

VALIDATION REPORT

Climate Change Capital Carbon Fund II s.a.r.l

Point of Use Abatement Device to Reduce SF6 emissions in LCD Manufacturing Operations in the Republic of Korea (South Korea)

SGS Climate Change Programme

SGS United Kingdom Ltd
SGS House
217-221 London Road
Camberley Surrey
GU15 3EY
United Kingdom

Date of Issue:		Project Number:	
05/02/2010		CDM.VAL1236 IN03	
Project Title:			
Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)			
Organisation:		Client:	
SGS United Kingdom Limited		Climate Change Capital Carbon Fund II s.a.r.l	
Publication of PDD for Stakeholders Consultation			
Commenting Period:		27/05/2009 – 25/06/2009	
First PDD Version and Date:		Version 03, 01/04/2009	
Final PDD Version and Date:		Version 14, 04/02/2010	
Summary:			
<p>Climate Change Capital Carbon Fund II s.a.r.l has commissioned SGS to perform the validation of the project: 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)'.</p> <p>Methodology Used: AM0078 - Point of Use Abatement Device to Reduce SF6 emissions in LCD Manufacturing Operations.</p> <p>Version and Date: Version 01.1 dated 28/05/2009</p> <p>The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and applicable CDM requirements.</p> <p>The report is based on the assessment of the project design document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, follow up actions (e.g site visit, telephone or e-mail interviews) and also the review of the applicable approved methodology and underlying formulae and calculations.</p> <p>The report and the annexed validation describes a total of 22 findings which include:</p> <ul style="list-style-type: none"> • 14 Corrective Action Requests (CARs); • 06 Clarification Requests (CLs); • 02 Forward Action Requests (FARs); and <p>All CL and CAR have been closed satisfactorily, the project</p> <p>– <input checked="" type="checkbox"/> Will be recommended to the CDM Executive Board with a request for registration.</p>			
Subject:		Document Distribution	
CDM Validation			
Validation Team:		<input checked="" type="checkbox"/> No Distribution (without permission from the Client or responsible organisational unit)	
Kunal Sharma - Lead Assessor Mayank Kumar Jain - Assessor Kim KyungHoon - Local Assessor B. Senthil Kumar - Technical Expert Abhishek Mahawar - Financial Expert			
Technical Review:		Trainee Technical Reviewer:	
Date: 03-02-2010, 18-02-2010		Name: Sathis Kumar	
Name: Sanjeev Kumar		<input type="checkbox"/> Limited Distribution	
Authorised Signatory:		<input type="checkbox"/> Unrestricted Distribution	
Name: Siddharth Yadav Date: 23 rd February 2010			
Revision Number:	Date:	Number of Pages:	
0	03-12-2009	87	
1	13/01/2010	99	
2	05/02/2010	92	

Abbreviations

CAR	Corrective action request
CAPEX	Capital Expenditure
CDM	Clean development mechanism
CDM EB	CDM Executive Board
CER	Certified emission reduction
CL	Clarification request
DOE	Designated operational entity
DNA	Designated national authority
EIA	Environmental Impact Assessment
FAR	Forward action request
FTIR	Fourier Transform Infrared
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
KDIA	Korean Display Industry Association
KEPCO	Korea Electric Power Corporation
KOSHA	Korea Occupational Safety & Health Agency
LCD	Liquid Crystal Display
LGD	LG Display
NCMM	Normalised Cubic Meter Per Minute
OPEX	Operating Expenditure
PDD	Project Design Document
PP	Project Proponent
QA/QC	Quality Assurance/ Quality Check
QMS	Quadruple Mass Spectrometer
UNFCCC	United Nations Framework Convention on Climate Change
WLICC	World LCD Industry Cooperation Committee

Table of Content

1.	Validation Opinion	5
2.	Introduction	6
2.1	Objective	6
2.2	Scope	6
2.3	GHG Project Description	6
2.4	The Names and Roles of the Validation Team Members	6
3.	Methodology	7
3.1	Review of CDM-PDD and Additional Documentation	7
3.2	Use of the Validation Protocol	7
3.3	Findings	7
3.4	Internal Quality Control	8
4.	Validation Findings	9
4.1	Approval	9
4.2	Participation Requirements	9
4.3	Project Design Document including Project Description	10
4.4	Applicability of selected methodology to the project activity	11
4.5	Project Boundary	13
4.6	Baseline Selection and Additionality	14
4.7	Application of Baseline Methodology and Calculation of Emission Factors	19
4.8	Application of Monitoring Methodology and Monitoring Plan	23
4.9	Environmental Impacts	25
4.10	Local Stakeholder Comments	25
5.	Comments by Parties, Stakeholders and NGOs	27
5.1	Description of how and when the PDD was made publicly available	27
5.2	Compilation of all comments received	27
5.3	Explanation of how comments have been taken into account	27
6.	List of Persons Interviewed	28
7.	Document References	29

Annexes:

A.1	Annex 1: Local Assessment	31
A.2	Annex 2: Validation Checklist	1
A.3	Annex 3: Overview of Findings	1

1. Validation Opinion

SGS United Kingdom Ltd has been contracted by Climate Change Capital Carbon Fund II s.a.r.l to perform a validation of the project: Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea) in South Korea.

The Validation was performed in accordance with the UNFCCC criteria for the Clean Development Mechanism (CDM), Validation and Verification Manual version 01.1 and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

By installing SF6 abatement devices on the exhaust from the dry etching process at plant P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju, South Korea, the project proponent aims at destroying the SF6 gas, presently which is vented off into the atmosphere. The SF6 gas is partially utilized in dry etching process (in LCD manufacturing process) and the remaining part, mixed with air and other by-products is released into the atmosphere. Under the proposed project activity, LG International and LG Display will collectively install the state-of-art technology to capture and destroy the SF6 gas leaving the dry etching process. For the effective monitoring of the process, Fourier Transform Infrared (FTIR) devices and QMS will be employed at the inlet and outlet of the abatement system. The project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It has been envisaged that in first crediting year only plant P6 will be operational. All plants are expected to be in operation from crediting year-2 onwards. The emission reductions are accordingly estimated in the PDD.

In our opinion, the project meets all relevant UNFCCC, CDM criteria and all relevant host country criteria. The project correctly applies methodology AM0078 version 1.1. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be 12,981,209 tCO2e over a 10 year crediting period during 01/04/2010 to 31/03/2020, averaging 1,298,121 tCO2e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not change.

The project will hence be recommended by SGS for registration with the UNFCCC.

Signed on Behalf of the Validation Body by Authorized Signatory



Signature:

Name: Siddharth Yadav

Date: 23rd February 2010

2. Introduction

2.1 Objective

Climate Change Capital Carbon Fund II s.a.r.l has commissioned SGS to perform the validation of the project: Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea) with regard to the relevant requirements for Clean Development Mechanism (CDM) project activities. The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP) and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reduction (CER). UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities and related decisions by the COP/MOP and the CDM Executive Board.

2.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. SGS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

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.

2.3 GHG Project Description

The project activity is point of use abatement of SF6 gas in LCD manufacturing plants in South Korea. The project participants LG international and LG display collectively will install end-of-pipe SF6 gas abatement devices at plants P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju South Korea. SF6 is particularly utilized in dry etching process in LCD manufacturing process. A part of the SF6 gas is utilized in dry etching process; however a majority component, mixed with air and other by-products, is vented off directly to the atmosphere. The project activity aims at capturing the SF6 gas from the exhaust of the dry etching process and further destroying it. SF6 is a Greenhouse Gas with a Global Warming Potential (GWP) of 23,900 tCO2e, the proposed project activity will mitigate GHG emissions by destroying the SF6 gas, which in the absence of the project activity would have been emitted directly to the atmosphere.

2.4 The Names and Roles of the Validation Team Members

Name	Role
Kunal Sharma	Lead Assessor
Mayank Kumar Jain	Assessor
Kim KyungHoon	Local Assessor
B. Senthil Kumar	Sectoral Scope Expert
Abhishek Mahawar	Financial Expert

3. Methodology

3.1 Review of CDM-PDD and Additional Documentation

The validation is performed primarily as a document review of the publicly available project document version 03 dated 01/04/2009 and the subsequent versions dated 07/08/2009, 17/08/2009, 26/08/2009, 11/09/009, 14/09/2009, 23/09/2009, 11/10/2009, 02/12/2009, 06/01/2010, 04/02/2010 (final version). The assessment is performed by trained assessors using a validation protocol attached as Annex 2, table 2.

The site visit was performed from 18/06/2009 to 19/06/2009, the observation and results are summarized in subsequent sections of the document.

3.2 Use of the Validation Protocol

The validation protocol used for the assessment is designed in accordance with the Validation and Verification Manual, Version 01.1. It serves the following purposes:

- it organises, details and clarifies the requirements the project is expected to meet; and
- it documents both how a particular requirement has been validated and the result of the validation (reporting).

The validation protocol consists of several tables. The different columns in these tables are described below.

Checklist Question	Ref ID	Means of Verification (MoV)	Comment	Draft and/or Final Conclusion
The various requirements are linked to checklist questions the project should meet.	Lists any references and sources used in the validation process. Full details are provided in the table at the bottom of the checklist.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided (Y), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification Request (CL) is used when the validation team has identified a need for further clarification.

The completed validation protocol for this project is attached as Annex A.1 to this report

3.3 Findings

As an outcome of the validation process, the team can raise different types of findings

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The CDM requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.

The validation process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

A Forward Action Request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Corrective Action Requests and Clarification Requests are raised in the draft validation protocol and detailed in a separate form (Annex A.3). In this form, the Project Developer is given the opportunity to "close" outstanding CARs and respond to CLs and FARs.

3.4 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team. Findings can be raised at this stage and client must address them within agreed timeline.

4. Validation Findings

4.1 Approval

South Korea is identified as the Host Party, South Korea has ratified the Kyoto Protocol on 08th November, 2002 and is allowed to participate in the CDM project activity^{/10/}. A letter of approval (dated 02nd December, 2009) issued by the South Korean DNA has been obtained from the project participants LG International Corp. and LG Display Co. Ltd. The letter of approval from the Host Party confirms that:

- The Government of Republic of Korea has ratified the Kyoto Protocol in November 2002;
- The Republic of Korea participates voluntarily in the Clean Development Mechanism (CDM) Project Activity;
- The project activity will contribute in bringing sustainable development in Republic of Korea;
- The letter of approval specifically refers to the project title 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)' as mentioned in the PDD to be submitted for registration;

The letter of approval^{/10/} also confirms that LG International Corp. and LG Display Co., Ltd., are the project participants involved in the project activity. The authenticity of Host Country Approval has been verbally verified with the Korean governmental officer Mr. HoSeung Sung in charge of Korean DNA, Green Growth Committee, Finance Industry Policy Institute under the Korean prime minister.

United Kingdom has been identified as the Annex 1 country and has ratified the Kyoto Protocol on 31st May 2002. The Letters of Approval (dated 29th Oct, 2009)^{/10/} submitted by the project participant-Climate Change Capital Carbon Fund II s.a.r.l clarifies the following:

- The United Kingdom ratified the Kyoto Protocol on 31st May 2002;
- The United Kingdom participates voluntarily in the CDM;
- The LoA refers to the precise proposed CDM project activity title 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)' in the PDD submitted for registration.

CAR#20 was raised the asking project proponent to submit the Letter of Approval(s) issued by the relevant DNA. In response the project participants (LG International and LG Display) have submitted a Letter of Approval issued by South Korean DNA. The project participant- Climate Change Capital Carbon Fund II s.a.r.l has submitted a Letter of Approval issued by UK DNA. These Letters of Approval(s) fulfils the requirement of paragraph 45 of Validation and Verification Manual version 01.1^{/30/}- Annex 3 EB 51. Hence **CAR#20** was closed.

CAR#21 was raised asking the PP to demonstrate how the project activity fulfils the sustainable development criteria in South Korea. The PP responded by including the necessary details on the contribution of project activity in bringing sustainable development in the Host country in PDD version 12. The Letter of Approval issued by Republic of Korea confirms that the project activity contributes to sustainable development in the Host Country. Hence **CAR#21** was closed.

4.2 Participation Requirements

The Republic of Korea (South Korea) is identified as the 'Host Party' and the United Kingdom is identified as the 'Other Party' involved in the project activity. South Korea has ratified the Kyoto Protocol on 08th November 2002 (<http://maindb.unfccc.int/public/country.pl?country=KR>) and The United Kingdom has ratified the Kyoto Protocol on 31st May 2002 (<http://maindb.unfccc.int/public/country.pl?country=GB>).

The participation of project participants listed in section A.3 of PDD has been validated in line with paragraph 54 of VVM version 01.1. The letter of approval from South Korean DNA and UK DNA confirms the participation of the project participants listed in section A.3 of PDD. The information on project participants is

consistent with details in further chapters of PDD, in particular Annex 1. The document on Modalities of Communication^{/11/} dated 26/01/2010 is submitted by the project proponent and was found to be acceptable.

4.3 Project Design Document including Project Description

SF6 is particularly utilized in dry etching process in LCD manufacturing process. A part of the SF6 gas is utilized in dry etching process; however a majority component, mixed with air and other by-products, is vented off directly to the atmosphere. The project entitled 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)' is the installation of end-of-pipe SF6 abatement device at plants P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju, South Korea, collectively by LG International and LG display. Along with a reactor for SF6 destruction, the technology will employ a quencher, emergency water tank, scrubbers, pre-treatment system and softening system. The technology will destroy a majority of SF6, which is currently vented off to the atmosphere after partial utilization in the dry etching process. The overall technical set up will reduce GHG emissions and will ensure that the non-GHGs are also within legally acceptable limits. FTIR system will be in place to continuously monitor the concentration of SF6 at the inlet and outlet of the abatement device. QMS system will be employed for the effective monitoring of overall process.

It has been envisaged that in first crediting year only plant P6 will be operational. All plants are expected to be in operation from 2nd year of crediting period onwards. The emission reductions are accordingly estimated in the PDD. As per the requirement of paragraph 62 of VVM 01.1, validation site visits has been conducted and available process flow diagrams and designs/16/ have been reviewed to confirm the project description mentioned in the PDD. The project description in PDD version 14 is accurate and complete.

The information provided in PDD version 14 allows for clear identification of the project site. The geographical co-ordinates of the project activity (all 4 plants) have been verified and were found to be correct. These are as mentioned below:

Plant	Location	Longitude	Latitude
P2/3	Gumi	36° 6' 33" N	128° 24' 40" E
P4/5	Gumi	36° 5' 26" N	128° 24' 40" E
P6	Gumi	36° 5' 40" N	128° 24' 40" E
P7	Paju	37° 48' 33" N	126° 40' 20" E

The project participants possess all the ownership documents and licenses for the implementation of the project at the project site. The original documents (which were in local language) were duly verified by the Local Assessor during the site visit, these were found to be valid and authentic. The project activity does not involve any public funding; this has been verified through a letter^{/13/} on 'NO ODA received' issued by the Vice Chairman and CEO of LG International Corporation.

The project design and its objectives are transparently discussed in the PDD version 14 and are consistent with the timeline of the project history. To verify the consistency of the project description in the PDD with the actual situation, a site visit of the project activity was conducted on 18/06/2009 & 19/06/2009. The project proponent clarified that the project activity is a future project and assured that the SF6 abatement system (including monitoring system) would be in place as according to the project design document version 14.

CAR#01 was raised as the geographical coordinates for site identification (location of all plants) were not mentioned in PDD version 3. In response the PP specified the latitudes and longitudes of all four plants in PDD version 12. The location of the site has been physically verified, the geographical coordinates of all plants were found to be correct, hence, **CAR#01** was closed.

CAR#02 was raised as the technical description of the project mentioned in the PDD version 03 was not sufficient; the PP was requested to include a profound description as per the requirement of Annex 12 EB 41. In response, the PP included information on equipments to be used in project activity. Also the PP described the baseline scenario and project scenario in PDD version 14. Hence **CAR#02** was closed.

4.4 Applicability of selected methodology to the project activity

The approved methodology AM 0078 version 01.1 applies to project activities that involve installation of a combustion or thermal abatement device that is able to eliminate the SF₆ from an LCD etching plant, which is currently vented off to the atmosphere. The project activity is the capture and destruction of SF₆ gas leaving the dry etching process in LCD manufacturing process at LG. This has been validated during the site visit with available flow diagrams and designs^{16/}. The project activity fulfils the applicability requirements of the approved methodology AM0078 version 01.1. The applicability criteria's of the approved methodology AM0078 version 1.1 are discussed below:

The methodology only applies to existing production lines with at least 3 years information of SF₆ purchase and consumption and production of LCD substrate by 31 January 2009. The crediting period is limited to the remaining lifetime of the production lines existing at the time of registration;

Existing production lines for which at least 3 years data on SF₆ purchase and consumption^{14/} is available are included in the project activity. Only plants P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju, South Korea are the part of the project activity. Three years historical data on SF₆ purchase and consumption has been obtained from the project proponent and found OK. The LCD production lines consist of several equipments, each having a technical lifetime of its own. LGD has confirmed in an email dated 15/01/2010 that the equipments are periodically upgraded and maintained to ensure the quality of the end product. The remaining lifetime of LCD production lines are estimated based on the general physical lifetime of the plant and market demand of the end-product, which basically determines the financial viability of the process. The estimated remaining lifetime of the existing production lines are confirmed in a separate letter dated 07/01/2010 from the Green technology team of LG Display. This has been checked and verified by the assessment team and was found to be acceptable.

The maximum treatment capacity of the abatement system is sized for the application in correlation to observed historical flow. The maximum SF₆ flow entering the abatement device, from all chambers combined, is below the maximum SF₆ abatement capacity of the abatement device and where the total flow of effluents (SF₆ plus all other by-products and diluents) does not exceed the total flow capacity of the abatement device;

According to the historical data, the total SF₆ flow from the exhaust of the dry etching process for plant P6 is 32.3 NCMM (before pre-treatment). Also from the engineering design it is clear that the abatement system for P6 is designed for a total flow of 40.2 NCMM. Further, the project participant has measured the flow rate of SF₆ from the exhaust of dry etching process of all the plants under consideration of this project. The measured data has been validated against the reports^{32/} provided. The required capacity of abatement system for plants other than P6 have been quoted based on recommendations made by technology supplier, as no engineering design are available for other plants. It will be ensured that the flow of SF₆ gas will not exceed the total capacity of the abatement device for any of the plant under this project activity.

Since, the capacity of abatement systems other than plant-P6 has not been fixed yet; therefore, the requirement of the applicability criteria shall be further validated during first verification. Hence, **FAR#19(c)** is raised.

No law or regulation which mandate decomposition, destruction, recycle or substitution of SF₆ or any component of exhaust gases containing SF₆ exist;

The below mentioned relevant laws among 46 Korean Acts registered at the website of Ministry of Environment (MEV)^{15/} were checked by the Local Assessor:

- Clean air conservation act(revised in Feb. 13, 2009)
- Framework act on sustainable development(effective since Feb. 13, 2009)
- Special Act on Metropolitan Air Quality Improvement (revised in Jan. 26, 2007)
- Enforcement Decree of the Environmental Impact Assessment Act(revised in 28 Mar. 2008)

None of the above mentioned laws in South Korea mandates the decomposition, destruction, recycle or substitution of SF₆ or any component of exhaust gases containing SF₆ exist.

The SF₆ destruction should occur at the same industrial site where the SF₆ is used, and SF₆ destroyed is not imported from other facilities;

The project activity is a future project; however, it is clear from the engineering design^{/16/} of the project activity that SF₆ will be destroyed at the project site and SF₆ destroyed is not imported from other industrial facilities. The engineering design plan for plant P6 it is clear that the abatement device is directly connected to etching chambers and there is no bypass to it. However, the engineering designs for other plants were not available during the course of validation. The usage and supply of SF₆ abatement plant shall be verified during the first verification. **FAR#19(a)** is raised.

