficiency in the initial stage. After few months of condition setting and final testing, the project was finally started in 21 October 2010. During the commissioning in the 1st monitoring period (21 October 2010 ~ 28 February 2011), PP could identify that vapour needed for reaction of pyrolysis in abatement

system is sufficiently retained in the gas mixture passed pre-wet scrubber for prevention of corrosion. Hence, the steam has not been used for the project activity since 27 January 2011, though the steam pipe still exists.

Regarding these changes, the validation team has fully assessed on changes from the project activity as described in the registered PDD [Ref.: #4] and confirmed that the proposed changes of project activity do not impact the additionality, project scale and the applicability and application of approved baseline methodology under which the project activity has been registered.

Consequently, PP has requested the changes from the project activity as described in the registered PDD to the UNFCCC, separately.

Furthermore, validation team found that it needs to contain the monitoring parameters from the activity of steam use and accordingly, it confirms that the revision of MP is required from the changes of project activity. Please refer to 3.4 for the details.

3.3 Additionality

As per the validation report by JQA, dated 12nd May 2010 available on UNFCCC webpage <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. There is no revenue except CDM related revenue in the project activity. No changes have been made.

3.4 Monitoring Plan

3.4.1 Description on Revision of Monitoring Plan in the registered PDD

In the revised MP, the following revision has been made:

1. Addition of the monitoring parameters in the MP

The emission caused by natural gas consumption for steam generation of the project ($PE_{NG,y}$) has been added in the revised MP. As per the 'Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)', the calculation of CO₂ emission from combustion of natural gas is summarized as below (Table 1);

Table 1. The summary on the calculation of Project Emission (PE_{NG,y}) generated from combustion of natural gas

According to the actual project activity (steam use), PE_{NG,y} is calculated as follows;

$$PE_{NG,y} = FC_{NG,y} \times COEF_{NG,y} \quad (1)$$

Where:

PE_{NG,y} Project emission from natural gas combustion in the year y (tCO₂)
 FC_{NG,y} Quantity of natural gas combusted in the year y (Nm³)
 COEF_{NG,y} CO₂ emission coefficient of natural gas (tCO₂/Nm³)

$$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO_2,NG,y} \quad (4)$$

Where:

NCV_{NG,y} Net calorific value of natural gas in year y (TJ/Nm³)
 EF_{CO₂,NG,y} CO₂ emission factor of the natural gas combusted in the Project (tCO₂/TJ)

$$FC_{NG,y} = C_{NG,plant,y} \times w_{Steam}$$

$$w_{Steam} = C_{Steam,y} / C_{Steam,plant,y}$$

Where

C_{Steam,y} Quantity of steam consumed by the Project year y
 C_{Steam,plant,y} Quantity of steam generated by the central boiler in year y
 C_{NG,plant} Quantity of natural gas consumed by the central boiler in year y

For calculation of GHG emissions by steam use, ‘Quantity of natural gas combusted for the project activity (FC_{NG, y})’ and ‘CO₂ emission coefficient of natural gas (COEF_{NG,y})’ is firstly considered. Since the project utilized only a small portion of steam generated at the central boiler, weighted ratio of steam consumed (C_{steam, y}) for the project against the total steam production at the central boiler (C_{steam, plant, y}) is used to calculate the FC_{NG, y}.

As per the above calculation equation, 1 parameter (EF_{CO₂,NG}) determined and 4 additional parameters (C_{steam,y}, C_{steam,plant,y}, C_{NG,plant}, NCV_{NG,y}) to be monitored are used in the calculation of project emission:

PP determined the EF_{CO₂, NG} (CO₂ emission factor of the natural gas combusted in the project) as IPCC upper value as conservative manner in accordance with the ‘Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)’ [Table 2].

Table 2. Parameter that is available at valuation in revised MP

Data/Parameter	Unit	Description	Source of Data	Value applied
EF _{CO₂,NG}	tCO ₂ /TJ	CO ₂ emission factor of the natural gas combusted in the Project	IPCC	58.3

Four parameters (C_{steam,y}, C_{steam,plant,y}, C_{NG,plant}, NCV_{NG,y}) are added in the revised MP as listed in Table 3 and it also are in accordance with the ‘Tool to calculate project or leakage CO₂

emissions from fossil fuel combustion (version 02)'.