The measurement with respect to determining SF₆ flow to the abatement device are taken immediately before the abatement device, without any other devices located in between which is capable of changing the SF₆ flow through transformation or decomposition;

To monitor the flow and composition of the inlet gas to the abatement system, FTIR & QMS devices will be installed at the end of pre-treatment device, no device which can change the flow of SF₆ is installed between the inlet measurement device and the abatement system. This is clearly reflected from the engineering design^{/16/} of the process.

Where the applicability conditions of US EPA Methods 1 and 2 are satisfied (i.e. the flow is not cyclonic or swirling and the stack has a circular cross section with a diameter greater than 0.3 meter);

As according to the engineering design^{/16/} of the process, the inlet pipe diameter is 0.35m and outlet is 0.6m. The flow of SF₆ gas will not be cyclonic or swirling. This has been validated through the 'annubar installation guidance' provided by the technology supplier. It will be ensured that flow is laminar in nature and not cyclonic or swirling.

The facility has obtained necessary permits concerning safety and health in order to install and operate the abatement device and monitoring facilities;

The project proponent has submitted a notice (Ref. no: 110637 dated 30th Nov, 2009) obtained from Korea Occupational Safety & Health Agency (KOSHA), which does not mandate LGI to submit the Hazard Risk Prevention Plan for authorization by KOSHA under Industrial Safety & Health Act. This is discussed briefly under CAR#19 below.

SF₆ is not temporarily stored for subsequent destruction;

It has been verified from the engineering design^{/16/} of the process for plant-P6 that the exhaust of the dry etching process is directly connected to the process chamber of abatement system. However, a separate line is connected to the existing acid scrubber which will only be used for emergency situations. This should be verified during the 1st verification. **FAR#19(b)**

It is demonstrated by test data by the manufacturer or the project proponent that the abatement technology does not generate known non-CO₂ greenhouse gas such as fluorocompounds, including non-Kyoto gases, at detection levels.

According to the test results^{/18/} provided by the technology supplier, the technology does not generate known non-CO₂ GHG (HF, HCl, CL₂) at detection level. This has been verified from the gas composition analysis results provided by the technology supplier 'Save Technology Co. Ltd.'

This methodology in its present form is not applicable to Chemical Vapor Deposition (CVD) processes that use SF₆.

The project activity does not use any Chemical Vapor Deposition device. This has been checked and verified by the assessment team during the site visit and was found to be satisfactory.

In addition, the applicability conditions included in the tools referred to above apply.

Further the project activity complies with the requirements of the following tools:

- Tool to calculate the emission factor for an electricity system; Annex 12 EB 35;
- Combined Tool to Identify the Baseline Scenario and demonstrate Additionality; Annex 14 EB 28;

- Tool to calculate baseline, project or leakage emissions from electricity consumption; Annex 7 EB 39;
- Tool to calculate project or leakage emissions from fossil fuel consumption; Annex 11 EB 41.

FAR#19 was raised asking the PP to further justify the applicability criteria's in the PDD and to submit the following documents to support the arguments mentioned in the PDD:

- 3 years historical data (ending on 31st January 2009) for SF₆ purchase, consumption and production in all 4 plants.
- Engineering design plan and other relevant technical details of the project activity.
- Information on existing laws and regulations on destruction/substitution/recycling of SF₆ or any other component of the exhaust gas from the process.
- Notices/clearances obtained from concerned organizations, concerning safety & health in order to install and operate the abatement device.

The justification on the applicability criteria's in version 14 of PDD has been validated and found OK. The relevant documents have been validated and found OK. The project proponent has submitted a notice (Ref. no: 110637 dated 30th Nov, 2009) obtained from Korea Occupational Safety & Health Agency (KOSHA), which does not mandate LGI to submit the Hazard Risk Prevention Plan for authorization by KOSHA under Industrial Safety & Health Act. SF₆ gas is not included in the list of 49 harmful substances in South Korea, hence Industrial Safety & Health Act, Article 36 is not applicable in this project. Further, as the capacity of local exhaust (37.2 m³/min) is less than 150 m³/min, Industrial Safety & Health Act, Article 24 & Industrial Health Standard Enforcement Regulation, Article 3 and Article 166 are not applicable to this project. The above mentioned information has been confirmed with Mr JaeHong Yoo and Mr SangGeun Lee from Work Environment Team, Industrial Health Division, KOSHA. The discussion with the relevant South Korean Organizations is tabulated below:

Organization(s)	Notice(s) and Permit(s) Obtained	Document Reference	Basis for acceptance
Korean Gas Safety Corporation	Technical Review Results on the change of Specialty Gas Facility (LNG usage)	Official letter received dated Nov. 4, 2009	Clause 28 Korean Pressurized Gas Safety Control Act.
Korean Occupational Safety Health Association	Process Safety Report(Exempted) of process safety management	Letter of BARTEC Safety (doc. # PSM 2009 1110) Engineering, confirming official consultation of PSM exemption.	Industrial Safety & Health Act Article 49 Clause 2 and Article 33.6.
Korean Occupational Safety Health Association	Hazard & Risk Prevention Plan(Exempted)	Official consultation of KOSHA records (Ref: 110637, 30 Nov 2009)	Industrial Safety & Health Act, Article 24 & Article 36; Industrial Health Standard Enforcement Regulation, Article 3 and Article 166

In view of the above statements, some of the issues are closed. However, three applicability criterions as per methodology AM 0078 version 01.1 have been analyzed above and shall be verified during first verification. Hence, FAR#19 (a), FAR#19 (b), FAR#19 (c) are raised.

4.5 Project Boundary

The project activity is the installation of SF₆ gas abatement device at its plants P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju, South Korea. The gas included in baseline scenario is SF₆; CO₂ & SF₆ gases will be the part of emissions included in the project scenario. The power requirement of the project activity will be met by importing electricity from the KEPCO grid. Hence, the project boundary of each of the plant includes the point of SF₆ usage, SF₆ abatement system, scrubbing system and KEPCO grid. As per the requirement

of paragraph 78 of VVM version 01.1, the delineation of the project activity in the PDD has been validated by inspecting the existing situation at the plants and the engineering design & process flow diagram^{/16/} of the project activity. Hence, based on assessment of process design documents and corroborated by observations, the delineation and description of the project boundary in the PDD version 14 is found to be correct. Other than the sources of emissions referred in the applied methodology, no other source of GHG emission is identified in the project boundary (which is contributing more than 1% of overall expected average annual reductions).

CAR#03 was raised as there was no information on delineation of the project activity in PDD version 03. In response the PP included a flow-diagram of the project activity in version 14 of PDD. Hence, **CAR#03** was closed.

4.6 Baseline Selection and Additionality

The methodology AM0078 version 1.1 applicable to the project activity refers to 'Combined tool to identify the baseline scenario and demonstrate additionality', Annex 14 EB 28, to identify the most plausible and credible baseline scenario. The steps followed to identify to baseline scenario are detailed below. The guidelines referred in the following applicable tools have also been strictly followed in demonstration of baseline identification and additionality:

- Guidelines for objective demonstration and assessment of barriers, EB 50 Annex 13;
- Guidelines on the assessment of investment analysis, EB 51 Annex 58.

As per **Sub-step 1a** of the combined tool-Annex 14 EB 28, the following plausible alternatives scenarios to the proposed CDM project activity are identified:

1. Undertaking this project, using an abatement device without CDM.
2. Continuing using SF6 without any abatement devices, the current situation
3. Using a substitute gas for SF6.
4. Continuing to use SF6 but undertaking a concerted effort to capture and reuse the SF6.
5. Process modifications/optimization to minimize SF6 consumption.

Further, compliance of identified baseline scenarios with the applicable mandatory laws and regulations in South Korea was checked and found that at present there is no law^{/15/} in South Korea which mandates the decomposition, destruction, recycle or substitution of SF6 gas, hence as per **Sub-step 1b** of Annex 14 EB 28, all the identified baseline scenarios are plausible and consistent with mandatory applicable laws and regulations.

Further, the barriers that would prevent the implementation of alternative scenarios were identified as per **Sub-step 2a** of the combined tool. The alternative scenarios which are prevented by at least one of the barriers identified in **Sub-step 2b** in the PDD are being eliminated from further consideration.

The barrier-'Lack of prevailing practice' (and arguments made under it) has been validated against the letter^{/19/} from Korean Display Industry Association (KDIA), which basically summarizes the results of a survey undertaken by KDIA on technical (common) practise in LCD Industry across WLICC countries. The letter from KDIA falls under type 'g' of the evidences those can be used to demonstrate the existence and significance of the identified barriers, as according to the guidance in Annex 14 EB 28. The alternatives (1), (3) and (4) are not the common practises in South Korea. These have not been commercially practised in the host country. This has been clearly reported in the letter issued by KDIA. Further, the credibility of KDIA as an organisation, was verified through an 'approval for establishment certificate'^{/20/} (Approval no. 2007-28, dated June 13, 2007) issued by Minister of Commerce, Industry and Energy. The official survey^{/19/} results presented at the 14th WLICC meeting (on 3rd March, 2009, held in Seoul, South Korea) were also verified and found to be satisfactory. Further, in a letter^{/21/} (type 'f' evidence) issued by 'environment technology team' of LG Display, it has been made quite clear that besides technical challenges and 'lack of prevailing practise', any change in current situation may require huge investments. Therefore, the alternatives (1) and (3) and (4) face the aforesaid mentioned barrier and are being eliminated from further consideration in the PDD. However, as per the requirement of EB 28 Annex 14, alternative (1) is further discussed in Step 3 to demonstrate that with consideration CDM revenues, the project becomes financially viable and barrier is alleviated. Investment analysis is discussed in section 4.6.4 below.

The Technology barrier (arguments made under it) has been validated against letters issued by the cost innovation team and environment technology team of LG Display and letter dated 15/01/2010 issued by KDIA. The letters^{21/} issued by LG display and KDIA falls under type 'f' and type 'g' respectively of the evidences those can be used to demonstrate the existence and significance of the identified barriers, as according to the guidance in Annex 14 EB 28. KDIA has confirmed that optimization efforts require an in-depth understanding of the entire processes of LCD production system and there is no external expert and consulting company available in the country due to specific LCD process technology. This has been further noted that optimization of SF6 consumption is not a challenge for LG display only but being faced by all LCD manufacturers in South Korea and around the world. LGD has achieved outstanding technological improvements in the SF6 consumption optimization through numerous R&D techniques and any further optimization of SF6 consumption is not achieved yet by any of the LCD manufacturing companies in South Korea. Therefore, it could be concluded that alternative (5) faces the 'technological barrier' and is being eliminated from further consideration.

Further, it has been confirmed that the survey has been undertaken by the Industrial support team of KDIA, which did not include any of the particular member of KDIA. The results of survey are not influenced by any of the member company of KDIA. Hence, this justifies the independence of KDIA from any member company.

Identified alternative scenario's which were prevented by at least one of the barriers listed in the PDD were eliminated from further consideration. Hence as an outcome of **Sub-step 2a and 2b**, only plausible alternative remaining is:

- Continuing using SF6 without any abatement devices, the current situation.

Hence, continuing using SF6 without any abatement devices, the current situation' is identified as the most plausible and credible baseline scenario.

As per the requirement of EB 28 annex 14 (sub-step 2b), *if there is only one alternative scenario that is not prevented by any barrier, and if this alternative is not the proposed project activity undertaken without being registered as a CDM project activity, then this alternative scenario is identified as the baseline scenario. Explain – using qualitative or quantitative arguments – how the registration of the CDM project activity will alleviate **the barriers** that prevent the proposed project activity from occurring in the absence of the CDM. If the CDM alleviates the identified barriers that prevent the proposed project activity from occurring, proceed to Step 4, otherwise the project activity is not additional.*

This has been demonstrated in the PDD that alternative 1 faces prevailing practice barriers due to the large investment costs required to install abatement technology and the additional financial resources required to operate the device without any financial return except CDM benefits. Therefore, the proponent has given a quantitative argument under investment analysis that with the consideration of CDM revenues, the prevailing practice barriers identified can be alleviated for alternative 1 i.e. undertaking this project using an abatement device without CDM. Hence, it has been validated and concluded under section 4.6.4 of this report that the CDM revenue overcomes both the initial costs and the operation costs that prevent this project from occurring without CDM and project activity becomes viable.

Alternatives (1) & (2) are further discussed below in **Step 3-Investment Analysis**.

To demonstrate the additionality of the project activity, common practice analysis has been performed as per Step 4 of Annex 14 EB 28, which basically complements the Barrier analysis and Investment analysis. The common practice is profoundly discussed in section 4.6.6 below. Based on an official survey^{19/} undertaken by the Korean Display Industry Association, none of the LCD manufacturing industry in South Korea has installed SF6 abatement system. The only SF6 abatement system installed in LCD industry in South Korea is LGD's small pilot plant at one of its plant. This abatement device was installed as a voluntary step to assess the critical data on cost, benefits, and other technical specification to inform potential future investments. This pilot plant has been shut down in the past, because of huge operating cost involved. Hence no similar project activity exists in South Korea.

Hence as per guidance in Annex 14 EB 28, the project activity can be called as additional.

The emission reduction calculations are performed as per the guidelines provided in the approved methodology AM0078 version1.1. The emission reduction calculation procedures in PDD version 14 complies with the applied methodology. This has been verified from the emission reduction calculation sheet.

CL#04 was raised asking PP to address the following issues:

- (a) Provide necessary references to justify the arguments mentioned to exclude the baseline scenarios- Using a substitute gas for SF₆ and Continuing to use SF₆ but undertaking a concerted effort to capture and reuse the SF₆.
- (b) Provide official survey report/data to justify the current technological practice in LCD manufacturing industries in South Korea.
- (c) Justify the exclusion of baseline scenario- Process modifications/optimization to minimize SF₆ consumption, from further consideration.

Based on the following arguments and clarifications, **CL#04** was closed:

- (a) The PP provided a letter^{/19/} from Korean Display Industry Association (KDIA) on common practise in LCD industry in South Korea. The documents clarifies that no substitute gas other than SF₆ is used in dry etching process in LCD industries in South Korea, Further, the PP clarified that SF₆ content in waste gas generated in the LCD industry is approximately 0.01% - 0.02%. The challenges regarding technology and investment are huge, there is no cases of SF₆ recycle and reuse in LCD manufacturing industries across South Korea.
- (b) According to the official survey^{/19/} undertaken by KDIA, only SF₆ abatement system in LCD industry in South Korea is a small pilot plant installed by LGD at one its plant P1 (which is not included in this project). Further the PP clarified that the equipment was installed to better understand the costs and potential SF₆ destruction benefits from the operation of the abatement system. However, due to very high operational cost (and no economic benefit) the device has not been operated since July, 2008. The credibility of KDIA as an organization has been verified through a certificate^{/20/} on 'Approval for establishment of Corporation' issued by Ministry of Commerce, Industry and Energy.
- (c) A letter^{/21/} from 'Cost Innovations Team' of LGD clarified that the LGD has fully implemented the optimization techniques to minimize SF₆ consumption dry etching process. Further actions are not known to the team and would need efforts, research and investment to improve the efficiency of the process. Hence, improving the efficiency of the process is a 'Technological Barrier' in itself.

4.6.1 Additionality

The additionality of the project activity is demonstrated based on 'Combined tool to identify the baseline scenario and demonstrate additionality', Annex 14 EB 28. As per the requirement of the combined tool, Barrier analysis (Lack of prevailing practice & Technology Barrier) and Investment analysis have been performed on the identified plausible alternatives. The facts and figures considered in the Barrier analysis have been verified and found to be satisfactory. The CAPEX and OPEX figures, for plant P6, considered in the investment analysis are taken from the contract & quotations^{/22/} raised by the equipment supplier. The CAPEX & OPEX figures for other three plants are projected based on the quantity of SF₆ gas to be treated in the abatement system. All the assumptions and figures considered in the investment analysis have been checked and verified by the assessment team and were found to be correct. Thus the project activity satisfies the requirement of the tool Annex 14 EB 28.

CAR#05 was raised as the additionality was demonstrated as per 'Tool for assessment and demonstration of additionality' in version 03 of PDD. The applied methodology AM0078 prescribes the use of 'Combined tool to identify the baseline scenario and demonstrate additionality'. In the revised PDD, the discussion on baseline scenarios and additionality is as per the Annex 14 EB 28. The revised PDD was checked and verified by the assessment team and was found to be satisfactory. Hence **CAR#05** closed.

4.6.2 Prior Consideration of the Clean Development Mechanism

The start date of the project activity is 1st June, 2009, the date on which the contract with the equipment purchase was signed; hence as per the guidelines in Annex 22 EB 49, the project activity is a new project activity. The contract^{/22/} dated 1st June, 2009 between the project proponent and the equipment supplier 'SAVE', has been verified by the assessment team and was found to be acceptable.

No notification is given to Host Party DNA and UNFCCC Secretariat, as prior to the start date of the project activity (start date in PDD version 03 is 1st December, 2009) a new methodology 'NM 271'^{/23/} was proposed to the CDM EB and also the PDD was published for global stakeholder consultation. Hence as per the

guidelines on New Projects Activities in Annex 22 EB 49, it can be concluded that CDM has been seriously considered in the project activity.

CL#07 was raised asking the PP to justify and substantiate the start date of the project activity. In response, the PP clarified that the start date of the project activity has been altered to 1st June 2009, which is the date on which an agreement for equipment purchase has been signed with the technology supplier 'SAVE'. The equipment purchase agreement^{/22/} between the project proponent and technology supplier is the earliest real action toward the project activity, under which the PP has committed to expenditures related to the implementation of the project activity. The chosen start date complies with paragraph 67 of EB 41 meeting report. The equipment purchase agreement has been checked and verified by the assessment team and was found to be acceptable. Hence **CL#07** was closed.

4.6.3 Identification of alternatives

The methodology AM0078 version 1.1 applicable to the project activity refers to 'Combined tool to identify the baseline scenario and demonstrate additionality', Annex 14 EB 28, to identify the most plausible and credible baseline scenario. The steps followed to identify to baseline scenario are detailed below.

As per **Sub-step 1a** of the combined tool-Annex 14 EB 28, the following plausible alternatives scenarios to the proposed CDM project activity are identified:

1. Undertaking this project, using an abatement device without CDM.
2. Continuing using SF6 without any abatement devices, the current situation
3. Using a substitute gas for SF6.
4. Continuing to use SF6 but undertaking a concerted effort to capture and reuse the SF6.
5. Process modifications/optimization to minimize SF6 consumption.

As per **Sub-step 1b**, to verify the compliance of identified baseline scenarios with the applicable mandatory laws and regulations in South Korea, the following laws relevant to the project activity were checked on website of Ministry of Environment in South Korea:

- Clean air conservation act(revised in Feb. 13, 2009)
- Framework act on sustainable development(effective since Feb. 13, 2009)
- Special Act on Metropolitan Air Quality Improvement (revised in Jan. 26, 2007)
- Enforcement Decree of the Environmental Impact Assessment Act(revised in 28 Mar. 2008)

It was found that at present no law in South Korea mandates the destruction of SF6 gas, hence as per Sub-step 1b of Annex 14 EB 28, all the identified baseline scenarios are plausible and are in compliance with mandatory legislation and regulations taking into account their enforcement in the country.

4.6.4 Investment analysis

The project proponent does not have any direct financial benefit from the installation of the SF6 abatement system at six of its LCD manufacturing plants in South Korea. The Capital expenditures in the equipment purchase and installation (CAPEX) and Expenditures towards the Operation & Maintenance of the equipments (OPEX) constitute the major component of the Cash outflow in the project activity. The investment analysis has been performed as per **Step 3** of the Annex 14 EB 28 to demonstrate that with consideration of CDM revenues, the barrier due to alternative 1 alleviates.

As per guideline in Annex 14 EB 28 (footnote 6 page 8); a simple cost analysis is applied to perform the investment analysis. As there is no direct revenue (financial returns) associated with the project activity, the Net Present Value (NPV) of the project activity without CDM is lower than US \$ -123 million. Hence, without the CDM revenue, in any case, the project activity will not become financially viable.