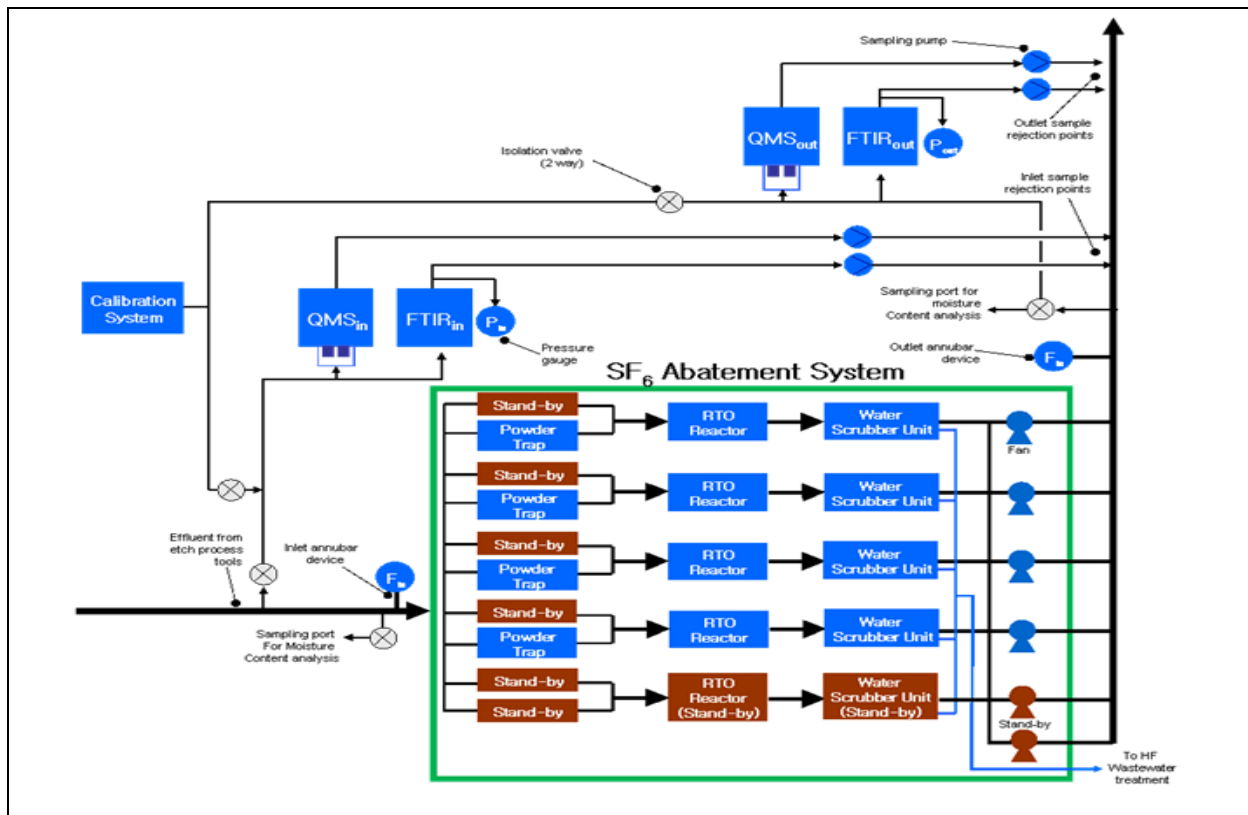
Table 3. Data and Parameters monitored in revised MP