This has been validated as per guidance EB 51 Annex 58 Para 6 that the input values used in the financial calculation sheet are valid and applicable at the time of investment decision. The CAPEX figures for plant P6 (abatement system) have been verified from the Equipment purchase agreement dated 1st June, 2009, signed between LG international Corp. and Save Technology Co. Limited. The OPEX figures for plant P6 (abatement system) have been verified from the contract & quotation^{/22/} provided by the technology supplier

SAVE Corporation. These values were found to be correct. No Equipment Purchase Contract has been signed for the plants P2/3, P4/5 and P7; therefore, the CAPEX and OPEX figures for these plants are the estimated figures considering the proportion of SF₆ gas to be treated by the abatement system in the respective plant. On a conservative side, the project proponent has applied a 20% discount^{/24/} in the estimation of CAPEX for plants other than P6. Further, there are few components in the operating cost, like wage, land rental fee, metering device maintenance cost, which would remain same regardless of quantity of SF₆ gas to be treated by the plant. Hence the cost of such components is taken same as that of plant P6. It has been successfully demonstrated in the investment analysis sheet that project becomes financially viable with the consideration of CDM revenues which will alleviate the prevailing practice barrier in South Korea due to large investment and operational cost required to install the abatement technology. Hence, the project activity fulfills the necessary requirements of EB 28 Annex 14.

The data and calculation considered in the investment analysis^{/24/} have been verified against the relevant records (purchase agreement, quotation and Investment analysis spreadsheet) as per the applicable requirement of VVM version 01.1 and found to be acceptable.

CAR#06(a) was raised asking the PP to provide the investment analysis calculation sheet and necessary documents to support the investments figures. In response the PP submitted the Investment analysis calculation sheet and clarified that for Plant P6, the CAPEX figures have been referred from the purchase agreement signed with the technology supplier and the OPEX figures have been taken from the quotation provided by the technology supplier. However, for other three plants, the same figures have been projected in proportion of the volume of gas treated by the abatement system. In estimation of CAPEX for plants other than P6, the PP has applied a 20% discount rate and for estimating OPEX, the operating costs like wage, land rental fee, metering device maintenance etc. are kept same, as the cost of these components will not change with the capacity of the system. A simple cost analysis has been performed as there is direct incentive from the project activity. Hence, any small difference between the estimated and actual figures will not make the project non-additional. Therefore, **CAR#06(a)** was closed.

4.6.5 Barrier analysis

The Barriers that would prevent the implementation of alternative scenarios were identified as per **Sub-step 2a** of the tool Annex 14 EB 28. Means of validation employed for inspecting the defined barriers in the PDD and reporting requirements as per VVM version 01.1 has been transparently and profoundly scripted under section 4.6.0-Baseline selection and Additionality above.

4.6.6 Common practice analysis

SF₆ abatement (particularly in LCD manufacturing industries in South Korea) is not the common practice, and the project activity is first-of-its-kind in the LCD manufacturing sector in South Korea (geographical scope). The only SF₆ abatement system installed in any LCD industry in South Korea is a small pilot plant at LG Display's LCD manufacturing unit. This abatement device was installed as a voluntary step, to assess critical data on cost, benefits, and other technical specifications, to inform potential future investments. Due to huge operating cost involved, the pilot plant is not in operation since July, 2008.

The above claims have been verified from the written documentation^{/19/} on SF₆ abatement or optimization techniques currently in practice in World LCD Industry Cooperation Committee (WLICC) countries, issued by the Korean Display Industry Association (KDIA). A request letter (ref. no: 7169548-2700-0019 dated 16th June, 2009) from CEO of LG Display was sent to KDIA, to share the results of the official survey undertaken by KDIA. The official document was issued by KDIA clearly says that there is no case of;

- Application of a substitute gas of SF₆ in LCD industry in South Korea;
- Application of SF₆ capture and recycle technology in South Korea;
- Set up of SF₆ abatement in LCD industries in South Korea (except the pilot plant at LGD, which is in non-operating condition at present due to the operating expense problem)

Further, the credibility of KDIA as organisation, was verified through an 'approval for establishment certificate'^{/20/} (Approval no. 2007-28, dated June 13, 2007) issued by Minister of Commerce, Industry and Energy. The official survey^{/19/} results presented at the 14th WLICC meeting (on 3rd March, 2009, held in Seoul, South Korea) were also verified and found to be satisfactory.

The common practise analysis have been validated and reported as per paragraph the applicable requirements (para 117, 118, 119) of VVM version 01.1. Hence it can be concluded that the proposed CDM project activity is a first-of-its-kind.

Also as the project activity complies with all Steps of 'Combined tool to identify the baseline scenario and demonstrate additionality, Annex 14 EB 28, the project activity can be termed as 'Additional'.

CAR#06(b) was raised asking the PP to justify the arguments used to demonstrate the Common Practice analysis. In response, the PP submitted a letter obtained from Korean Display Industry Association (KDIA) which concludes the results of the official survey undertaken by KDIA. The letter clarifies that the only SF₆ abatement system in LCD industry in South Korea is a small pilot plant (of capacity 5 cubic meter per minute) installed by LGD at one its plant P1 (which is not included in this project). No other case of SF₆ abatement system exists in South Korea. Further the PP clarified that the equipment was installed to better understand the costs and potential SF₆ destruction benefits from the operation of the abatement system. However, due to very high operational cost (and no economic benefit) the device has not been operated since July, 2008. The credibility of KDIA as an organization has been verified through a certificate on 'Approval for establishment of Corporation' issued by Ministry of Commerce, Industry and Energy. Hence **CAR#06(b)** was closed.

4.7 Application of Baseline Methodology and Calculation of Emission Factors

The emission reductions calculations in PDD version 14 are performed as per the guidelines provided in the approved methodology AM0078 version 1.1. All the equation and steps taken in the calculation process comply with the requirements of the applied methodology. The procedures used for calculating the baseline emissions, project emissions and leakages are detailed below:

Procedure for calculating Baseline Emissions is detailed below:

$$BE_{in,y} = k * E_{SF6,y} * GWP_{SF6}$$

Where,

$BE_{in,y}$ = Total baseline emissions in year y, (tonnes of CO₂)

k = SF₆ consumption factor, defined as the ratio of SF₆ consumption per unit surface area of LCD substrate processed (in m²) in the project period with that of the baseline

$E_{SF6,y}$ = SF₆ baseline emissions in year y (tonnes SF₆)

GWP_{SF6} = Global warming potential of SF₆ in tonnes CO₂ per tonnes of SF₆

$$E_{SF6,y} = \min (E_{SF6,in,y}; 0.48 * C_{SF6,y}; 0.48 * C_{SF6,hist})$$

$E_{SF6,in,y}$ = Mass of SF₆ gas entering the abatement device in year y (tonnes SF₆), which is the annual sum of the mass of SF₆ entering the abatement device per unit time ($E_{SF6,in}$ in grams per second)

$C_{SF6,y}$ = Annual consumption of SF₆ during the project year y, defined as the total SF₆ purchased in a specific project year y, taking into account the change in inventory in the same year (tonnes SF₆)

$C_{SF6,hist}$ = Historical SF₆ consumption, calculated as the three years maximum consumption prior the implementation of the project activity before January 31, 2009. Consumption is defined as the total SF₆ purchased in a year, taking into account the change in inventory in a specific year (tonnes SF₆)

0.48 = Ratio of SF₆ consumed but not destroyed or transformed in the process. This is derived from the IPCC 2006 Guideline's default factor on destruction/decomposition (0.4), and factoring in 20% uncertainty ((1-0.4) * 0.8 = 0.48)

Procedure for calculating SF₆ consumption ratio

$$SF_{6, ratio} = \min (C_{SF6,-1} / SP_{-1}; C_{SF6,-2} / SP_{-2}; C_{SF6,-3} / SP_{-3})$$

$SF_{6, ratio}$ = Ratio of SF₆ consumption to the surface area of LCD substrate processed (tonnes/m²)

$C_{SF_6, -i}$ = Historical SF_6 consumption in year i , where $i = -1, -2, -3$, previous to the implementation of the project activity before January, 31, 2009 (tonnes)

SP_{-i} = Historical production of LCD substrate (in m^2) during year i (where $i = -1, -2, -3$) prior the implementation of the project activity before January, 31, 2009

Procedure for calculating SF_6 consumption factor

$k = 1$; if $SF_{6, ratio} \geq C_{SF6,y} / SP_{project,y}$

$k = SF_{6, ratio} / (C_{SF6,y} / SP_{project,y})$; if $SF_{6, ratio} < C_{SF6,y} / SP_{project,y}$

Where,

$SP_{project,y}$ = Production of LCD substrate (in m^2) during the project year y

$C_{SF6,y}$ = 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 (tonnes SF_6)

$SF_{6, ratio}$ = Ratio of SF_6 consumption to the surface area of LCD substrate processed (tonnes/ m^2)

Procedure for calculating the Project emissions is detailed below:

$PE_y = BE_y (1 - DRE_y) + C_{CO2,y}$

Where,

PE_y = Project emissions during year y

DRE_y = Destruction removal efficiency of the abatement unit

$C_{CO2,y}$ = Amount of CO_2 produced in a year from the operation of the abatement machine from electricity and/or fuel combustion in year y , calculated using the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

Leakage Estimation:

No leakage estimation has to be accounted under this methodology.

The equation applied to calculate the Net emission reduction is: $ER_y = BE_y - PE_y$.

The values of the parameters fixed ex-ante have been validated and were found to be correct. These are as described below:

- The **Global Warming Potential** of SF_6 of 23,900 is used in the baseline emission calculations. The value of GWP of SF_6 is taken from IPCC 2006 guidelines. This has been verified and found to be correct.
- There is no SF_6 abatement devices on the existing lines of production plants (P2/3, P4/5, P6 and P7) included in this project activity. However, the project proponent has a SF_6 abatement device (pilot plant) installed at the production facility P1, which is beyond the purview of this project activity. Further, it has been verified during the site visit that the pilot plant is not operational, reason being the extremely high capital cost and no direct incentive associated with it. Hence **Design capacity for existing Abatement Device (CAP SF_6 , ex)** is not considered in baseline emission calculations.
- **Historical SF_6 consumption ($C_{SF6,hist}$)** is calculated as the three years maximum consumption prior the implementation of the project activity before 31st January 2009. Consumption of SF_6 is taken as the total SF_6 purchased in a year, taking into account the change in inventory in a specific year and the heel value of 10%. The SF_6 purchase records and inventory records^{14/} have been verified for the

data reported in the PDD version 14, the values were found to be inline with the relevant documents. The Heel value of the SF₆ gas cylinder is taken from the IPCC 2006 guidelines^{/25/}.

- **Historical production of LCD substrate (SP-i)** for last three years prior to 31st January 2009 is verified from the plant records^{/28/} and found to be correct.
- **Combined margin CO₂ emission factor for grid ($EF_{grid,CM,y}$)** is calculated as per 'tool to calculate the emission factor for an electricity system', Annex 14 EB 50. The figures used in the emission factor calculation are referred from the most recent data^{/26/} published by Korea Electric Power Corporation (KEPCO). The calculation procedures, assumptions and data used were verified and found to be correct. The combined margin emission factor has been fixed ex-ante and a value of 0.5708 tCO₂/MWh is applied in the emission reduction calculations^{/27/}.
- **Maintenance schedule for abatement device, FTIR devices, QMS measurement devices, Annubar devices** will be followed as per the schedule mentioned in Annex 4 of the PDD version 14.
- **Mass of SF₆ gas entering the abatement device ($E_{SF6, in, y}$)** is estimated assuming the default SF₆ etch utilization efficiency of 70% and a heel value of 10% from the expected purchase level. Both these default values are taken from IPCC 2006 guidelines^{/25/} for National GHG Inventories (Chapter 6: Electronics Industry Emissions). These values are checked from the IPCC 2006 guidelines and found to be appropriate. The calculation procedures for estimating $E_{SF6, in, y}$ have been checked and found to be correct. However, actual baseline emission will be calculated based on the procedures outlined for the monitoring of $E_{SF6, in, y}$ in the applied methodology. The equations and procedures to be used for the monitoring of $E_{SF6, in, y}$ are clearly mentioned in the PDD version 14.
- **Mass of SF₆ gas exiting the abatement device ($E_{SF6, out, y}$)** is estimated assuming the default SF₆ destruction efficiency of 90% of the abatement system. The default value of SF₆ destruction efficiency of the abatement system is taken from 'IPCC 2006 guidelines for National GHG Inventories (Chapter 6: Electronics Industry Emissions)'^{/25/}. The value has been checked from the IPCC 2006 guidelines and found to be appropriate. The calculation procedures for estimating $E_{SF6, out, y}$ have been checked and found to be correct. However, actual project emissions will be calculated based on the procedures outlined for the monitoring of $E_{SF6, out, y}$ in the applied methodology. The equations and procedure to be used for the monitoring of $E_{SF6, out, y}$ are clearly mentioned in the PDD version 14.
- **Production of LCD substrate during the project year y ($SP_{project,y}$)** is conservatively estimated based on the LGD business plan for the year 2009^{/28/} and advance order^{/28/} for LCD purchase placed by the clients. On a conservative basis, it has been considered that the production of LCD substrate will remain constant for the complete crediting period of 10 years, however the projections made for the demand and production of LCD clearly shows an increasing trend. This has been verified through the confidential business plans and market projections submitted by LG Display to SGS. Hence the LCD production figures for the year 2009 are used in emission reduction estimation for each year in the crediting period.
- **Annual consumption of SF₆ during the project year y ($C_{SF6,y}$)** is estimated based on the production of LCD substrate in year 2009 and the minimum SF₆ ratio in the last three years prior to 31st January 2009. The calculation procedures^{/27/} for $C_{SF6,y}$ have been checked and found to be appropriate.
- **Coefficient of the inlet Annubar device ($Cp.in$) and Coefficient of the outlet Annubar device ($Cp.out$)** has been chosen as per the manufacturer specifications for all plants. This has been validated against a letter (Ref. no: TH-10205L) from the manufacturer. As plants other than P6 are not yet commissioned, the coefficient values for other plants should be verified during the first verification.
- **Cross sectional area of the inlet stack (A_{in})** for plant P6 is calculated from the diameter of inlet stack specified in engineering designs provided by the technology supplier. The value has been verified and found OK. For other plants, this value will be determined on or before commissioning. This should be verified during first verification of the project activity.
- **Cross sectional area of the outlet stack (A_{out})** for plant P6 is calculated from the diameter of outlet stack specified in engineering designs provided by the technology supplier. The value has been verified and found OK. For other plants, this value will be determined on or before commissioning. This should be verified during first verification of the project activity.

CAR#08 was raised asking the PP to clearly specify the equations and parameters that will be used to calculate the mass of SF₆ entering and existing the abatement system in ex-post scenario (actual situation). In response, the PP specified the equations (as per the requirement of the applied methodology AM 0078 version 1.1) in PDD version 14. Hence **CAR#08** was closed.

CAR#09 was raised asking the PP to clearly specify the equations to calculate project emissions due to electricity consumption & fuel consumption as per the requirement of the applied tools EB39 Annex 7 & EB 41 Annex 11, in the PDD. The PP included the relevant equations in PDD version 14.

Further, the PP was asked to clarify the inclusion of Bituminous coal in 'low-cost/must-run' sources to calculate the simple operating margin. In response the PP excluded Bituminous coal from 'low-cost/must-run' sources category and recalculated the grid emission factor to comply with the definition of low cost/must run sources in the Annex 12 EB 35. The data^{/26/} used in the calculation of grid emission factor have been verified and found correct. The grid emission factor is calculated as per 'Tool to calculate the emission factor for an electricity system' Annex 12 EB 35. This validated from the EF calculation spreadsheet^{/27/} submitted for validation along with the PDD. The calculation procedures^{/27/} have been checked and found correct. Hence **CAR#09** was closed initially. However, after publication of latest guideline on calculation of emission factor- EB 50 Annex 14, **CAR#09** was reopened asking the PP to re-work the emission factor calculation as per the requirement of EB 50 Annex 14. In response the PP has re-worked the emission factor calculation as per the requirement of EB 50 Annex 14. The revised EF calculations have been checked and found OK. Hence **CAR#09** was closed.

CAR#10 was raised as the monitoring parameters $M_{s,in}$ (Minimum molecular weight of inlet stack gas, wet basis) & $M_{s,out}$ (Minimum molecular weight of outlet stack gas, wet basis) were fixed ex-ante. These parameters are calculated figures, derived from the monitoring parameters $M_{d,in}$ & $M_{d,out}$. Hence the above parameters cannot be fixed ex-ante and should be monitored. In response, the PP included $M_{s,in}$ & $M_{s,out}$ among the list of monitoring parameters in section B.7.1 of PDD version 14. Hence **CAR#10** was closed.

FAR#11 was raised asking the PP to specify the values of the ex-ante parameters C_{pin} , C_{pout} , A_{in} & A_{out} in section B.6.2 of PDD. In response the PP clarified the values of parameters C_{pin} , C_{pout} , A_{in} & A_{out} are only available for plant P6, and hence, these have been included in the revised PDD. The values of these parameters for plants other than P6 will be determined on commissioning of the project activity and same values will be used henceforth. These values should be checked during the 1st verification of the project activity. **FAR#11** is raised.

CL#12 was raised asking the PP to provide the supportive documents for the figures used in estimating baseline emissions and project emissions. The following list of documents has been verified for the relevant parameter:

- Statistics of electric power in Korea for grid emission factor;
- Official enquiry on LNG from Korean Gas Corporation;
- Historical data on SF₆ consumption;
- SF₆ purchase receipts and Inventory records;
- Utility consumption for plant P6 from technology supplier 'SAVE';
- Production plan of LCD substrate;

All the references, assumptions, projections methods and estimated (or actual) values of the respective parameters have been verified and found to be correct in version 14 of PDD. Hence **CL#12** was closed.

CAR#13 was raised asking the PP to provide the emission reduction calculation sheet. For plant P6, the baseline emissions and projects emissions are calculated from the utility consumption data provided by the technology supplier 'SAVE'. However, for plants P2/3, P4/5, P7, the baseline emissions and project emissions are estimated in proportion to the capacity of the respective abatement system with respect to the abatement system of plant P6. A destruction efficiency of 90% (against the manufacturer guaranteed value of 95%) is applied to calculate the project emissions. The emission reduction calculation in version 14 of PDD is found to correct. Hence **CAR#13** was closed.

CAR#14 was raised asking the PP to provide the information on the projection methods used to arrive at the production figures of LCD substrate for year 2009. In response the PP clarified that for year 2009; the production of LCD substrate is based on the expected market consumption, historical production patterns and advanced order placed by the clients for year 2009. According to a Market survey, in coming years the production/ sale of LCD will go on a higher side, however, as a conservative approach, it is assumed that for rest of the crediting period, the production of LCD substrate will remain same as that of year 2009. All the reference documents have been verified and found OK. Hence **CAR#14** was closed.

4.8 Application of Monitoring Methodology and Monitoring Plan

The monitoring plan of the proposed CDM project activity complies with the requirements of approved methodology AM0078 version 1.1 for the collection and archiving of all the relevant data necessary for estimation and measuring the emission reductions within the project boundary during the crediting period. The feasibility of the monitoring plan mentioned in the PDD has been validated during the site visit with the available engineering design and process flow design documents and interviews with the technical team responsible for the implementation of the project activity. The PP will hire an independent third party to undertake the monitoring process of the project activity. The monitoring plan mentioned in the PDD will be exactly followed at all plants under consideration of the proposed project activity. The monitoring plan of the project activity also fulfils the requirements of the following applied tools:

- Tool to calculate the emission factor for an electricity system, version.2.
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version1.
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version 2.

The choice of the monitoring parameters and information towards the monitoring parameters is in conformance within the requirements set by the approved methodology applied. To ensure the data quality, necessary information on QA/QC procedures for each of the monitoring parameters are included and sufficiently described in PDD version 14.