Data /Parameter	Unit	Description	Source of Data	Monitoring procedure/ Calibration
			Applied Value	
$C_{NG, plant}$	Nm^3	Quantity of natural gas consumed by the central boiler in year y	On-site measurement	This parameter is monitored using natural gas meters located at the central boilers of the plant and recorded on daily basis. The calibration of meter will be conducted according to the manufacturer's instruction and/or national standard.
			53,000,000	
$NCV_{NG, y}$	TJ/Nm^3	Net calorific value of natural gas	Korea Gas Cooperation data	This parameter value is provided by the fuel supplier, Korea Gas Corporation. Since the supplier only releases Gross Calorific Value (GCV; 43.54×10^{-6}), it will be converted to NCV by discounting 10%, which is in line with the IPCC Guideline for National Greenhouse Gas Inventories. The GCV will be recorded on monthly bases, from which weighted average annual value will be calculated.
			39.19×10^{-6} $= 43.54 \times 10^{-6} (GCV) * (1-10\%)$	
$C_{steam, y}$	ton	Quantity of steam consumed by the Project year y	On-site measurement	This parameter is monitored using meter located at the site and recorded on daily basis. The calibration of meter will be conducted according to the manufacturer's instruction and/or national standard.
			0	
$C_{steam, plant, y}$	ton	Quantity of steam generated by the central boiler in year y	On-site measurement	This parameter is monitored using meter located at the site and recorded on daily basis. The calibration of meter will be conducted according to the manufacturer's instruction and/or national standard.
			800,000	