The list of monitoring parameter includes:

S.No:	Monitoring Parameter	Notation	Units
1.	Mass of SF6 gas entering the abatement device in year y	$E_{SF6,in,y}$	tonnes
2.	Annual consumption of SF6 during the project year y, defined as the total SF6 purchased in a specific project year y taking into account the change in inventory in the same year	$C_{SF6,y}$	tonnes
3.	Production of LCD substrate during the project year y	$SP_{project,y}$	m ²
4.	Emissions of SF6 gas measured at the inlet of the SF6 abatement system	$E_{SF6,in}$	g/sec
5.	Emissions of SF6 gas measured at the outlet of the SF6 abatement system	$E_{SF6,out}$	g/sec
6.	Maximum molecular weight of inlet stack gas, wet basis	$M_{s,in}$	g/mole
7.	Minimum molecular weight of outlet stack gas, wet basis	$M_{s,out}$	g/mole
8.	Molecular weight of inlet stack gas, dry basis	$M_{d,in}$	g/mole

9.	Molecular weight of outlet stack gas, dry basis	$M_{d,out}$	g/mole
10.	The proportion of water in the inlet gas stream measured using EPA method 4, and used to calculate the inlet gas mass density.	$B_{ws,in}$	%
11.	The proportion of water in the outlet gas stream measured using EPA method 4, and used to calculate the inlet gas mass density.	$B_{ws,out}$	%
12.	The inlet stack pressure measured during manufacturing operations	$P_{s,in}$	mmHg
13.	The outlet stack pressure measured during manufacturing operations	$P_{s,out}$	mmHg
14.	The inlet stack temperature measured during manufacturing operations	$T_{s,in}$	K
15.	The outlet stack temperature measured during manufacturing operations	$T_{s,out}$	K
16.	The averaged velocity head measurement used to calculate the inlet gas velocity	$P_{avg,in}$	mmH ₂ O
17.	The averaged velocity head measurement used to calculate the outlet gas velocity	$P_{avg,out}$	mmH ₂ O
18.	Inlet gas velocity	$V_{s,in}$	m/sec
19.	Outlet gas velocity	$V_{s,out}$	m/sec
20.	Inlet volumetric flow rate	Q_{in}	m ³ /sec
21.	Outlet volumetric flow rate	Q_{out}	m ³ /sec
22.	Inlet SF ₆ concentration measured by FTIR	Inlet SF ₆ conc.	Ppm
23.	Outlet SF ₆ concentration measured by FTIR	Outlet SF ₆ conc.	Ppm
24.	volume unit per year of natural gas consumed by abatement device	$FC_{i,j,y}$	m ³ /yr
25.	Weighted average mass fraction of carbon in natural gas in year y	$wC_{i,y}$	tC/t LNG
26.	Weighted average density of natural gas in year y	$\rho_{i,y}$	t/ m3
27.	Electricity Consumption in year y	$EC_{,y}$	kWh

The project proponent will hire a qualified independent third party to look after the operation and monitoring of the process, this includes:

- Design and operation of metering system
- The calibration of metering system
- Data management

Each of the monitoring team for the three processes described above will work under a separate higher authority (director) for each team. The project management team will be responsible for the overall implementation and execution of the monitoring plan.

The personnel employed will be given training to ensure the efficient monitoring of the process as per the requirement of the applied methodology. The project monitoring plan is sufficiently described in the Annex 4 of the PDD version 14.

CAR#15(a) was raised asking the PP to add the following details for each of the monitoring parameter in section B.7.1 of the PDD:

- Monitoring frequency of the parameter;
- Calibration frequency of the meter/device used;
- Data storage/archiving procedure (electronic or on paper);
- Relative positioning of the meter/device;
- QA/QC procedures followed for each parameter;
- Internal audits;
- Procedures that will be followed to calculate the emission reductions in case of data redundancy.

The PP has incorporated necessary information in monitoring plan of PDD version 14. The monitoring plan fulfills the requirement of the applied methodology AM 0078 version 1.1 and applicable tools. Hence, **CAR#15(a)** was closed.

CAR#15(b) was raised as 'electricity consumption' was not among the list of monitoring parameters in PDD version 03. The PP responded by including 'electricity consumption in year y' in section B.7.1 of PDD version 14. The procedures towards the monitoring of the parameter have been checked and verified by the assessment team and were found to be acceptable. Hence **CAR#15(b)** was closed.

As per the requirement of the applicable methodology AM 0078 version 1.1, under **CAR#16** was the PP asked to provide a description on the measurement equipments used in the process and maintenance of the abatement system, in Annex 4 of PDD. In response the PP included the relevant information on Abatement system, Annubar devices, FTIR system and QMS. This was found to be in line with the applicable methodology; hence **CAR#16** was closed.

CL#17 was raised asking the PP to specify the date of completion of the application of baseline study and monitoring methodology in section B.8 of PDD. In response the PP clarified that the baseline and monitoring methodology study was completed on 1st April, 2009. This date is consistent with the timeline of the project history. Hence **CL#17** was closed.

4.9 Environmental Impacts

The proposed CDM project activity does not fall in the list of projects that require Environment Impact Assessment. As per Annex1 of the South Korean Enforcement ordinance Article 3 Clause 2 in Environmental Impact Assessment Act dated 28th March 2008, SF6 abatement projects are not required to undertake EIA studies.

CL#22 was raised asking the PP to substantiate the claim that EIA is not required for the SF6 destruction projects activity in South Korea. In response, the PP submitted a document on 'Environmental Impact Assessment Act' dated 28th March 2008. It has been verified that under the environmental legislation of Republic of Korea, EIA is not required for SF6 projects. Hence **CL#22** was closed.

4.10 Local Stakeholder Comments

Local Stakeholder Consultation was conducted separately in cities of Paju and Gumi in South Korea on 8th June 2009 and 9th June 2009 respectively. The local stakeholders were invited through official invitation letter dated 11th May, 2009 and through advertisements on local government websites^{29/} in both the cities. A formal presentation was made to the attendees and the comments received were duly addressed. No negative comment was received in the Local Stakeholder Consultation Process. The adequacy of the local stakeholder consultation has been verified through a complied report (which includes Invitation letters, attendance list, public comments and pictures of the stakeholder meetings) on "local stakeholder consultation process" submitted by the PP and interviews with the local stakeholders during the validation site visit. All the comments have been sufficiently addressed by the PP; a summarized description on comments received is included in the PDD. The local stakeholder consultation process has been sufficiently and fairly carried out by the project proponent.

CL#18 was raised asking the PP to provide an elaborative description on comments received in the local stakeholder process. In response the PP included the list of comments received in PDD version 14. No negative comments have been received in the process. Hence **CL#18** was closed.

5. Comments by Parties, Stakeholders and NGOs

In accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures, the project design document of a proposed CDM project activity shall be made publicly available and the DOE shall invite comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organizations and make them publicly available. This chapter describes this process for this project.

5.1 Description of how and when the PDD was made publicly available

The Project Design Document for this project was made available on the UNFCCC website <http://cdm.unfccc.int/Projects/Validation/DB/MTDPC0S9WMPJSSGBJNUPC86RJFBVWY/view.html> and was open for comments from 27th May, 2009 until 25th June, 2009. Comments were invited through the UNFCCC CDM homepage.

5.2 Compilation of all comments received

Comment Number	Date Received	Submitter	Comment
1	N/A	N/A	Nil

5.3 Explanation of how comments have been taken into account

No comment was received in ISHC.

6. List of Persons Interviewed

Date	Name	Position	Short Description of Subject Discussed
18/06/2009 & 19/06/2009	Sang Won Lee	Manager-LG International	<ul style="list-style-type: none"> Project activity as a whole Plant Operations Project Management Investment in Project
18/06/2009 & 19/06/2009	Dong In Jung	Manager-LG Display	<ul style="list-style-type: none"> Project activity as a whole Plant operations Project Management Investment in Project Progress of Governmental Notice/Permit SF6 Purchase/Inventory Records Dry Etching Process presentation
18/06/2009 & 19/06/2009	Myoung Suk Baek	Director - Save	<ul style="list-style-type: none"> Progress of Notice/Permit
18/06/2009 & 19/06/2009	Jae-ho Choi	Manager-Save Technology	<ul style="list-style-type: none"> Technical Drawing Review Abatement System presentation Estimation Sheet of Parameters
18/06/2009 & 19/06/2009	Seok Hyun Seong	Team Leader-LG Display	<ul style="list-style-type: none"> Historical Data Management of LGD
18/06/2009 & 19/06/2009	Young Suk Seo	Staff-LG International	<ul style="list-style-type: none"> Emission Reduction Calculation Additionality demonstration Investment analysis Issue raised during Public Hearing Monitoring Plan Presentation
19/06/2009	Doo Hoon Yoon	Vice President - Joowon	<ul style="list-style-type: none"> Presentation on FTIR Calibration Procedure/Period of FTIR Supervision of calibration
19/06/2009	Young Tae Chae	President - Bongil	<ul style="list-style-type: none"> Presentation on QMS Calibration Procedure/Period of QMS Supervision of calibration
19/06/2009	Sang Tae Park	President - Taehung M&C	<ul style="list-style-type: none"> EPA Method Presentation Installation Location of Annubar Calibration Procedure/Period of Annubar Supervision of calibration

7. Document References

Category 1 Documents (documents provided by the Client that relate directly to the GHG components of the project, (i.e. the CDM Project Design Document, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the designated national authority) :

- /1/ PDD version 3 dated 01/04/2009 (First web hosted version for stakeholders' consultation)
- /2/ PDD version 4 dated 14/07/2009
- /3/ PDD version 5 dated 17/08/2009
- /4/ PDD version 6 dated 17/08/2009
- /5/ PDD version 7 dated 26/08/2009
- /6/ PDD version 8 dated 11/09/2009
- /7/ PDD version 9 dated 14/09/2009
- /8/ PDD version 10 dated 23/09/2009
- /9/ PDD version 11 dated 11/10/2009, PDD version 12 dated 02/12/2009, PDD version 13 dated 06/01/2010, Final PDD version 14 dated 04/02/2010
- /10/ Host Country Approval Letter dated 02/12/2009 from South Korean DNA and Letter of Approval dated 29/10/2009 from UK DNA.
- /11/ Modalities of Communication dated 26/01/2010
- /12/ Approved CDM Methodology AM0078 version 1.1

Category 2 Documents (background documents used to check project assumptions and confirm the validity of information given in the Category 1 documents and in validation interviews):

- /13/ Letter on 'No Official Development Assistance Received' (Ref. no: BDTFT20090625-01 dated 25th June 2009)
- /14/ Historical data (plant records) on SF6 purchase, consumption and inventory records for years 2005, 2006, 2007, 2008.
- /15/ Web site of Ministry of Environment (MEV) <http://eng.me.go.kr>
- /16/ Engineering design of Process dated 12/06/2009, Pipeline design and Reactor design dated 28/04/2009 prepared by SAVE Technology Co. Ltd..
- /17/ Notices and clearances obtained from Korean Gas Safety Corporation (letter dated 04/11/2009) and Korean Occupational Safety Health Association (ref. no: PSM 2009 1110 and ref. no: 110637)
- /18/ Test results on Inlet and outlet gas composition obtained from SAVE Technology Co. Ltd.
- /19/ Letter dated 24th June 2009 issued KDIA and results of the survey conducted by KDIA on LCD industries in WLICC countries.
- /20/ Certificate on 'Approval for Establishment of Corporation' (dated 13th June 2007) issued to KDIA by Minister of Commerce, Industry and Energy.
- /21/ Letters dated 26th August 2009 from Manager, Environment Technology Team and Cost Innovation Team at LGD
- /22/ Equipment Purchase Agreement dated 1st June 2009 and quotations obtained from the technology supplier SAVE Technology Co. Ltd.
- /23/ Web link to the methodology NM 271 submitted by the project proponent: http://cdm.unfccc.int/methodologies/PAMethodologies/publicview.html?meth_ref=NM0271
- /24/ Investment Analysis Calculation sheet version 3
- /25/ Data on Heel value, SF6 utilization efficiency in dry etching process and destruction efficiency of the abatement system.
Source: Chapter 6: Electronics Industry Emissions, IPCC 2006 guidelines
- /26/ Electricity Statistics in South Korea from KEPCO
http://cyber.kepc.co.kr/kepc_new/eng/ir/resource/powerStatistics.jsp?gubun=K
- /27/ Emission reduction calculation sheet version 4 and Emission factor calculation sheet.
- /28/ LCD substrate production plans for year 2009
- /29/ Media used to invite Local Stakeholder:
<http://www.egumi.org/comm/index.asp?menu=1>
http://www.paju.go.kr/open_content/participation/free_talk/board.tdf?a=user.board.B

- /30/ Validation and Verification Manual version 01.1 (EB 51 Annex 3)
- /31/ Letter dated 07/01/2010 from Green Technology Team of LG Display and email dated 15/01/2010 explaining the procedures for estimating the remaining lifetime of the existing production lines.
- /32/ Reports prepared by Sillaentech Co. Ltd. for measurement of SF6 flow at exhaust of dry etching process: P2-08/13/2007, P3-08/13/2007, P4/5-10/16/2007, P6-08/14/2007, P7-05/15/2009

- o0o -

A.1 Annex 1: Local Assessment

This checklist is designed to provide confirmation of in-country data and information provided in the Project Design Document for 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)'

It serves as a “**reality check**” on the project that is completed by a local assessor from SGS (IN)

Issue	Findings	Source/Mean of Verification	Further Action / Clarification / Information Required?
Please provide the Letter of approval issued by Host Country (Republic of Korea) Designated National Authority (DNA) to the Project proponent for the proposed CDM project activity.	Letter of Approval from the Host Country is pending. The letter of approval dated 02 nd December, 2009 obtained from South Korea DNA by the project participants (LG International and LG Display) and LoA dated 29 th October, 2009 obtained from UK DNA, have been submitted by the project participants. These have been verified as per the requirement of VVM version 01 and found OK. Hence CAR 20 is closed.	Host country approval dated 02/12/2009 Letter of approval dated 29/10/2009 from UK DNA.	CAR 20 CAR 20 is closed Y
Please provide information on the criteria's for sustainable development in South Korea	Please provide the information on Sustainable Development under the applicable criteria's in the PDD. A profound description on projects contribution to Sustainable Development in South Korea is included in section A.2 of PDD version 14. Hence CAR 21 was closed.	Sustainable development criteria in South Korea and PDD.	CAR 21 CAR 21 is closed. Y

Issue	Findings	Source/Mean of Verification	Further Action / Clarification / Information Required?
Please provide the ownership licenses for the implementation of the project activity.	The necessary ownership documents which allow the proponent to implement the project at the site have been verified and found correct	Ownership documents of the project site.	Y
Please provide an undertaking on NO Official Development Assistance (ODA) received.	A letter (undertaking) on 'NO ODA Received' has been submitted by the project proponent.	Letter (Ref. no: BDTFT20090625-01) dated 25 th June 2009 on 'NO ODA Received'.	Y
<p>However the PP is requested to submit the following documents during the site visit:</p> <ol style="list-style-type: none"> 3 years historical data (ending on 31st January 2009) for SF6 purchase, consumption and production in all 4 plants. Engineering design plan and other relevant technical details of the project activity. Information on existing laws and regulations on destruction/substitution/recycling of SF6 or any other component of the exhaust gas from the process. Notices/clearances obtained from concerned organizations, concerning safety & health in order to install and operate the abatement device. 	<p>The PP submitted the data on:</p> <ol style="list-style-type: none"> Historical data on SF6 purchase and consumption Engineering design and technical details of the project Information on existing laws on SF6 destruction in South Korea Notices and clearances obtained from concerned organizations, concerning safety & health in order to install and operate the abatement device. <p>The PP is requested to further justify the applicability criteria 2, 3, 5, 6, 8 & 9 of the approved methodology AM 0078 version 01.1. Please also substantiate the same.</p> <p>Further justification on the applicability criteria's is included in the PDD version 14. The necessary references have been verified and found correct.</p>	<p>The following reference documents have been provided:</p> <ol style="list-style-type: none"> Plant records on SF6 consumption and purchase receipts of SF6. Engineering design and technical details from the technology supplier. Documents on air pollution prevention act in South Korea. Notices and clearances issued by Korean Occupational Safety Health Association and Korean Gas Safety Corporation. <p>The usage and supply of SF6 from exhaust of dry etching process should be verified during the 1st verification. FAR#19(a) is raised.</p> <p>'No temporarily storage of SF6' should be verified during the 1st verification. FAR#19(b) is raised.</p> <p>The capacity of abatement system for plants other than P6 should be checked during first verification, Hence FAR#19 (c) is raised.</p>	<p>CAR 19</p> <p>FAR#19(a), FAR#19(b) and FAR#19 (c) are raised.</p> <p>Y</p>

Issue	Findings	Source/Mean of Verification	Further Action / Clarification / Information Required?
Information on training of monitoring personnel	The project proponent has submitted a separate training plan on Abatement system, Annubar devices, FTIR and QMS. The training plans have been checked and found to be satisfactory.	Training manual	Y
As mentioned in Annex 4 of the PDD, a single person from the independent third party will be overseeing the calibration process. The calibration procedure is specified in Annex 4 of the PDD. However, please clarify, whether the calibration will be done internally or externally?	The project proponent clarified that the calibration will be done by the manufacturer of the respective metering device.	Interview with project proponent	Y
EIA Act for SF6 destruction project in South Korea.	Please provide a copy of the document justifying that EIA is not required for SF6 abatement project in South Korea. As per EIA Act dated 28 th March 2008 and Enforcement decree of EIA Act dated 21 st April 2009, the SF6 destruction project does not fall in the list of projects that require EIA. Hence CL 22 was closed.	EIA Act dated 28 th March 2008 and Enforcement decree of EIA Act dated 21 st April 2009,	CL 22 CL 22 is closed. Y

A.2 Annex 2: Validation Checklist

Table 1 Participation Requirements for Clean Development Mechanism (CDM) Project Activities (Ref PDD, Letters of Approval and UNFCCC website)

Requirement	Reference	Comments	Conclusion/CARs/CLs
<p>1. All Parties involved have approved the project activity</p> <p>1.1. Has the DNA of each Party involved in the proposed CDM project activity in section A.3 of the PDD provided a written letter of approval which confirms</p> <p>1.1.1. The country is a Party to the Kyoto Protocol</p> <p>1.1.2. Participation is Voluntary</p> <p>1.1.3. The Host Party confirming that the proposed CDM project activity contributes to sustainable development of the country Non-Annex 1 Party shall submit a letter of approval</p> <p>1.1.4. It refers to the precise proposed CDM project activity title in the PDD being submitted for registration</p>	<p>Annex 3, Clean Development Mechanism, Validation and Verification Manual, Version 01 (from this point forwarded referenced as VVM) - 49a-d /54a-b/125</p> <p>Paragraph 37 CDM Modalities and procedures</p>	<p>The Party (Republic of Korea) has ratified the Kyoto Protocol on 8th November 2002 and is allowed to participate in the CDM project activity. The web link is http://maindb.unfccc.int/public/country.pl?country=KR</p> <p>United Kingdom is the annex I Party is involved in the proposed CDM project activity at the stage of Registration.</p> <p>The Project will assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment.</p> <p>Letter of approval issued by the relevant Designated National Authority (DNA) to be submitted by the project proponent.</p> <p>The letter of approval issued by South Korean DNA and UK DNA have been checked and found OK. Hence CAR20 is closed.</p>	<p>LAC</p> <p>CAR 20</p> <p>CAR 20 is closed.</p> <p>Y</p>

Requirement	Reference	Comments	Conclusion/CARs/CLs
1.2. The letter/s of approval are unconditional with respect to 1.1.1 to 1.1.4 above	VVM Para. 49/54	Letter of Approval(s) issued by the Host country and relevant DNA should be submitted to the DOE. CAR 20 is closed.	Pending Closed. Y
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof, and be entered into voluntarily	VVM Para. 54 Marrakech Accords, CDM Modalities §29 and §30 Kyoto Protocol Art. 12.2, Marrakech Accords, CDM Modalities §40a	Please provide information on the criteria's for sustainable development in South Korea. Please provide the information on Sustainable Development under the applicable criteria's in the PDD. A profound description on projects contribution to Sustainable Development in South Korea is included in section A.2 of PDD version 14. This has also been verified from the letter of approval issued by the South Korean DNA. Hence CAR 21 was closed.	Pending/LAG CAR 21 CAR 21 is closed. Y