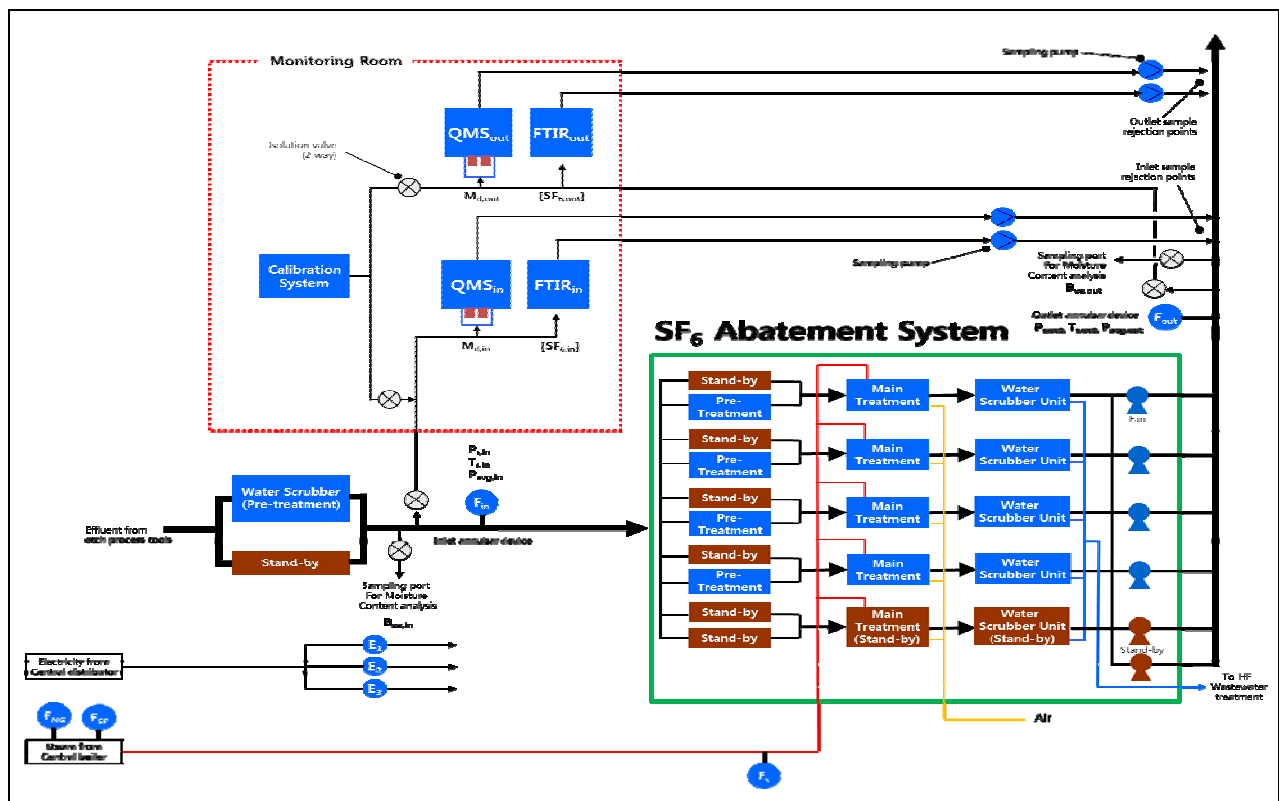
2. Revision of Monitoring Diagram

- i) As described in 3.2 Project Design, the installation of pre wet-scrubber and steam pipe is determined for prevention of corrosion in the abatement facility. Accordingly, the pre wet-scrubbers and steam line are added in the revised monitoring diagram.
- ii) The monitoring points for steam use are newly added in revised monitoring diagram. For calculation of project emission from steam use, 3 flow meters for LNG consumption, Steam generated at the central boiler and Steam consumed at the project are installed before connecting to the abatement system. It measures the amounts of $C_{NG, plant}$, $C_{steam, y}$, $C_{steam, plant, y}$ directly and continuously.
- iii) The monitoring diagram in the registered PDD did not reflect the monitoring point of electricity meters including in the MP of registered PDD. Hence, the monitoring points of

electricity consumption for the project activity are included in revised monitoring diagram. For measuring the electricity consumption of project activity, 3 major electricity meters are installed and each meters are measured for QMS and FTIR, for abatement system operation (heater and fan), and for general use in control room.



Picture 1. The approved Monitoring Diagram for Project Activity (Registered PDD, ver. 5.0)



Picture 2. The revised Monitoring Diagram for Project Activity (Revised PDD, ver. 6.0)

3. Changes of Wording mistakes in the registered PDD

There are some minor wording changes in the revised MP that improves the quality of the MP. The changes and reason is as follows [Table 4.];

Table 4. The list of wording changes and revision reason

B.6.2 (p.33 of the registered PDD)			
Data /Parameter	Revision Reason	Description	
		Registered PDD	Revised PDD
C_{p,out}	Description of ‘Data Unit’ should be replaced.	Coefficient of the <i>inlet</i> Annubar device	Coefficient of the <i>outlet</i> Annubar device
B.7 (p. 39, p. 45 of the registered PDD)			
E_{SF6,in,y}	Description of ‘Source of data to be used’ should be corrected	From inlet <i>FRIT</i> and inlet Annubar device	From inlet <i>FTIR</i> and inlet Annubar device
B_{ws,in} B_{ws,out}	Description of ‘QA/QC procedures to be applied’ is wrong information by human mistake. According to the applied methodology AM0078 (version 01.1), ‘QA/QC procedures of B_{ws,in} and B_{ws,out} are recorded only following the ‘annex 1.a’. However, the annex 1.a. of the methodology is only for calibration of FTIR and QMS systems and its content is not applicable in B_{ws,in} and B_{ws,out} . Because the EPA method is the measuring methodology of B_{ws,in} and B_{ws,out} . Accordingly, the QA/QC procedures will follow EPA method.	<i>Guideline in Annex 1.a. in the methodology will be followed.</i>	<i>QA/QC will follow US EPA method. This will be calibrated and maintained per the manufacturer’s instruction.</i>
B_{ws,out}	Description of this parameter should be replaced.	The proportion of water in the <i>inlet</i> gas stream measured using EPA Method 4, and used to calculate the <i>inlet</i> gas molecular weight.	The proportion of water in the <i>outlet</i> gas stream measured using EPA Method 4, and used to calculate the <i>outlet</i> gas molecular weight.
P_{avg,out}	Description of this parameter should be replaced.	The averaged velocity head measurement used to calculate the <i>inlet</i> gas velocity	The averaged velocity head measurement used to calculate the <i>outlet</i> gas velocity

3.4.2 Validation on Revision of Monitoring Plan in the registered PDD

The validation team confirms that the revised MP is in line with the monitoring methodology (AM0078 version 01.1) and paragraph 57 of the modalities and procedures for the CDM. And the revised MP is not reduced the level of accuracy and completeness in the monitoring and verification process as following assessment;

(a) The proposed revision of the MP ensures that the level of accuracy and completeness in the monitoring and verification process is not reduced as a result of the revision.

1. Addition of the monitoring parameters in the MP

In the course of initial and 1st verification, validation team found that PP used the steam for project activity for the 1st monitoring period and the central boilers and meters used exist at the project site. Hence, PP calculated the project emission generated from combustion of natural gas ($PE_{NG,y}$) as shown in Table 1. According to the equation of Table 1, finally 5 parameters ($EF_{CO_2,NG}$, $NCV_{NG,y}$, $C_{NG, plant}$, $C_{steam,y}$, $C_{steam,plant,y}$) are chosen for its calculation and the details including the description, applied value, source of data are listed in Table 2 and Table 3 of this report.

As shown in Table 1, The project emission generated from combustion of natural gas ($PE_{NG,y}$) is primarily calculated by ‘CO₂ emission coefficient of natural gas ($COEF_{NG,y}$)’ and ‘Quantity of natural gas combusted for the project activity ($FC_{NG,y}$)’.

- For the $COEF_{NG,y}$, 2 Parameters ($EF_{CO_2,NG}$, $NCV_{NG,y}$) are included as the monitoring parameters in the revised MP. These parameters are correctly considered in accordance with the approved methodology (AM0078, ver.1.1) and “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)”. The applied values are assessed as follows;
 - Parameter ‘CO₂ emission factor of natural gas ($EF_{CO_2,NG}$)’ provided by the fuel supplier are not available. Hence, this parameter is validated to the default value (58.3 tCO₂/TJ) cited from IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guideline on National GHG Inventories.
 - Parameter ‘Net calorific value ($NCV_{NG,y}$)’ is provided by the fuel supplier, Korea Gas Corporation as only Gross Calorific Value. Accordingly, it will be converted to NCV by discounting 10 %, which is in line with the IPCC Guideline for National Greenhouse Gas Inventories. The applied value ($GCV: 43.54 \times 10^{-6} \text{ TJ/Nm}^3$) in revised MP is from the data officially published in the website of Korea Gas Corporation (http://www.kogas.or.kr/kogas_kr/html/info/info_06.jsp) and it is valid. The GCV will be recorded on monthly bases, from which weighted average annual value will be calculated.

- For the $FC_{NG, y}$, 3 parameters ($C_{NG, plant}$, $C_{steam, y}$, $C_{steam, plant, y}$) are included as the monitoring parameters in the revised MP. Validation team found that the central boiler generates the steam before the implementation of project activity and steam will be supplied to the project site from the central boiler if it needs. Actually, the steam only used for project activity during the commissioning in the 1st monitoring period (21/10/2010 ~ 28/02/2011, 131 days) and it has not been used since 27 January 2011 until now. As for the measurement of $FC_{NG, y}$, PP apply the approach using the weighted ratio of steam consumed for the project ($C_{steam, y}$) against the total steam production at the central boiler ($C_{steam, plant, y}$) instead of direct measurement on $FC_{NG, y}$ due to utilizing only a small portion of steam generated at the central boiler. In regard of this approach, validation team could check that a quantity of steam used for project activity (16.25 ton) is relatively low (0.00572 %) against total steam generated at the central boiler (284,051 ton) during the 1st monitoring period (using a steam for the project activity) [Ref. #11]. Hence, validation team considers that applying approach is reasonable and accordingly, the parameters are appropriately chosen. The applied values are assessed as follows;

- Parameter ‘Quantity of natural gas consumed by the central boiler in year y ($C_{NG, plant}$)’ is monitored using natural gas meters at the central boilers of the plant and it is recorded on daily basis. Validation team found that the applied value in revised MP is estimated from total consumption of natural gas (18,877,964 Nm^3) for 1st monitoring period (21/10/2010 ~ 28/02/2011, for 131 days) and accordingly, it is applied 53,000,000 Nm^3 /yr ($\approx 18,877,964 Nm^3 / 131 \text{ days} * 365 \text{ days/yr}$) in revised MP. To be confirmed, validation team also checked the actual consumption of natural gas from the historical data (2007~ 2010) and it was averagely consumed 17,812,645 Nm^3 /yr. In comparison, the estimated consumption (53,000,000 Nm^3 /yr) is much higher than actual average consumption (17,812,645 Nm^3 /yr) because the consumption of natural gas for steam use tends to increase in winter (November~ February). Consequently, validation team could conclude that the value is applied reasonably
- Parameter ‘Quantity of steam consumed by the Project year y ($C_{steam, y}$)’ is monitored using meter located at the project site and recorded on daily basis. As for this parameter, validation team found that there is no plan to consume the steam at the project site in the future and accordingly, it is applied zero. As mentioned in 3.2 Project Design, the main purpose of steam use at the project site is a prevention of corrosion in order to achieve the planned efficiency. However, it was identified that vapour needed for reaction of pyrolysis in abatement system is sufficiently retained in the gas mixture through the experimental result and its application after application of steam use during the commissioning period. Hence, PP has not used the steam for the project activity since 27 January 2011, though the steam pipe still exists. Consequently, validation team confirms that the applied value estimated

reasonably and it will be monitored if steam is needed by the abnormal condition in the future.