Requirement	Reference	Comments	Conclusion/C ARs/ CLs
3. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for a minimum of 30 days, and the project design document and comments have been made publicly available	VVM Para. 128 Marrakech Accords, CDM Modalities, §40	The PDD has been web-hosted in the UNFCCC website for invitation of comments on the project activity as the global stakeholder consultation process: Website: http://cdm.unfccc.int/Projects/Validation/DB/MTD_PC0S9WMPJSSGBJNUPC86RJFBVWY/view.html Start date: 27/05/09 Close date: 25/06/09 Number of comments received: Nil	Y
4. The project design document is in accordance with the applicable CDM requirements for completing PDDs.	VVM Para. 57 Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	The project has used version 3 of CDM-PDD format correctly.	Y

Table 2PDD

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
A. General Description of Project Activity				
A.1. Project Title				
A.1.1. Does the used project title clearly enable the reader to identify the unique CDM activity?	VVM Para.56 Guidelines for completing a CDM-PDD (PDD) section A.1	DR/SV	The project title 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)' clearly enable the reader to identify the unique CDM activity.	Y
A.1.2. Is there an indication of a revision number and the date of the revision?	VVM Para.56 PDD section A.1	DR	Version 03 of PDD was web hosted on UNFCCC website for Global Stakeholder Comments. The same version of PDD was initially submitted for validation of the project activity.	Y
A.2. Description of the Project Activity				
A.2.1. Does the description of the proposed CDM project activity as contained in the PDD sufficiently cover all relevant elements accurately?	VVM Para.59 PDD section A.2 see also A.4, A.4.3 and B.3	DR/S V	The project activity is point of use abatement of SF6 gas in LCD manufacturing plants in South Korea. The project participants LG international and LG display collectively will install end-of-pipe SF6 gas abatement devices at plants P2/3, P4/5, P6 in Gumi, South Korea and plant P7 in Paju South Korea. SF6 is particularly utilized in dry etching process in LCD manufacturing process. Fourier Transform Infrared (FTIR) devices and Quadruple Mass Spectrometer will be used for the effective monitoring of the process.	Y
A.2.2. Does the information provide the reader with a clear understanding of the proposed CDM activity?	VVM Para.60 PDD section A.2 see also A.4, A.4.3 and B.3	DR	Yes the description of the project activity (as explained above) gives reader a clear picture of the project activity.	Y
A.2.3. Is all information provided consistent and in compliance with the actual	VVM Para.64 PDD section A.2 see also A.4,	DR/S V	The actual situation on project activity will be verified during the site visit.	Pending site-visit Closed

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
situation or planning?	A.4.3 and B.3		The project activity is the future project; it will be implemented as according to the details documented in PDD version 14. The existing plants locations and condition have been verified during the site visit and found in line with the project design document.	Y
A.2.4. Is all information provided consistent with details provided in further chapters of the PDD?	VVM Para.64 PDD section A.2	DR	Yes the information provided in PDD is consistent with other sections of the PDD.	Y
A.3. Project Participants				
A.3.1. Is the table required for the indication of project participants correctly applied?	VVM Para. 51 PDD section A.3	DR	The table is correctly applied as per EB 41 Annex 12. Government of the Republic of Korea is the Host Party. LG international, LG display and Climate Change Capital Carbon Fund II s.a.r.l are the project participants.	Y
A.3.2. Is all information provided in consistency with details provided by further chapters of the PDD (in particular Annex 1)?	VVM Para. 51 PDD section A.3	DR	The information provided in section A.3 of PDD version 14 is consistent with further chapters of the PDD.	Y
A.4. Technical Description of the Project Activity				
A.4.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)? Are the latitude and longitude of the site indicated (decimal points)	VVM Para.64 PDD section A.4	DR/S V	The PP is requested to mention the latitudes and longitudes of all the 4 plants in section A.4 of the PDD. The geographical coordinates of the plants 2/3, 4/5, 6, 7 are included in section 4.1 of the PDD. The location of the project activity has been physically verified and found correct.	CAR 01 CAR01 is closed. Y
A.4.2. Does the proposed CDM project activity involve the alteration of existing	VVM Para.64 PDD section A.4	DR	The PP is requested to provide profound information on technical description of the project activity in the PDD, as per EB 41 Annex 12 (Guidance on PDD for large scale projects).	CAR 02 CAR 02 is

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
installations or process?			The technical description (pre-project scenario, list of equipments, project flow diagram) of the project activity is provided as per Annex 12 EB 41 in PDD version 14.	closed. Y
A.4.3. Do the project participants possess ownership or licenses which will allow the implementation of the project at that site / those sites?	VVM Para.64 PDD section A.4	DR	Please provide the ownership licenses for the implementation of the project activity. The project ownership documents have been provided by the project proponent, these were found to be authentic and valid.	Pending/LA € Closed Y
A.4.4. Is the category(ies) of the project activity correctly identified?	VVM Para.64 PDD section A.4	DR	The project falls under sector 4- manufacturing industries and sector 11- Fugitive emissions from production and consumption of Halocarbons and Sulphur Hexafluoride. The category of the project activity is correctly specified in the PDD version 14.	Y
A.4.5. Is all information provided in compliance with actual situation or planning as available by the project participants?	VVM Para.64 PDD section A.4	DR/S V	This will be verified during the site visit. The project activity is the future project; it will be implemented as according to the details documented in PDD version 14. The existing plants locations and condition have been verified during the site and found in line with the project design document.	Pending site visit Closed Y
A.4.6. Is the table required for the indication of projected emission reductions correctly applied?	VVM Para.64 PDD section A.4	DR	Yes, the table required for the indication of projected emission reductions is correctly applied as per EB 41 Annex 12.	Y
A.5. Public Funding				
A.5.1. Does the information on public funding provided conform to the actual situation or planning as presented by the project participants?	PDD section A.4.5	DR	No public funding has been identified in section A.4.5 of the PDD. Please substantiate the claim that 'NO Official Development Assistance (ODA)' has been received for the project activity. An undertaking on 'No ODA received' (Ref. no: BDTFT20090625-01 dated 25 th June 2009) is provided by LG International Corporation. This is acceptable.	Pending/LA € Closed Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
A.5.2. Is all information provided consistent with details provided by further chapters of the PDD (in particular annex 2)?	PDD section A.4.5	DR	The information on ODA is consistent with annex 2 of the PDD	Y
A.5.3. In case of public funding from Annex I Parties is it confirmed that such funding does not result in a diversion of official development assistance	PDD section A.4.5	DR	Please refer above sections. No ODA is received in the project activity. This is verified from the undertaking provided by the project proponent.	Pending Closed Y
B. Baseline and Monitoring Methodology				
B.1. Choice and Applicability				
B.1.1. Is the baseline methodology previously approved by the CDM Methodology Panel?	VVM Para.68 PDD section B.1	DR	Yes the baseline methodology AM 0078, version 01.1 is an approved methodology.	Y
B.1.2. Has the methodology (incl. the tools) been altered from the original version as referenced in the PDD?	VVM Para.69 PDD section B (B.1-B.2)	DR	The PDD is developed based on AM0078 version 01.1 and is using all the referred tools in the methodology.	Y
B.1.3. Is the selected approved methodology applicable to the project activity in the PDD?	VVM Para.75/66a/68/73 PDD section B (B.1-B.2)	DR	To justify the applicability of the approved methodology AM0078 version 01.1, the PP is requested to submit the following documents: 5. 3 years historical data (ending on 31st January 2009) for SF6 purchase, consumption and production in all 4 plants. 6. Engineering design plan and other relevant technical details of the project activity. 7. Information on existing laws and regulations on destruction/substitution/recycling of SF6 or any other component of the exhaust gas from the process.	Pending/LA G

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
			<p>8. Notices/clearances obtained from concerned organizations, concerning safety & health in order to install and operate the abatement device.</p> <p>The PP is requested to further justify the applicability criteria 2, 3, 5, 6, 8 & 9 of the approved methodology AM 0078 version 01.1. Please also substantiate the same.</p> <p>Further justification on the applicability criteria's is included in the PDD version 14. The necessary references have been verified and found correct.</p> <p>Notices and clearances issued by Korean Occupational Safety Health Association and Korean Gas Safety Corporation have been obtained and found satisfactory.</p> <p>The usage and supply of SF₆ from exhaust of dry etching process should be verified during the 1st verification. FAR#19(a) is raised.</p> <p>'No temporarily storage of SF₆' should be verified during the 1st verification. FAR#19(b) is raised.</p> <p>The capacity of the abatement system other than plant P6 will be checked during first verification. Hence, FAR#19(c) is raised.</p>	<p>CAR 19</p> <p>FAR#19 (a) and FAR#19(b) and FAR#19 (c) are raised.</p> <p>Y</p>
B.1.4. Is the discussion in the PDD in conformance with all applicability criteria of the applied methodology?	VVM Para.75/66b/68 PDD section B (B.1-B.2)	DR	<p>The PP needs to submit the supportive documents to fulfill the applicability criteria's of the applied methodology AM 0078.</p> <p>Further justification on the applicability criteria's is included in the PDD version 14. The necessary references have been verified and found correct.</p>	<p>Pending</p> <p>Closed. Y</p>
B.2. Project Boundary				
B.2.1. Are all emission sources and gases related to the baseline scenario, project scenario and leakage clearly identified and described in a complete and transparent manner?	VVM Para.79/76/67a PDD section B.3	DR/S V	<p>SF₆ is GHG used in baseline scenario and SF₆ & CO₂ are the GHGs considered in the project scenario. This is as per the applied methodology AM 0078 version 1.1.</p> <p>Any other emission sources in the project boundary, which may contribute to more than 1% emissions of the overall expected average annual emission, will be verified during the site visit.</p>	<p>Pending site visit</p> <p>Y</p>

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
Is there information on GHG emissions in proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which are expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology.			The project activity is a future project. The project implementation will be in line with the requirements of PDD version 14.	
B.2.2. In case of grid connected electricity projects: Is the relevant grid correctly identified in accordance with the tool to calculate emission factor of electricity system (wherever applicable) and the underlying methodology?	VVM Para.79 PDD section B.3	DR/S V	The project is not a grid connected electricity generation project. However in the project scenario electricity will be utilized to run the SF6 abatement devices. The project may import electricity from KEPCO grid.	Y
B.2.3. Does the project boundary include the physical delineation of the proposed CDM project activity?	VVM Para.78/79 PDD section B.3 also see section A.4.3	DR/S V	The PP is requested to provide a delineation of the project boundary for the proposed project activity. This should be as per EB 41 Annex 12, Guidance to complete CDM-PDD for large scale projects. A detailed process flow diagram of the process is included in section B.3 of the PDD version 14.	CAR 03 CAR 03 is closed Y
B.2.4. Are the project's geographical boundaries and the project's system	VVM Para.76/79 PDD section B.3	DR/S V	Pending closure of CAR 03 A detailed process flow diagram of the process is included in section B.3 of the PDD	Pending Closed

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
boundaries (components and facilities used to mitigate GHGs) clearly defined?	also see section A.4.3		version 14.	Y
B.3. Identification of the Baseline Scenario				
B.3.1. Does the PDD discuss the identification of the most likely baseline scenario? Does the PDD follow the steps to determine the baseline scenario required by the methodology and is the application of the methodology and the discussion and determination of the chosen baseline transparent?	VVM Para.67b.80/82/86 PDD Section B.4/B.5	DR	<p>In section B.4 of the PDD, the PP has given a transparent discussion on the identification of the most likely baseline scenario.</p> <p>All the scenarios mentioned in the applied methodology AM0078 are being discussed and the most plausible scenario is identified after eliminating the other baseline scenarios. However, the PP is requested to clarify the following:</p> <ul style="list-style-type: none"> (a) The PP is requested to provide necessary references/documents to support the arguments mentioned under point 3. Using a substitute gas for SF6 and point 4. Reuse of SF6 after recycling it in the process. (b) Please provide any official survey/ report on current technology used in LCD manufacturing industry in South Korea. (c) Baseline scenario 5- Process modifications, is missing in the final table in section B.4. Please make necessary corrections <p>A survey report on current situation (process, technology used etc.) in LCD manufacturing industries in South Korea obtained is carried by Korea Display Industry Association. A letter issued by KDIA clarifies that 'Neither the SF6 gas is recycled nor any substitute gas is used the LCD manufacturing Industries in South Korea'.</p> <p>Also in addition, the letter from LG's 'Cost Innovations Team' responsible for optimization activities indicates that they have completed the optimization of SF6 consumption to the complete extent of their existing knowledge and training. Additional optimization activities face the technology barrier of being beyond the current knowledge of the staff.</p> <p>Hence CL04 was closed.</p>	<p>CL 04</p> <p>CL 04 is closed</p> <p>Y</p>

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.3.2. Are all tools/procedures in the methodology correctly applied to identify the most reasonable baseline scenario? This includes all potential realistic and credible baseline scenarios in the discussion taking into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	VVM Para.81/82/86a-d/83/84 PDD Section B.4/B.5	DR	Please refer section B.3.1. All the methodological tools are correctly applied to identify the most reasonable baseline scenario.	Pending Closed Y
B.3.3. Is the choice of the baseline compatible with the available data?	VVM Para.86b-c/95 PDD Section B.4/B.5	DR	Please refer section B.3.1. The choice of the baseline scenario is compatible with the available data.	Pending Closed Y
B.3.4. Is conservativeness addressed in the way of identifying the baseline?	VVM Para.90 PDD Section B.4/B.5	DR	Please refer section B.3.1 The most plausible baseline scenario is identified conservatively.	Pending Closed Y
B.3.5. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	VVM Para.90/91 PDD Section B.4/B.5	DR	Please refer section B.3.1 The identified baseline scenario 'Continuing using SF6 without any abatement devices, the current situation' represents the most likely baseline scenario.	Pending Closed Y
B.3.6. Is there a verifiable description of the baseline scenario? Does this	VVM Para.86e/85 PDD Section	DR	The identified baseline scenario is the continuation of existing practice i.e. venting off the SF6 generated in LCD manufacturing process.	Pending

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
include a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	B.4/B.5		Under CAR 02 PP is requested to provide a profound description on the technology used in the baseline scenario. Pending closure of CAR 02 The PP has included a profound description of the baseline scenario in PDD version 14. Hence CAR 02 was closed.	Closed Y
B.4. Additionality				
B.4.1. Does the PDD clearly demonstrate the additionality using the approach as specified in the methodology and by following all the required steps?	VVM Para.67d/95 PDD Section B.1/B.4/B.5	DR	As per the approved AM 0078 version 01.1, the Additionality of the project activity has to be demonstrated as per 'Combined tool to identify the baseline scenario and demonstrate Additionality' i.e. EB 28 Annex 14. Instead, in the PDD version 03, the additionality is demonstrated as per EB 39 Annex 10. Please clarify Necessary amendments have been made in the PDD version 14, the additionality of the project is demonstrated as per Annex 14 EB 28.	CAR05 CAR05 is closed. Y
B.4.2. In case of using the additionality tool: Is the 'Additionality Tool' used in the PDD latest version? If an earlier version has been used, do the changes impact the discussion in the PDD? Are all steps followed in a transparent manner?	PDD Section B.1/B.4/B.5	DR	Please refer section B.4 above. The additionality tool 'Combined tool to identify the baseline scenario and demonstrate Additionality' Annex 14 EB 28 is used for the demonstration of additionality. This is as per the guidelines prescribed in approved methodology EB 0078 version 01.1.	Pending Closed. Y
B.4.3. Has all information been backed up with references, sources and certification? Is the data presented credible and	VVM Para.93/91 PDD Section B	DR	Under CAR06 the PP is requested to address the following issues: (a) Please provide the necessary documents to support the financial data mentioned in section B.5 of the PDD. (b) Please provide official reports/surveys to justify the arguments mentioned under common practice analysis.	CAR 06

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
reliable with complete transparency to all available data and documentation?			Reasons for closure of CAR06: (a) As there is no Cash Inflow associated with the project activity, a Simple Cost Analysis is carried out to demonstrate investment analysis. The CAPEX and OPEX figures have been checked and found correct. The facts and assumptions considered were found to be appropriate. (b) The arguments under 'Common Practice Analysis' are verified from the results of the survey carried out by KDIA. Also the authenticity of the KDIA as an organization is verified from a 'letter of establishment' issued by the Government of South Korea to KDIA. All the references were verified and found correct.	CAR 06 is Closed. Y
B.4.4. Is the discussion on additionality and the evidence provided consistent with the starting date of the project? If the project activity start date is prior to the validation is it discussed how the CDM was taken into account in the decision to go ahead with the project activity	VVM Para.102b PDD Section B.5	DR	As per section C of the PDD, the start date of the project activity is December 1, 2009. Please substantiate the start date of the project as per Para 67 of EB 41. The start date of project activity has been changed to 1 st June, 2009, the date on which the contract was signed between the equipment supplier and the project proponent. Hence CL07 was closed.	CL07 CL07 is Closed. Y
B.4.5. If an investment analysis has been used, has it been shown that the proposed project activity is economically or financially less attractive than at least one other alternative without the revenue from the sale of CERs?	VVM Para. 106, 107, 109 112a-c PDD Section B.5	DR	Pending closure of CAR 06 As there is no Cash Inflow associated with the project activity, a Simple Cost Analysis is carried out to demonstrate investment analysis. The CAPEX and OPEX figures have been checked and found correct. The facts and assumptions considered were found to be appropriate. Hence CAR 06 was closed.	Pending Closed Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.4.6. If a benchmark is used, is it ensured that it is selected in accordance with the requirements of the tool /methodology and it represents standard returns in the market (not linked to the subjective profitability expectation or risk profile of a particular project developer).	VVM Para. 110 PDD Section B.5	DR	A simple investment analysis approach has been followed, no benchmark is used in the investment analysis	Y
B.4.7. If a barrier analysis has been used, has it been shown that the proposed project activity faces barriers that prevent the implementation of this type of proposed project activity but would not have prevented the implementation of at least one of the alternatives?	VVM Para. 114 115a-b/116 PDD Section B.5	DR	Pending closure of CAR 05 The barrier analysis is used in the project activity, the project activity faces the technological barriers and the project activity is not a prevailing practice in South Korea. The arguments and assumptions used to demonstrate these barriers have been verified and found correct. Hence CAR 05 was closed.	Pending Closed Y
B.4.8. Is the discussion on additionality consistent with the identification of all plausible and credible baseline scenarios?	VVM Para. 105 PDD Section B.5	DR	Pending closure of CAR 05 As discussed under CAR 05, all the plausible baseline scenarios were considered in the demonstration of the additionality as per the applied tool Annex 14 EB 28.	Pending Closed Y
B.4.9. Do the identified baseline scenarios include technologies and practices that include outputs or services comparable with the proposed CDM project	VVM Para. 105 PDD Section A.4.3/B.5	DR/S V	All the plausible scenarios comparable to the project activity were considered in identification of the most plausible baseline scenario and demonstration of additionality. No law or regulation in South Korea restricts the destruction of SF6 gas, neither there in any CAP on SF6 destruction. Hence all the identified alternatives abide by the applicable laws and legislation in South Korea.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
activity? Do they also abide by the same applicable laws and legislations?				
B.4.10. Has it been shown that the project is not common practice?	VVM Para. 119a/b PDD Section B.5	DR	Pending closure of CAR 06 The common practice in South Korea is the atmospheric release of SF6 gas, which is the baseline scenario to the project activity. This has been verified during the site visit.	Pending Closed Y
B.4.11. What are the key distinctions between the project activity and any similar projects that are widely used as common practice?	VVM Para. 118, 119c/d PDD Section B.5	DR	Pending closure of CAR 06 Please refer B.4.10 above.	Pending Closed Y
B.5. Application of the Baseline Methodology				
B.5.1. Has the approved methodology been applied correctly for determining baseline emissions ?	VVM Para. 91d PDD Section B (B.6.1 -B.71)	DR	The PP is requested to clearly specify the equations and parameters used to calculate the mass of SF6 entering and exiting the abatement device per unit time in the PDD. The equations and parameters used to calculate the mass of SF6 entering and exiting the abatement device are specified in PDD version 14.	CAR 08 CAR08 is closed. Y
B.5.2. Has the approved methodology been applied correctly for determining project emissions ?	VVM Para. 90/91d PDD Section B	DR	The PP is requested to clearly specify the equations to calculate project emissions due to electricity consumption & fuel as per the applied tools EB39 Annex 7 & EB 32 Annex 9, in the PDD. The equations to calculate project emissions due to electricity consumption & fuel	CAR 09 CAR 09 is