- Parameter ‘Quantity of steam generated by the central boiler in year y ($C_{\text{steam, plant, y}}$)’ is monitored using steam meters located in the central boiler and recorded on a daily basis. The applied value is estimated 800,000 ton/yr ($\approx 284,051 \text{ ton}/131 \text{ days} * 365 \text{ days/yr}$) which is based from actual generated steam (284,051 ton) for 1st monitoring period (21/10/2010 ~ 28/02/2011, for 131 days). Validation team could also confirm that it is reasonably applied as the same viewpoint on $C_{\text{NG, plant}}$.

QA/QC procedure for parameters used is described in Table 2 and Table 3 of this report. Consequently, validation team confirms that the description of each parameter is appropriate and these are all in accordance with the approved methodology (AM0078, ver. 1.1.) and ‘Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)’.

The calculation equation of project emission caused by natural gas consumption is validated correctly incorporated in the revised MP as per the ‘Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)’. Hence, the revised MP is not reduced the level of accuracy and completeness in the monitoring and verification process.

2. Revision of Monitoring Diagram

- i) As described in 3.2 Project Design of this report, validation team found that the implementation of the project does not in accordance with the description contained in the registered PDD. Because PP determined the pre wet-scrubber and steam use for prevention of corrosion incurred in the pilot test stage of project activity. Accordingly, validation team assessed on changes from the project activity as described in the registered PDD and PP has requested the changes from the project activity as described in the registered PDD to the UNFCCC, separately. For reflecting the actual activity in revised MP, the installation of pre wet-scrubber and steam pipe is clearly depicted in the revised monitoring diagram.
- ii) Monitoring Diagram is revised due to add the monitoring parameters. From the inclusion of steam use for the project activity, 3 monitoring parameters ($C_{\text{NG, plant}}$, $C_{\text{steam, y}}$, $C_{\text{steam, plant, y}}$) will be monitored by each meter at the project site. Hence, validation team checked that the meters involved are all pointed in the revised monitoring diagram.
- iii) According to the parameter ‘Quantity of electricity consumed by the project electricity consumption source j in year y ($EC_{\text{pj, y}}$)’ including the MP of registered PDD, it demonstrates that the meter will be measured continuously using electricity meters. However, the monitoring diagram in the registered PDD does not include the monitoring point of electricity meters. Accordingly, the revised monitoring diagram adds the electricity meters. Validation team found that PP installed 3 meters for measuring electricity consumption for

monitoring. The major electricity consumption parts are divided as 3 parts in the boundary. Each of part are electricity consumption for QMS and FTIR, for abatement system operation (heater and fan), and for general use in control room. Consequently, $EC_{pj,y}$ will be calculated by sum of 3 meters. These meters will be periodically calibrated in accordance with the description of 'QA/QC procedure' in registered PDD.

Through physical site visit and interview with PP, the validation team concluded that the revised monitoring diagram reflects current status of the site well and it does not affect level of accuracy and completeness of the result of emission reduction.

3. Changes of Wording mistakes in the registered PDD

Validation team found that there are some wording mistakes in the registered PDD. The details are described in the table of section 3.4.1 in this report. Validation team confirms that these wording mistakes are occurred by human error and accordingly, it is changed in the revised MP. Consequently, it could conclude that the level of accuracy and completeness in the monitoring and verification process is not reduced as a result of the revision.

The rest of the MP remains the same as mentioned in the registered PDD available at UNFCCC website <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. And It is also checked that the emission reduction calculation and the responsibilities & authorities of monitoring parameters and maintenance does not change due to the revision of MP as described above.

(b) The proposed revision of the MP is in accordance with the approved monitoring methodology applicable to the project activity.