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
	(B.6.2-B.71)		consumption are included in the PDD version 14. The emission factor is calculated as per EB 50 Annex 14. Hence CAR 09 is closed.	closed Y
B.5.3. Has the approved methodology been applied correctly for determining leakage ?	VVM Para. 91d PDD Section B (B.6.2 -B.71)	DR	As per the methodology, no leakage is expected under AM 0078, version 01.1.	Y
B.5.4. Where applicable, has the approved methodology been applied correctly for the direct calculation of emission reductions ?	VVM Para 88/91d PDD Section B (B.6.2 -B.71)	DR	Pending closure of CAR 08 & CAR 09 Pendency closed	Pending Closed Y
B.5.5. Where there is an option between different equations or parameters, has the methodological choices for the project been explained, have they been properly justified and are they correct?	VVM Para.89/90/91 PDD Section B (B.6.2 -B.71)	DR	Pending closure of CAR 08 & CAR 09 Pendency closed	Pending Closed Y
B.5.6. Are uncertainties in the GHG emissions estimates properly addressed in the	PDD Sections B.5-C	DR	Pending closure of CAR 08 & CAR 09 Pendency closed	Pending Closed

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
documentation?				Y
B.6. Ex-ante Data and Parameters Used				
B.6.1. Are the data provided in compliance with the methodology?	VVM Para. 91/67c PDD Section B.6.3/B.6.4	DR	<p>Ms, in (Minimum molecular weight of inlet stack gas, wet basis) & Ms, out (Minimum molecular weight of outlet stack gas, wet basis) are the calculated figure, derived from the monitored figure Md, in & Md,out. Hence these parameters cannot be fixed ex-ante and should be monitored.</p> <p>Ms,in (Minimum molecular weight of inlet stack gas, wet basis) & Ms,out (Minimum molecular weight of outlet stack gas, wet basis) are included in the list of monitoring parameters in PDD version 14. Hence CAR 10 is closed.</p>	<p>CAR 10</p> <p>CAR 10 is closed</p> <p>Y</p>
B.6.2. Is all the data derived from official data sources or replicable records and have these been correctly quoted?	VVM Para. 91a/b PDD Section B.6.3/B.6.4	DR	<p>Please clearly specify the values of the parameters Cpin, Cpout, Ain & Aout (to be fixed ex-ante) in section B.6.2 of the PDD.</p> <p>Parameters Cpin, Cpout, Ain & Aout are not used in the ex-ante calculation of emission reductions. Also as the project activity is a future project; it isn't possible to determine the exact value of these parameters before the project gets commissioned. The values of parameters Cpin, Cpout, Ain & Aout are only available for plant P6, hence, these have been included in the PDD. The values of these parameters for plants other than P6 will be determined on commissioning of the project activity and same values can be used henceforth. These values should be checked during the 1st verification of the project activity. FAR#11 is raised.</p>	<p>CAR 11</p> <p>FAR 11 is raised</p> <p>Y</p>
B.6.3. Is the vintage of the baseline data correct?	PDD Section B.6.3/B.6.4	DR	<p>The PP is requested to provide the documents/ references/evidences of the data used to calculate the baseline and project emissions.</p> <p>The historical data of production of LCD substrate and SF6 consumption have been provided by the project proponent and found OK. The values specified in PDD version 14 are consistent with the plant records. Hence CL 12 was closed.</p>	<p>CL 12</p> <p>CL 12 is closed</p> <p>Y</p>
B.6.4. Is all the data appropriate and correctly applied to	VVM Para.	DR	Pending closure of CL 11	Pending

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
the CDM project activity?	91c PDD Section B.6.3/B.6.4		Pendency closed	Closed Y
B.6.5. Are data and parameters that are not being monitored and remained fixed throughout the crediting period appropriately assessed, correct, and will they result in conservative estimates?	VVM Para. 90 PDD Section B.6.3/B.6.4	DR	Pending closure of CL 11 & CL 12 raised above. Pendency closed	Pending Closed Y
B.7. Calculation of Emissions Reductions				
B.7.1. Has the approved methodology been applied correctly for determining emission reductions ?	VVM Para. 91d PDD Section A.4.4/B.6	DR	Please provide the emission reduction calculation sheet. The emission reduction calculations in version 14 of PDD are done as per the requirement of the approved methodology AM 0078 version 01.1 and the applicable 'tool to calculate project emissions from electricity consumption'. Hence CAR 13 was closed	CAR 13 CAR 13 is closed Y
B.7.2. Are the emission reduction calculations documented in a complete and transparent manner?	VVM Para. 91e PDD Section B.6	DR	Pending closure of CAR 13 raised above Pendency closed	Pending Closed Y
B.7.3. Is the projection based on same procedures as used for later monitoring or acceptable alternative models?	PDD Section B.6	DR	Please provide the information on projection methods used to evaluate the value parameters used (based on historical data) in baseline and project emission calculations. Incorporate the relevant information in PDD as well. The projection methods to estimate the production of LCD substrate is based on the orders placed by the clients for the purchase of LCD in year 2009 and market expectations considering historical trends. As a conservative approach in CER estimation, the LCD substrate production for the crediting period is kept same as that of	CAR 14 CAR 14 is closed.

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
			1 st crediting year (2009). Hence CAR 14 is closed.	Y
B.7.4. Is the calculation of the emission reduction correct?	VVM Para. 91e PDD Section B.6	DR	Pending closure of CAR13 raised above Pendency closed	Pending Closed Y
B.8. Emission Reductions				
B.8.1. Is the form/table required for the indication of projected emission reductions correctly applied?	PDD Section A.4.4/ Section B.6	DR	Yes the table used for the indication of projected emission reductions is correctly applied, as per the CDM-PDD guidance for large scale projects.	Y
B.8.2. Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	PDD Section A.4.4/ Section B.6	DR	Projections for net emission reductions are being made for the crediting period of 10 years.	Y
B.9. Monitoring Methodology				
B.9.1. Does the monitoring methodology provide a consistent approach in the context of all parameters to be monitored and further information provided by the PDD? Are all parameters and data that are available at	VVM Para. 67e PDD Section B.7- B.8 see also Annex 4	DR	Ms, in (Minimum molecular weight of inlet stack gas, wet basis) & Ms, out (Minimum molecular weight of outlet stack gas, wet basis) are the calculated figure, derived from the monitored figure Md, in & Md,out. Hence these parameters cannot be fixed ex-ante and should be monitored. CAR 10 has already been raised in this regard. Ms, in (Minimum molecular weight of inlet stack gas, wet basis) & Ms, out (Minimum molecular weight of outlet stack gas, wet basis) are included in the list of monitoring parameters in the revised PDD. Pendency closed.	Pending Closed Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
validation consistent with the approved methodology. Has this data been interpreted and applied correctly?				
B.9.2. Does the monitoring methodology apply consistently the choice of the option selected for monitoring both of project and baseline emissions?	PDD Sections B and C	DR	A profound description of the monitoring plan is specified in Annex 4 of the PDD.	Y
B.10. Data and Parameters Monitored				
B.10.1. Does the monitoring plan in the PDD comply with the approved methodology provided for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period?	VVM Para. 91a/91d/121/79 PDD Section B.7-B.7.2	DR	<p>(a) Please clearly specify the following details for each of the monitored parameter in the monitoring plan:</p> <ul style="list-style-type: none"> i. Monitoring frequency of the parameter ii. Calibration frequency of the meter/device used iii. Data storage/archiving procedure (electronic or on paper) iv. Relative positioning of the meter/device (if possible) v. QA/QC procedures followed for each parameter vi. Internal audits vii. Also please specify the procedures that will be followed to calculate the emission reductions, in case of data redundancy. <p>(b) The electricity consumption is not included in the list of monitoring parameters. Please clarify.</p> <p>The project proponent has profoundly described the monitoring plan in PDD version 14. The monitoring plan fulfills the requirements of the approved monitoring methodology AM 0078 version 01.1.</p>	<p>CAR 15</p> <p>CAR 15 is closed</p> <p>Y</p>

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.10.2. Are the choices of project GHG indicators reasonable and in conformance with the requirements set by the approved methodology applied?	PDD Section B.7-B.7.2/B.6.2	DR	Pending closure of CAR 10 and CAR 15. All the monitored parameters (GHG indicators) are considered as per the methodology AM 0078 version 01.1 and the applicable tools in PDD version 14. Pendency closed.	Pending Closed Y
B.10.3. Will it be possible to determine the specified project GHG indicators?	PDD Section B.6.2-B.8	DR	Pending closure of CAR 15 All the monitored parameters (GHG indicators) are considered as per the methodology AM 0078 version 01.1 and the applicable tools in PDD version 14. Pendency closed	Pending Closed Y
B.10.4. Is the information given for each monitoring variable by the presented table sufficient to ensure the verification of a proper implementation of the monitoring plan?	PDD Section B.6.2-B.7.1	DR	Pending closure of CAR 15 The information on each monitoring variable in the PDD version 14 is sufficient to ensure the verification of a proper implementation of the monitoring plan. Pendency closed	Pending Closed Y
B.10.5. Is the information given for each monitoring variable by the presented table sufficient to ensure the delivery of high quality data free of potential for biases or intended or unintended changes in data records?	PDD Section B.6.2-B.7.1	DR	Quality assurance and corrective action procedures as defined in Annex 4 of PDD version 14, will be followed to assure the data accuracy.	Y
B.10.6. Is the monitoring approach in line with current good	PDD Section B.5-	DR	Refer section B.10.6 above	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
practice, i.e. will it deliver data in a reliable and reasonably acceptable accuracy?	B.7.2			
B.10.7. Are all formulae used to determine project emission clearly indicated and in compliance with the monitoring methodology.	PDD Section B.6.2-B.7.1	DR	CAR 09 has already been raised in this regard. Pending closure of CAR 09. All formulae used in determining project emissions are clearly indicated in PDD version 14. This is in compliance with the applicable methodology. Pendency closed	Pending Closed Y
B.11. Quality Control (QC) and Quality Assurance (QA) Procedures				
B.11.1. Is the selection of data undergoing quality control and quality assurance procedures complete?	VVM Para. 121 Refer to all data within the PDD Inc. B.6.2-B.7.1	DR	As mentioned in the PDD, QA/QC are being followed for each of the monitoring parameter, however PP is requested to give a more precise and elaborative description on the QA/QC methods that will be followed in the ex-post scenario. CAR 15 has already been raised in this regard. The selection of data undergoing QA/QC procedures is complete in PDD version 14.	Pending Closed Y
B.11.2. Is the belonging determination of uncertainty levels done correctly for each ID in a correct and reliable manner?	Refer to all data within the PDD Inc. B.4/B.7.2/Annex 4	DR	Pending closure of CAR15 raised. QA/QC procedures for each parameter will be followed as per the requirement of the applicable methodology and manufacture specifications, which ever is conservative. Pendency closed.	Pending Closed Y
B.11.3. Are quality control procedures and quality assurance procedures sufficiently described to	VVM Para 121	DR	Pending closure of CAR 15 raised Quality control procedures and Quality assurance procedures are sufficiently described in PDD version 14 to ensure the delivery of high quality data.	Pending Closed

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
ensure the delivery of high quality data?			Pendency closed.	Y
B.11.4. Is it ensured that data will be bound to national or internal reference standards?	VVM Para. 86d	DR	The reference standard (local, national, IPCC) of the relevant parameters in mentioned in PDD version 14.	Y
B.11.5. Is it ensured that data provisions will be free of potential conflicts of interests resulting in a tendency of overestimating emission reductions?	VVM Para. 19	DR	The monitoring of the relevant parameters will be done as per requirement of the applicable methodology as document in the PDD. The data provisions will be free of potential conflicts of interests.	Pending Closed Y
B.12. Operational and Management Structure				
B.12.1. Is the authority and responsibility of project management clearly described?	PDD Section B.8/Annex 1	DR/I	As mentioned in annex 4 of the PDD, LG plans to hire a qualified independent third party for engineering, implementing, managing and monitoring of the SF6 abatement system. The monitoring team will be headed by an experienced manager appointed by the 3rd party, but the ultimate authority will lie with LG.	Y
B.12.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	PDD Section B.8/Annex 1	DR/I	Please refer section B.12 above	Y
B.12.3. Are procedures identified for training of monitoring personnel?	PDD Section B.8/Annex 1	DR/I	Please provide information on training of monitoring personnel. The project proponent has submitted a separate training plan on Abatement system, Annubar devices, FTIR and QMS. The training plans have been checked and found to be satisfactory.	Pending/LA G Closed

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
				Y
B.13. Monitoring Plan (Annex 4)				
B.13.1. Is the monitoring plan developed in a project specific manner clearly addressing the unique features of the CDM activity?	VVM Para. 122a	DR	The monitoring plan provides information on operation procedures, Management & Operational systems to be employed, Calibration of equipments and QA/QC procedures to be followed.	Y
B.13.2. Does the monitoring plan completely describe all measures to be implemented for monitoring all parameter required, including measures to be implemented for ensuring data quality?	VVM Para. 122b	DR	QA/QC procedures to ensure the data quality are documented in Annex 4 of the PDD.	Y
B.13.3. Does the monitoring plan provide information on monitoring equipment and respective positioning in order to safeguard a proper installation?	VVM Para. 122b	DR	<p>Please provide a description on the measurement equipments used in the process and maintenance of the abatement system in Annex 4 of the PDD. This has to be as per AM 0078, version 01.01.</p> <p>A profound description on the measurement equipments used in the process and maintenance of the abatement system is provided in Annex 4 of PDD version 14. This has been checked and found in line with the requirement of the applicable methodology. Hence CAR 16 was closed.</p>	<p>CAR 16</p> <p>CAR 16 is closed.</p> <p>Y</p>
B.13.4. Are procedures identified for calibration of monitoring equipment?	VVM Para. 122a-c	DR	<p>As mentioned in Annex 4 of the PDD, the independent third party will be looking the calibration process. The calibration procedures are specified in Annex 4 of the PDD. However, please clarify, whether the calibration will be done internally or externally?</p> <p>The project proponent clarified that the calibration will be done by the manufacturer of</p>	<p>Pending/LA</p> <p>C</p> <p>Closed.</p>

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
			the respective metering device.	y
B.13.5. Are procedures identified for maintenance of monitoring equipment and installations?	VVM Para. 122a-c	DR	Pending closure of CAR 16 raised. The procedures for the maintenance of the monitoring equipments and installations are included in PDD version 14. Also CAR 16 is closed. Pendency closed.	Pending Closed. Y
B.13.6. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	VVM Para. 122a-c	DR	The data is backed up on a weekly basis and monthly reports are prepared, which will be stored electronically.	Y
B.13.7. Are procedures identified for dealing with possible monitoring data adjustments and missing data allowing redundant reconstruction of data in case of monitoring problems?	VVM Para. 122a-c	DR	Pending closure of CAR 15. The proponent will use the most conservative data in case of any redundant information.	Pending Closed Y
B.13.8. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	VVM Para.122a-c	DR/I	Pending closure of CAR 15. The Monitoring Management Team will use the raw data collected to make monthly reports of the results, including any irregularities and remedies.	Pending Closed Y
B.13.9. Are procedures identified	VVM Para.	DR	The yearly monitoring report will prepared by the project management team, will be	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
for project performance reviews before data is submitted for verification, internally or externally?	122a-c		circulated to the entire project team and corrective actions will be taken against any discrepancy found. This is mentioned in Annex 4 of the PDD	
B.13.10. Describe the ability of the project participants to implement the monitoring plan.	VVM Para. 122c	DR	<p>All the parameters are being monitored as per the monitoring plan specified in AM 0078 version 01.1.</p> <p>The monitoring plan provides information on operation procedures, Management & Operational systems to be employed, Calibration of equipments and QA/QC procedures to be followed.</p> <p>The actual situation will be verified during the site visit and against the CAR & CL raised.</p> <p>The project is a future project; the PP will hire a third party to implement the monitoring activities.</p>	<p>Pending</p> <p>Closed.</p> <p>Y</p>
B.14. Baseline Details				
B.14.1. Is there any indication of a date when determining the baseline?	PDD Section B.8/Annex 3	DR	<p>Please specify the date of completion of the application of the baseline study and monitoring methodology in section B.8 of the PDD.</p> <p>The baseline and monitoring methodology study was completed on 1st April, 2009. The information is specified in PDD version 14.</p>	<p>CL 17</p> <p>CL 17 is closed.</p> <p>Y</p>
B.14.2. Is this consistent with the time line of the PDD history?	Also see revision history of the PDD	DR	<p>Pending due to CL 17 raised.</p> <p>The date of baseline determination is consistent with the time line of the PDD history.</p> <p>Pendency closed.</p>	<p>Pending</p> <p>Closed</p> <p>Y</p>
B.14.3. Is all data required provided in a complete manner by annex 3 of the	PDD Annex 3	DR	All the required data is presented in a complete manner in Annex 3 of PDD version 14.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
PDD?				
C. Duration of the Project / Crediting Period				
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	VVM Para. 102a-c PDD Section C.1.1/C.1.2	DR	<p>The start date of the project activity is December 1, 2009 (mentioned in section C of the PDD).</p> <p>Please give a clarification on considering December 01, 2009 as the start date.</p> <p>CL 07 has already been raised in this regard.</p> <p>In response the PP clarified that June 1st 2009 has been considered as the start date of the project activity, which is the date of purchase agreement between LGI & Technology supplier.</p>	<p>Pending</p> <p>Closed</p> <p>Y</p>
C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	VVM Para. 102a PDD Section C.2/C.2.1/C.2.2	DR	The PP has opted for a fixed crediting period of 10 years	Y
C.1.3. Does the project's operational lifetime exceed the crediting period	VVM Para. 102a PDD Section C.1.2/C.2.1.1/C.2.1.2	DR	The expected operational lifetime of the project activity (10 years) is equal to the crediting period (10 years).	Y
C.1.4. Does the start date indicate whether this is a new project activity or a pre-existing project	VVM Para. 102a/ 98 PDD Section	DR	As per the guidelines in Annex 22 EB 49, This is a new project activity.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
activity?	C.1.1/C.2.1.1			
D. Environmental Impacts				
D.1.1. Does the project comply with environmental legislation in the host country?	VVM Para. 131 PDD section D	DR/I	As mentioned in the PDD, the EIA is not required for SF6 abatement projects in South Korea Please provide a copy of the document justifying that EIA is not required for SF6 abatement project in South Korea. As per EIA Act dated 28 th March 2008 and Enforcement decree of EIA Act dated 21 st April 2009, the SF6 destruction project does not fall in the list of projects that require EIA. Hence CL 22 was closed.	Pending/LA CL 22 CL 22 is closed. Y
D.1.2. Has an analysis of the environmental impacts of the project activity been sufficiently described?	VVM Para. 131 PDD section D	DR	Please refer section D.1.1. above	Y
D.1.3. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	VVM Para. 131 PDD section D	DR	Please refer section D.1.1 above	Y
D.1.4. Will the project create any adverse environmental effects?	VVM Para. 131 PDD section D	DR	The project activity will mitigate SF6 emissions to the atmosphere; there is no significant environment impact due to project activity.	Y
D.1.5. Are trans-boundary environmental impacts considered in the analysis?	VVM Para. 131 PDD section D	DR	Please refer section D.1.1 and D.1.4 above	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
D.1.6. Have identified environmental impacts been addressed in the project design?	VVM Para. 131 PDD section D	DR	Please refer section D.1.1 and D.1.4 above	Y
E. Stakeholder Comments				
E.1.1. Have relevant stakeholders been consulted?	VVM Para. 128a PDD Section E.1	DR// SV	Local business leaders, government officials, project implementation staff were invited to attend the two stakeholder meetings in city of Gumi & Paju, South Korea.	Y
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	VVM Para. 128a PDD Section E.1	DR	The meetings were advertised on local government websites in two cities. The PP is requested to provide an evidence for the same. The invitation letters and advertisements on local government websites have been verified and found OK.	Pending/LA CL Closed Y
E.1.3. Is the undertaken stakeholder process described in a complete and transparent manner?	VVM Para. 128b PDD Section E.1	DR	Yes the stakeholder process undertaken is described in a complete and transparent manner in version 14 of PDD.	Y
E.1.4. Is a summary of the stakeholder comments received provided?	VVM Para. 128b PDD Section E.2	DR	Please provide an elaborative description on summary of the comments received in the stakeholder process undertaken for the proposed CDM project activity. The comments received from the stakeholder consultation process are well addressed in PDD version 14. Hence CL 18 is closed.	CL 18 CL 18 is closed Y
E.1.5. Has due account been taken of any stakeholder	VVM Para.	DR	Pending closure of CL 18	Pending



Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
comments received?	128b PDD Section E.3		No negative comment has been received in the local stakeholder consultation process. Pendency closed.	Closed. Y

A.3 Annex 3: Overview of Findings

Findings Overview

Findings from validation of 'Point of use Abatement Device to Reduce SF6 emissions in LCD manufacturing operations in the Republic of Korea (South Korea)'

Each Table below represents a finding from the validation assessment. The findings are numbered consecutively, approximately in the order that they have been identified and irrespective of the nature of the findings, for eg.: CAR #1, CAR #2, CL #3, FAR #4 etc.

Description of Table:

Type	Findings are either Corrective Action Requests (CARs), Clarification Requests (CLs), and Forward Action Request (FARs). A corrective action request (CAR) is raised if one of the following occurs: I. The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions; II. The CDM requirements have not been met; III. There is a risk that emission reductions cannot be monitored or calculated. A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.
Lead Assessor Comments	Details the content of the finding
Ref	Refers to the item number in the Validation Protocol
Response	Please insert response to finding, starting with the date of entry.

Please Note: This is an open list and more findings may be added as validation progresses. Responses to each Finding and relevant associated documentation should be recorded in this form by the Client and send back to the Lead Assessor in one submission to SGS (exception of finding linked to Letter of Approval, which can be submitted separately).

SGS reserves the right to review the associated fees and timeline if:

- more than one response submission is received from the Client
- a finding (CL/CAR), raised by the Lead Assessor prior to Technical Review stage, is not closed within 30 days of notification to the Client by SGS.

Rows for comments and further response will be appended to the table until the Findings has been addressed to the satisfaction of the Lead Assessor.

	CARs	CLs	FARs
Total Number raised	14	6	02

Date:	13/06/2009		Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	01		Reference:	A.4.1.
Lead Assessor Comment:				Date: 13/06/2009		
The latitudes and longitudes of all the plants are not mentioned in section A.4 of the PDD. Please clarify.						
Project Participant Response:				Date: 10/07/2009		
The PDD has been updated to include the latitude and longitude of the plants.						
Documentation Provided by Project Participant:						
Attachment 1 (Coordinates of sites)						
Information Verified by Lead Assessor:						
The geographical coordinates of the plant sites.						
Reasoning for not Acceptance or Acceptance and Close Out:						

The geographical coordinates of the plants 2/3, 4/5, 6, 7 are included in section A.4 of the PDD. The coordinates have been verified and found correct.

Acceptance and Close out by Lead Assessor: CAR 01 is closed. **Date: 27/07/2009**

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	02	Reference:	A.4.2.
Lead Assessor Comment:				Date: 13/06/2009	
The PP is requested to provide a profound description on technical information of the project activity in the PDD, as per EB 41 Annex 12 (Guidance on PDD for large scale projects).					
Project Participant Response:				Date: 10/07/2009	
The PDD has been updated with a more detailed project description as per the guidance provided in EB41 Annex 12. In addition, detail design drawings and equipment details are being provided to the validator.					
Documentation Provided by Project Participant:					
Attachment 2 (Abatement system information)					
Attachment 3 (Annubar information)					
Attachment 4 (FTIR information)					
Attachment 5 (QMS information)					
Information Verified by Lead Assessor:					
Information on technical description and list of equipments that would be used in the project activity.					
Reasoning for not Acceptance or Acceptance and Close Out:					
The pre-project scenario and project scenario is described in section A.4.3 of the PDD. The PP has also mentioned the list of equipments that would be used in the project activity. Apart from this the PP has provided a detailed project flow diagram, which gives a profound description of the project activity.					
Acceptance and Close out by Lead Assessor: CAR02 is closed				Date: 27/07/2009	

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	03	Reference:	B.2.3.
Lead Assessor Comment:			Date: 13/06/2009		
The PP is requested to provide a delineation of the project boundary for the proposed project activity. This should be as per EB 41 Annex 12, Guidance to complete CDM-PDD for large scale projects.					
Project Participant Response:			Date: 10/07/2009		
The PDD section B.2.3. has been adjusted to include a flow diagram of the project boundary.					
Documentation Provided by Project Participant:					
Attachment 2.4 (Process flow model)					
Information Verified by Lead Assessor:					
The delineation of the project activity.					
Reasoning for not Acceptance or Acceptance and Close Out:			Date: 27/07/2009		
The process flow diagram in section B.3 of the revised PDD is unreadable due to its small font size. The PP is requested to include only the relevant components in the delineation of the project activity, so as to easily interoperate the information mentioned.					
Project Participant Response:			Date: 07/08/2009		
More readable diagrams are inserted in section B.3 of the PDD					
Documentation Provided by Project Participant:					
Change made to PDD. No additional documentation needed					
Information Verified by Lead Assessor:					
Delineation of the project activity (Flow diagram)					
Reasoning for not Acceptance or Acceptance and Close Out:			Date: 18/08/2009		
A detailed process flow diagram of the process is included in section B.3 of the PDD. This is done as per EB41 Annex12. Also a delineation of the project activity is included to give a better view of the project activity.					
Acceptance and Close out by Lead Assessor: CAR 03 is closed			Date: 18/08/2009		

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
-------	------------	------------	-----------------------------------	--	--

Type:	CL	Number:	04	Reference:	B.3.1.
Lead Assessor Comment:			Date: 13/06/2009		
(a) The PP is requested to provide necessary references/documents to support the arguments mentioned under point 3. Using a substitute gas for SF6 and point 4. Reuse of SF6 after recycling it in the process.					
(b) Please provide any official survey/ report on current technology used in LCD manufacturing industry in South Korea.					
(c) Baseline scenario 5- Process modifications, is missing in the final table in section B.4 of the PDD. Please Clarify.					
Project Participant Response:			Date: 10/07/2009		
According to an official survey recently undertaken by the Korea Display Industry Association (Attachment 14), there is no case using substitute gas or recycled gas in Korea. Additionally, the survey revealed the only SF6 abatement system for the LCD industry in Korea is LGD's small pilot facility which has not been operating recently because of its huge operating cost. The Association also indicated that in other WLICC party countries – Japan and Taiwan, there is also no example in the LCD industry of complete SF6 gas substitution, SF6 being recycled or an SF6 abatement system in place which has a larger capacity than 5CMM.					
Documentation Provided by Project Participant:					
Attachment 14.(Common practice in Korea and in WLICC(Korea, Japan, Taiwan))					
Information Verified by Lead Assessor:					
Information on common practice in LCD industry in South Korea and WLICC countries, based on the documents provided by the PP.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(a) Please provide the English translation of the documents.					
(b) Please provide a more elaborative and transparent description on the identified barriers 'Lack of prevailing practise' and 'Technology barrier' under step 2(a) of the PDD. Please refer to the guidelines in the EB28 Annex 14.					
(c) Under Step 2.b, the information mentioned for the elimination of the baseline scenarios is insufficient and incomplete. Please provide a profound description in the PDD and substantiate the same data/arguments.					
For filling the missing information in the PDD and more clarity on the issues raised, please refer to the guidelines under Sub-steps 2a & 2bin EB28 Annex 14.					
Acceptance and Close out by Lead Assessor: CL 04 is open			Date: 27/07/2009		
Project Participant Response:			Date: 07/08/2009		
(a) Supporting documents on common practice were translated into English and provided to DOE. Please refer to new-attachment 1.1, 1.2 and 1.3					
(b) Changes in the PDD have been made to more clearly reflect the definitions used in EB28 Annex 14.					
(c) The PDD has been changed to substantiate using the evidences suggested in EB28 Annex14 how the options are inhibited by the various barriers. Please refer to New-attachment 1.1, 1.2 and 1.3					
Documentation Provided by Project Participant:					
New-attachment 1.1, 1,2, 1.3 and revised PDD					
Information Verified by Lead Assessor:					
Information on common practice in LCD industry in South Korea and WLICC countries, based on the documents provided by the PP and revised PDD.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(a) The PP has provided a letter from the Korean Display Industry Association (Ref. no: 7169548-2700-0019) on common practise in LCD industry in South Korea and WLCC countries. It clarifies that there is no substitute gas other than SF6 is used in LCD industries in South Korea, please submit the survey report which support the above claim, also please provide any survey/data which is publically available or published by Government officials. Open					
(b) The PP is requested to provide demonstrate the 'Technological barrier' in the PDD, as per the guidance in EB 28 Annex 14. Open					
© Please provide the suitable explanation and precise explanation relevant to the scenario discussed and consistent with the information provided in the documents (attachment 1.1 & 1.2). Open					
Acceptance and Close out by Lead Assessor: CL 04 is open			Date: 18/08/2009		

Project Participant Response:		Date: 26/08/2009
<p>(a) The PPs would suggest that the letter from the Korean Display Industry Association would fit without further types of evidence as a clearly approved documented evidence type 'g' as per the EB 28 Annex 14 Guidance. KDIA is the only trade Association representing the Korean LCD manufacturers and represents the Korean manufacturers in the WLICC process for LCD manufacturers in Asia. The letter from KDIA was based on confidential surveys on GHG emission reduction activities of LCD manufacturers in Korea, Taiwan and Japan as part of WLICC activities. Newly provided documents (New-attachment 14.1 and 14.2) are meeting materials and an attendees list of 14th WLICC meeting held on 12th of March this year that was the source of the data. This should better clarify KDIA's position a expert and aggregator for the LCD industry in Korea.</p> <p>According to the attachment 14.1, it is clear that neither substitute gas(NF3) for SF6 nor recycled gas has been used in the dry etching proccess in Korea. And the only abatement of SF6 was occured by the pilot device installed in P1 of LGD. Detailed data for other countries cannot be disclosed. The letter from KDIA is based on the information from these confidential surveys. It is the PPs opinion that this exact situation where a trade association had a very informed opinion based on quality data that could not be shared was foreseen by the EB. The EB specifically lists two types of document evidence involving trade associations- type 'b' which specifically references publicly available data sets and reports and type 'g' which relies on written documentation of expert judgment.</p> <p>In this case the PPs have provided written documentation of expert judgment and have provided enough information as to the source of their expertise to satisfy the EB's requirements. Instead, PPs provided a certificate issued by Ministry of Commerce, Industry and Energy for establishment of KDIA to prove creditability of KDIA. Please refer to New-attachment 14.3</p> <p>There is no government supplied documentation or survey data in Korea. To the best knowledge of the PPs, Korean Government organization has not researched SF6 use and abatement in LCD manufacturing.</p> <p>(b) The PP has add to the PDD a complete list of realistic and credible barriers that may prevent the alternative scenarios to occur, i.e. PP has just identifies and sub-categorized the list of barriers faced by all the baseline scenarios under the categories Technology, Investment, Lack of prevailing practice in the PDD</p> <p>(c) The PP believes there may be a slight misunderstanding based on language of the second part of attachment 1.2. The first sentence of the Scenario 4 section states makes the strong point that the technology to recover and recycle SF6 currently does not exist in the market place for LCD manufacturing as it does in other industries like the electricity transmission switch gear industry. This clearly supports, along with several other pieces of clear evidence, the fact that this alternative would constitute a 'first of its kind' project in Korea. The document goes on to explain that even if the PP were to over come this Lack of Prevailing Practice Barrier, there are several other equally daunting technical barriers facing the PPs as well. The PP has updated the PDD and resubmitted a revised letter from LGD(Revised New-attachment 1.2) to clarify this position more clearly.</p>		
Documentation Provided by Project Participant:		
New-attachment 14.1 14.2 and 14.3, Revised PDD and Revised New attachment 1.2		
Information Verified by Lead Assessor:		
<p>(a) Credibility of the organisation 'Korean Display Industry Organization' and Survey report on possible use of SF6 in etching process in LCD industries across South Korea.</p> <p>(b) Information on technological barrier in revised PDD.</p> <p>(c) Information on baseline scenario 4 in the revised PDD.</p>		
Reasoning for not Acceptance or Acceptance and Close Out:		Date: 18/08/2009
<p>(a) To support the letter issued on "Current practise in LCD industries in South Korea and WLICC countries' and possible use of a substitute gas in etching process in LCD industries across South Korea, the project proponent has provided a survey report which was carried out to understand and estimate the GHG emissions in LCD industries in WLICC countries. A certificate issued by Ministry of commerce, Industry & Energy was also verified to ensure the credibility of Korean Display Industry Association. Based on the data & information provided, it can be concluded that in the present scenario, SF6 is the only gas used in etching process in LCD industries across South Korea and no other substitute gas is used. Closed</p> <p>(b) The technological barrier is demonstrated as per tool EB 28 Annex 14. Closed</p> <p>(c) The information mentioned to exclude baseline scenario 4 from the list of plausible alternatives is</p>		

consistent with the documents provided. Closed					
Acceptance and Close out by Lead Assessor: CL 04 is closed					Date: 04/09/2009
Date:	13/06/2009		Raised by:		Nikunj Agarwal/ Mayank Kumar Jain
Type:	CAR	Number:	05	Reference:	B.4.1.
Lead Assessor Comment:			Date: 13/06/2009		
As per the methodology the additionality needs to be demonstrated based on the 'combined tool to identify the baseline scenario and demonstrate Additionality' i.e. EB 28 Annex 14. Please justify.					
Project Participant Response:			Date: 10/07/2009		
The PDD has been revised to utilize the process and format dictated by the 'Combined Tool to identify the baseline scenario and demonstrate Additionality' i.e. EB 28 Annex 14.					
Documentation Provided by Project Participant:					
Revised PDD					
Information Verified by Lead Assessor:					
Revised PDD					
Reasoning for not Acceptance or Acceptance and Close Out:					
The additionality is demonstrated as per the applied tool EB 28 Annex 14.					
However, to demonstrate the common practise, the PP is requested to provide the reference documents in English.					
Acceptance and Close out by Lead Assessor: CAR 05 is open			Date:27/07/2009		
Project Participant Response:			Date: 07/08/2009		
Supporting documents on common pratice were translated into English and provided to DOE. Please refer to new-attachment 1.1					
Documentation Provided by Project Participant:					
New-attachment 1.1					
Information Verified by Lead Assessor:					
Revised PDD					
Reasoning for not Acceptance or Acceptance and Close Out:					
The additionality is demonstrated as per the applied tool EB 28 Annex 14.					
However, to demonstrate the common practise, the PP is requested to provide the reference documents in English.					
Acceptance and Close out by Lead Assessor: CAR 05 is open			Date:27/07/2009		
Project Participant Response:			Date: 07/08/2009		
Supporting documents on common pratice were translated into English and provided to DOE. Please refer to new-attachment 1.1					
Documentation Provided by Project Participant:					
New-attachment 1.1					
Information Verified by Lead Assessor:					
Letter on Common practise in LCD industry in South Korea.					
Reasoning for not Acceptance or Acceptance and Close Out:					
Please submit the survey report which support the above claim, also please provide any survey/data which is publically available or published by Government officials. Open					
Acceptance and Close out by Lead Assessor: CAR 05 is Open			Date:18/08/2009		
Project Participant Response:			Date:26/08/2009		
The requested documents are provided to the best of the ability of the PPs as the raw data compiled by the industry association is strictly confidential. The PPs would point out that the Guidance from EB 28 Annex 14 clearly lays out the documented evidence type provided by the industry trade association as a clearly acceptable form of documented evidence in it own right without additional evidence such as reports which fall into a different evidence type category 'b'.					
Documentation Provided by Project Participant:					
New-attachment 14.1 14.2 and 14.3					
Information Verified by Lead Assessor:					
Credibility of the organisation 'Korean Display Industry Organization' and Survey report on possible use of SF6 in etching process in LCD industries across South Korea.					

Reasoning for not Acceptance or Acceptance and Close Out:					Date: 04/09/2009	
To support the letter issued on "Current practise in LCD industries in South Korea and WLICC countries' and possible use of a substitute gas in etching process in LCD industries across South Korea, the project proponent has provided a survey report which was carried out to understand and estimate the GHG emissions in LCD industries in WLICC countries. A certificate issued by Ministry of commerce, Industry & Energy was also verified to ensure the credibility of Korean Display Industry Association. Based on the data & information provided, it can be concluded that in the present scenario, SF6 is the only gas used in etching process in LCD industries across South Korea and no other substitute gas is used. Closed						
Acceptance and Close out by Lead Assessor: CAR 05 is closed					Date: 04/09/2009	
Date:	13/06/2009		Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	06	Reference:	B.4.3.	
Lead Assessor Comment:				Date: 13/06/2009		
(a) Please provide the necessary documents to support the financial data mentioned in section B.5 of the PDD. Please submit the financial analysis sheet to substantiate the financial analysis.						
(b) Please provide official reports/surveys to justify the arguments mentioned under common practice analysis.						
Project Participant Response:				Date: 10/07/2009		
Attached file #7 contains financial analysis for all plants in sum. The operating cost quotation is based on an actual quotation provided for P6. Attachment 17 is utility consumption quotation from the manufacturer for calculating the operating cost. The investment cost and operating cost are slightly changed.						
A pilot facility installed at P6 of LGD is only one case of SF6 abatement system in Korea (Please refer to Attachment 14). The equipment was manufactured by same supplier of this project, SAVE Tech. Attachment 2.1(CAPEX&OPEX sheet) contains OPEX and CAPEX of the pilot facility.						
Documentation Provided by Project Participant:						
Attachment 2.1, CAPEX&OPEX sheet						
Attachment 7 (Financial analysis)						
Attachment 14 (Common practice in Korea and in WLICC)						
Attachment 25 (Flow measurement report)						
Information Verified by Lead Assessor:						
Financial calculations and supporting evidences						
Reasoning for not Acceptance or Acceptance and Close Out:						
(a) Please provide the supportive documents (purchase agreements etc.) for the operating and capital cost of the plant P6.						
(b) Please justify the appropriateness of the method used to estimate the Operating and Capital for other 3 plants.						
(c) As per the "Tool for demonstration and assessment of additionality version 5.2": Sub-Step 2b Option 1 "Document the costs associated with the CDM project activity and the alternatives identified in Step 1 and demonstrate that there is at least one alternative which is less costly than the project activity."						
<ul style="list-style-type: none">With reference to above guidance, please justify the relevance of the IRR spreadsheet.How is it demonstrated that there is at least one alternative which is less costly than the project activity?						
Acceptance and Close out by Lead Assessor: CAR 06 is open				Date: 28/07/2009		
Project Participant Response:				Date: 07/08/2009		

(a) Equipment Purchase Agreement(EPA) was translated into English and provided to DOE. Please refer to new-attachment 2.1 Quotation for the operating cost of P6 from the system manufacturer, Save tech, was already provided to DOE. Please refer to attachment 7.2 in the Document Package.