The revision of MP relates to the inclusion of the monitoring parameters resulting from the steam use, addition of monitored points in the monitoring diagram and changes some wording changes, compared to the original description in the registered PDD. During the validation stage, it has been confirmed that the Project meets the applicability of the baseline and monitoring methodology. KFQ was able to conclude that the proposed revision is in accordance with the methodology applied by the Project

(c) The findings of previous verification reports, if any, have been taken into account.

This is not applicable. During the initial and 1st periodic verification, this revision issues are raised.

3.5 Environmental Impacts

As per the validation report by JQA, dated 12nd May 2010 available on UNFCCC webpage <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. No changes have been made.

3.6 Comments by Localstakeholders

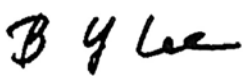
As per the validation report by JQA, dated 12nd May 2010 available on UNFCCC webpage <http://cdm.unfccc.int/Projects/DB/JQA1264981590.19/view>. No changes have been made.

4 VALIDATION OPINION

Korean Foundation for Quality (KFQ) has performed a validation of the revised Monitoring Plan of CDM project Ref. No. 3333: Samsung Electronics SF₆ abatement project

Based on our assessment, KFQ recommends the approval of the revised monitoring plan submitted by the project participants.

Signed on behalf of the Korean Foundation for Quality

Signature : 

Name : Byung Yong LEE

Date : 3 November 2011

5. REFERENCES

1. Revised monitoring plan of Samsung Electronics SF₆ abatement project
2. Registered PDD of “Samsung Electronics SF₆ abatement project” (version 5.0 dated 22 January 2010)
3. Validation Report of “Samsung Electronics SF₆ abatement project” (JQA, version 01.1 dated 12nd May 2010)
4. Validation Opinion for on changes from the project activity as described in the registered PDD of “Samsung Electronics SF₆ abatement project” (KFQ, version 2.1, 2 Nov. 2011)
5. Methodology:
Applied methodology in the registered PDD
AM0078 (version 01.1) : Point of Use Abatement Device to Reduce SF₆ emissions in LCD Manufacturing Operations
6. Annex 4/EB 49 “Procedure for requests to the executive board for deviation from an approved methodology”
7. Annex 26/EB 49 “Procedure for requests for deviation prior to submitting request for issuance”
8. Annex 28/EB 49 “Procedure for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM”
9. Operation record on pilot test result (Reporter: Samsung Engineering, 06 February 2010)
10. Internal assessment report (Reporter: Samsung Engineering, 10 February 2010)
11. Data on Amount of steam and LNG consumption (during 1st monitoring period, 21/10/2010~ 28/02/2011)

Appendix
Qualification of Validation Team



CERTIFICATE OF COMPETENCE

Name: Sung Han YOON

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from sol
- 1.2 Energy generation from renewable energy sources
- 11.2 GHG capture and destruction.
- 13.1 Waste handling and disposal

Approved by Qualification Committee of KFQ on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee', is written over the printed name.



CERTIFICATE OF COMPETENCE

Name: Yu Shim JEONG

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

1.2 Energy generation from renewable energy sources

Approved by Qualification Committee of KFQ on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee', is written over the printed name.



CERTIFICATE OF COMPETENCE

Name: Sang Yeon PARK

Qualification:

	Validation	Verification
-Lead auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

1.2 Energy generation from renewable energy sources

13.1 Waste handling and disposal

Approved by Qualification Committee of KFQ on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee', is written over the printed name.



CERTIFICATE OF COMPETENCE

Name: Jae Hyun KIM

Qualification:

	Validation	Verification
-Lead auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

4.6. Electricity Device (Complex)

Approved as Technical Expert on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee', is written over a horizontal line.



CERTIFICATE OF COMPETENCE

Name: Mi Jung LEE

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

1.2 Energy generation from renewable energy sources

Approved by Qualification Committee of KFQ on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee'.



CERTIFICATE OF COMPETENCE

Name: Byung Ho KO

Qualification:

	Validation	Verification
-Lead auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

4.6 Electricity Device (Complex)

Approved as Technical Expert on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee'.



CERTIFICATE OF COMPETENCE

Name: Kyoon Duk YOON

Qualification:

	Validation	Verification
-Lead auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

11.2 GHG capture and destruction.

Approved as Technical Expert on 28 February 2011

Sustainability Management Institute
Byung Yong LEE

A handwritten signature in black ink, appearing to read 'B Y Lee'.