(b) To calculate CAPEX and OPEX of each plant, equipment suppliers need to make detailed engineering drawings before making quotations. LG is now investing only in P6 and other plants will be invested next year or later, so it is not possible to obtain credible quotations at this moment. Therefore PPs simply assumed CAPEX and OPEX would be in proportion to inlet gas flow to be treated. More specifically, PPs distinguished some operating costs(i.e. wage, land rental fee, metering device maintenance cost and etc) which would not be affected to the capacity of an applied equipment from other cost (mainly utility cost) which would be changed according to the capacity. Main operating mechanism of the combustion equipment is treating SF6 on steady and high temperature and energy needed for keeping temperature steady is proportional to the total volume of gas to be treated. Therefore, PP's assumption is reasonable and most appropriate approach at this stage. Regarding CAPEX, PPs assumed that CAPEX of each plant will be changed according to the capacity of each equipment to be installed and 20% of discount rate was applied as CAPEX depends on other raw materials as well.(Double times of capacity does not mean double size) 20% of discount rate is more conservative than the supplier suggested in an unofficial form. And PPs simply assumed that expenditure for metering devices purchasing would not be changed as they are independent to the capacity of the main equipment.

(c) The IRR spreadsheet has been altered to show more clearly the project does not have a return on investment without the inclusion of CERs as the project has no positive revenue streams without CERs and significant costs. (Please refer to New-attachment 2.2). It should be clear that the costs associated with option #1 Installation of the Abatement System without CDM are exactly the same as the costs associated with the installation of the abatement device proposed in the CDM project. In addition, the costs of option #2 continuation of the same situation would cost zero which is less than the cost of the project activity which meets the EB criteria. The table in the PDD has been edited to more clearly demonstrate this.

Documentation Provided by Project Participant:

New-attachment 2.1 and 2.2

Information Verified by Lead Assessor:

Equipment purchase agreement.

Reasoning for not Acceptance or Acceptance and Close Out:

- (a) The equipment purchase agreement price i.e. CAPEX and Operating cost of the plant P6 i.e. OPEX have been verified from the English translated version of the Purchase agreement for plant P6 and found to be correct. Closed
- (b) For Plant P6, the CAPEX figures have been referred from the purchase agreement signed with the technology supplier. However for other three plants, the same figures have been projected based on the volume of gas supplied to the abatement system. The OPEX values have also considered on the same basis. This is acceptable considering that there is no other source of revenue from the process and simple cost analysis is applied to demonstrate the investment analysis. Closed
- (c) It is not clear how some of the attached excel sheets in the financial calculations are relevant for the demonstration of additionality. For demonstration of additionality, impact of CDM revenues on the financial viability of the project is not the requirement of the combined tool. Please justify the relevance of the financial calculations with CDM revenues for demonstration of additionality. Open

Acceptance and Close out by Lead Assessor: CAR 06 is open

Date: 19/08/2009

Project Participant Response:

Date: 26/08/2009

Revised attachment 7.2 which has been provided contains the financial calculation without CDM revenue or any reference to CDM. Please refer to "variable" sheet of the Revised attachment 7.2.

Documentation Provided by Project Participant:

Revised Attachment 7.2

Information Verified by Lead Assessor:

Financial analysis

Reasoning for not Acceptance or Acceptance and Close Out:

In Financial Analysis Sheet: Payment Schedule, F10 - It is not clear why repayment is added to the beginning balance. It should have been subtracted from the beginning balance. Please clarify.

Acceptance and Close out by Lead Assessor: CAR06 is Open

Date: 04/09/2009

Project Participant Response:

Date: 11/09/2009

This is because there is no revenue in the model. Please refer to the "Income Statement(project)" sheet of the file. There is not any revenue expected but huge operating cost is annually occurred. Therefore, the "profit before investment payback" is minus and it means the project needs additional money(additional loan) to pay annual operating cost. And this is why the investment payback cells in the same sheet are all minus. It can be considered a kind of additional loan and the value of F9 actually means an additional loan, not repayment.

If there is enough revenue to offset annual operating cost, the value of "F9" in Payment Schedule sheet will turn to minus and it will cause the decrease of ending balance. (i.e. please insert 20,000 into G11 of "Income Statement(project)" sheet. Then you can find the value of F9 is turned to minus, -9,540 and it will cause decrease of ending balance of the year. As a matter of fact, it is personal preference that PP chose to add repayment cells as the values of cells are normally "minus". Please be noted that the repayment cell is calculated as "(-1) X investment payback."

Documentation Provided by Project Participant:

Revised Attachment 7.2

Information Verified by Lead Assessor:

Financial analysis

Reasoning for not Acceptance or Acceptance and Close Out:

In Financial Analysis Sheet: Payment Schedule, F10 - g loan amount is not clear. The outstanding loan has to be calculated based on the initial capital requirement and operating cost requirement. Interest payment has to be based on the total loan outstanding. The repayment of loan amount has to be appropriately mentioned and deducted from the outstanding loan.

The PP is requested to be more clear in approach in the financial calculation.

Acceptance and Close out by Lead Assessor: CAR06 is Open
Date: 22/09/2009

Project Participant Response:
Date: 23/09/2009

This is the logic of repayment that PP considered.

1)CER Revenue – Operating cost(excluding Depreciation) – Interest cost = Profit(Cash) available for debt repayment

2)Repayment amount = -1 X Profit available for debt repayment of the year

3) Ending balance = Beginning balance + Repayment amount

If revenue is greater than Operating cost and Interest cost, the Profit(cash) available for debt repayment will be "PLUS" and Repayment amount will be "MINUS". And it will cause decrease of ending balance.

However in case of former calculation which PPs have provided, there is no revenue so profit available for debt repayment becomes "MINUS" and Repayment amount becomes "PLUS". Therefore it causes increase of ending balance.

PPs explained that the "PLUS" Repayment amount has similar effect with additional loan as it increases ending balance but it does not mean that it is an additional loan.

For more clear understanding, PPs have changed the sign of Repayment amount and subtract it from beginning balance as the validator requested. (Please refer to New attachment 19.1)

And PPs also have made another version that Repayment amount is zero to simplify the logic. It is also reasonable as there is no revenue. (Please refer to New attachment 19.2)

PPs believe that both of new versions can fully demonstrate the financial barrier. Therefore, any version that the validator thinks more reasonable can be used.

Documentation Provided by Project Participant:

New attachment 19.1 and New attachment 19.2

Information Verified by Lead Assessor:

Investment analysis

Reasoning for not Acceptance or Acceptance and Close Out:

As there is no cash inflow from the project activity, hence it would be almost impossible to repay the debts without the CDM revenue. The same is being reflected in the version 03 of the Investment analysis calculation sheet.

Acceptance and Close out by Lead Assessor:
CL 06 is closed

Date: 05/10/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CL	Number:	07	Reference:	B.4.4.
Lead Assessor Comment:			Date: 13/06/2009		
As per section C of the PDD, the start date of the project activity is December 1 st , 2009. Please substantiate start date with the supporting evidences as per Para 67 of EB 41.					
Project Participant Response:			Date: 10/07/2009		
The start date in the PDD has been altered to June 1st as the initial contract was signed on that date. The contract is provided to the validator as attachment 8. And progress of the project is described in attachment 21.					
Documentation Provided by Project Participant:					
Attachment 8 (Equipment purchase agreement)					
Attachment 21 (progress of the project)					
Information Verified by Lead Assessor:					
Chronology of the project implementation and Equipment purchase agreement.					
Reasoning for not Acceptance or Acceptance and Close Out:					
Please provide an English translated version of the Equipment Purchase Agreement.					
Acceptance and Close out by Lead Assessor:			Date: 27/07/2009		
CL 07 is open					
Project Participant Response:			Date: 07/08/2009		
Equipment Purchase Agreement (EPA) was translated into English and provided to DOE. Please refer to new-attachment 2.1 which contains both of a translated version and the original version.					
Documentation Provided by Project Participant:					
New-attachment 2.1					
Information Verified by Lead Assessor:					
Equipment purchase agreement & Revised PDD					
Reasoning for not Acceptance or Acceptance and Close Out:					
The project start date is the date of purchase agreement between LGD & Technology supplier.					
Acceptance and Close out by Lead Assessor: CL 07 is closed					Date: 18/08/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	08	Reference:	B.5.1.
Lead Assessor Comment:			Date: 13/06/2009		
The PP is requested to clearly specify the equations and parameters used to calculate the mass of SF6 entering and exiting the abatement device per unit time in the PDD. These equations and parameters have to be used in making baseline emission calculations in the ex-post scenario.					
Project Participant Response:			Date: 10/07/2009		
A detailed spreadsheet of all calculation with corresponding formulas has been provided to the validator to demonstrate the baseline emissions calculations in attachment 18. In addition, key equations and parameter calculations are included in the PDD annex.					
Documentation Provided by Project Participant:					
Revised PDD Attachment 2.4 (process flow model) Attachment 9.1 (calculation of emission factor from electricity use) Attachment 18 (Ex-ante calculation)					
Information Verified by Lead Assessor:					
Emission reduction calculations in the revised PDD.					
Reasoning for not Acceptance or Acceptance and Close Out:					
Please specify the equations and parameters used to calculate the mass of SF6 entering and exiting the abatement device per unit time in the ex-post scenario in the PDD.					
Acceptance and Close out by Lead Assessor: CAR 08 is open			Date: DD/MM/YYYY		
Project Participant Response:			Date: 07/08/2009		
The detailed calculations have been copied from Annex 3 and included in the main body of the PDD as requested by the validator.					
Documentation Provided by Project Participant:					
Revised PDD					
Information Verified by Lead Assessor:					

Emission reduction calculations in the revised PDD.	
Reasoning for not Acceptance or Acceptance and Close Out:	
Please specify the equations and parameters used to calculate the mass of SF6 entering and exiting the abatement device per unit time in the ex-post scenario in the PDD.	
Acceptance and Close out by Lead Assessor: CAR 08 is open	Date: 18/08/2009
Project Participant Response:	Date: 26/08/2009
All the equations and calculations have been added to the PDD.	
Documentation Provided by Project Participant: Revised PDD.	
Information Verified by Lead Assessor:	
Emission reduction calculations in the revised PDD.	
Reasoning for not Acceptance or Acceptance and Close Out:	
The PP has mentioned the equations that will be used to calculate the mass of SF6 entering and leaving the abatement system. This information is incorporated in version 07 of the PDD.	
Acceptance and Close out by Lead Assessor: CAR 08 is Closed	Date: 04/09/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	09	Reference:	B.5.2.
Lead Assessor Comment:			Date: 13/06/2009		
The PP is requested to clearly specify the equations to calculate project emissions due to electricity consumption & fuel as per the applied tools EB39 Annex 7 & EB 41 Annex 11, in the PDD.					
Project Participant Response:			Date: 10/07/2009		
The equations have been included in the PDD as per the EB Tools. Electricity and LNG consumption are designed by the manufacturer in accordance with attachment 17. And emission from LNG is estimated based on information from Korea Gas corporation (Attachment 10).					
Documentation Provided by Project Participant:					
Attachment 9 (Emission factor from electricity use) Attachment 10 (LNG information for calculating emission factor from LNG consumption) Attachment 17 (Utility consumption)					
Information Verified by Lead Assessor:					
Revised PDD, Calculation sheets have been verified for the projects emission from consumption of electricity and fossil fuel.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(a) Please justify why the Coal (Anthracite) has been included in the low cost must run sources in the calculation of the Emission factor.					
(b) Please clarify which all power generating options are included in the 'Alternative' defined under low cost must run sources.					
(c) The 'Grid emission factor' is defined as the monitoring parameter in section B.7.1 of the PDD. Please justify suitability of using the combined margin approach (ex-ante approach) in calculating the Grid emission factor (OM & BM).					
(d) The formula applied to calculate the Simple Operating Margin is not matching up with the one mentioned in the applied tool EB 35 Annex 12.					
(e) Please provide the English translation of the documents provided under attachment 10 (to calculate emissions from LNG consumption).					
(f) The references of the data are not mentioned in the PDD. Please clarify.					
Acceptance and Close out by Lead Assessor: CAR 09 is open			Date: 28/07/2009		
Project Participant Response:			Date: 07/08/2009		

- (a) While Bituminous coals are imported from abroad, Anthracite coals are domestically supplied. The Korean government has provided diverse preferential policies such as subsidies to promote use of domestic anthracite coals. In Korea, Anthracite plant is included in low cost must run plants.
- (b) According to the attachment 9.2 in the Document Package, annual electricity statistics issued by KEPCO, the alternative consists of Geothermal, Wind, Low-cost biomass, Solar and LFG
- (c) EFgrid has been moved to section B6.2 and an explanation has been provided as to how the calculation meets the criteria of the ex-ante option.
- (d) The most recent formula has been included in the revised PDD.
- (e) The document was translated into English and provided to DOE. Please refer to new-attachment 3. And please refer to the attachment 10.2 in the Document Package for checking how the values came.
- (f) For the avoidance of doubt the references to the KEPCO data was included in various places throughout the PDD.

Documentation Provided by Project Participant:

New-attachment 3 and revised PDD

Information Verified by Lead Assessor:

Emission factor and project emission calculations in the revised PDD.

Reasoning for not Acceptance or Acceptance and Close Out:

- (a) Please substantiate the claim that the 'Anthracite coal' is a low/must run source in South Korea. Open
- (b) The 'alternatives' term include electricity generation from wind/geothermal/LFG/solar and low-cost-biomass. This has been verified from the annual electricity statistics issued by KEPCO. Closed
- (c) The 'Emission factor' is included in the list of parameters that are available during validation i.e. it has been fixed ex-ante. Closed
- (d) The correct representation of the formula for calculating OM has been included in the PDD. Closed
- (e) The values of density of LNG and 'Weight of carbon per ton of LNG' have been verified from the values provided by the Korean Gas Corporation. The values specified in the PDD are correct. Closed
- (f) The references of the data used for calculation of emissions from LNG are not included in the PDD. Please clarify. Open

Acceptance and Close out by Lead Assessor: CAR 09 is open
Date: 19/08/2009

Project Participant Response:
Date: 26/08/2009

(a) According to the data from Korea Energy Statistics Information System(New-attachment 15.1 and 15.2), Anthracite coal(domestic coal in Korea) is one of primary energy sources. This information is publicly available on the web site in English.(<http://www.kesis.net>) According to KESIS, Korean government supported KRW 188 Billion as subsidies to encourage domestic coal(anthracite) use of power plant in 2007. (http://www.kesis.net/sc/SC0304_04D.jsp)

(f) The references(manufacturer's specification and Korea Gas Corporation) are included in the PDD

Documentation Provided by Project Participant:

New-attachment 15.1, 15.2 and Revised PDD

Information Verified by Lead Assessor:

Emission factor and project emission calculations in the revised PDD.

Reasoning for not Acceptance or Acceptance and Close Out:

- (a) As per the Emission factor tool EB35 Annex12, the low cost/must run sources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the seasonal load of the grid. Granting subsidy for the use of anthracite coal in South Korea do not make a must run source. Also the operational cost of the coal based power plants would be higher than nuclear or hydro power plants. Please justify the inclusion of power plants running on anthracite coal in low cost/must run sources. Open
- (f) The reference for the specifications of natural gas are included in the PDD version 07. Closed

Acceptance and Close out by Lead Assessor: CAR 09 is open
Date: 06/09/2009

Project Participant Response:
Date: 14/09/2009

Anthracite coal has been excluded from low-cost/must-run sources and newly added to OM calculation in accordance with the validator's request. the revised CM calculation sheet, Emission reduction calculation sheet and PDD has been provided to the validator.

Documentation Provided by Project Participant:

revised attachment 9.1, 3rd revised attachment 29 and revised PDD	
Information Verified by Lead Assessor:	
Information on calculation of grid emission factor.	
Reasoning for not Acceptance or Acceptance and Close Out:	
SGS 22/09/2009: Anthracite coal is excluded from the low-cost/must run sources category and is added in the calculation of Operating Margin. The revised emission reduction calculations have been checked and found appropriate. Hence CAR 09 is closed. SGS 04/01/2010: PP is requested to re-work the emission factor calculation as per the requirement of EB 50 Annex 14.	
PP 06/01/2010: The EF calculations have been re-worked as according to the requirement of EB 50 Annex 14.	
SGS 14/01/2010: The calculation of EF has been checked and found OK. The information has been updated in the revised PDD. CAR 09 is closed.	
Acceptance and Close out by Lead Assessor: CAR 09 is closed	Date: 14/01/2010

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	10	Reference:	B.6.1.
Lead Assessor Comment:			Date: 13/06/2009		
Ms, in (Minimum molecular weight of inlet stack gas, wet basis) & Ms, out (Minimum molecular weight of outlet stack gas, wet basis) are the calculated figure, derived from the monitored figure Md, in & Md,out. Hence these parameters cannot be fixed ex-ante. Please justify.					
Project Participant Response:			Date: 10/07/2009		
These parameters have been moved to the parameters to be monitored section					
Documentation Provided by Project Participant:					
No documentation required					
Information Verified by Lead Assessor:					
Information on Molecular weight of Inlet and Outlet stack gas on Wet basis					
Reasoning for not Acceptance or Acceptance and Close Out:					
As per the applied methodology AM0078, the parameters MS in and MS out are the calculated figures. Please justify the explanation given for both the monitored parameters. Open					
Acceptance and Close out by Lead Assessor:			Date: 27/07/2009		
CAR 10 is open					
Project Participant Response:			Date: 07/08/2009		
These values are included in monitored parameters because Ms can not be calculated before actual equipment installation and is currently only estimated.					
Documentation Provided by Project Participant:					
No additional documentation required					
Documentation Provided by Project Participant:					
No documentation required					
Information Verified by Lead Assessor:					
Information on Molecular weight of Inlet and Outlet stack gas on Wet basis					
Reasoning for not Acceptance or Acceptance and Close Out:					
Please refer to equations 8 & 9 on page 9 of AM 0078 and justify the compliance of the explanation given for the parameters MS in and MS out on page 39 of the PDD.					
Acceptance and Close out by Lead Assessor: CAR 10 is open				Date: 18/08/2009	
Project Participant Response:				Date: 26/08/2009	
PDD has been updated to include the values for MS in and Out as calculated using equation 8 and 9.					
Documentation Provided by Project Participant: Updated PDD.					
Information Verified by Lead Assessor:					
Information on parameters MS in and MS out					
Reasoning for not Acceptance or Acceptance and Close Out:					
Information on monitoring of the parameters Ms in and Ms out is incorporated in the PDD version 07. The information given is in compliance with the applied methodology AM 0078 version 01.1.					

Acceptance and Close out by Lead Assessor: CAR 10 is closed					Date: 04/09/2009
Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	FAR	Number:	11	Reference:	B.6.2.
Lead Assessor Comment:					Date: 13/06/2009
Please clearly specify the values of the parameters Cpin, Cpout, Ain & Aout (to be fixed ex-ante) in section B.6.2 of the PDD.					
Project Participant Response:					Date: 10/07/2009
Changes have been made to the PDD as requested. Ain_out data is documented in a technical drawing entitled "process flow model.jpg" of the Attachment 2 Attachment 11 was issued by Korea Research Institute of Standards and Science(National standard). The value of pitot coefficient is 1.0126. And it should be changed when the actual annubar is provided with its testing report by the manufacturer.					
Documentation Provided by Project Participant:					
Attachment 2.4 (Process flow model) Attachment 11 (Pitot coefficient test report)					
Information Verified by Lead Assessor:					
Information on the discussed parameter in the Revised PDD and applied methodology AM 0078.					
Reasoning for not Acceptance or Acceptance and Close Out:					
As per the applied methodology AM 0078 version 01.1, the values of the parameters Cpin, Cpout, Ain & Aout has to be as per the manufactures specifications i.e. only the actual data has to be used. Please put a clear description in section B.6.2 of PDD.					
Acceptance and Close out by Lead Assessor: CAR 11 is open					Date: 28/07/2009
Project Participant Response:					Date: 07/08/2009
The highlighted changes have been made to the revised PDD.					
Documentation Provided by Project Participant:					
Revised PDD					
Information Verified by Lead Assessor:					
Information on the discussed parameter in the Revised PDD and applied methodology AM 0078.					
Reasoning for not Acceptance or Acceptance and Close Out:					
The values of parameters Cpin, Cpout, Ain & Aout are only available for plant P6, hence, these have been included in the PDD. The values of these parameters for plants other then P6 will be determined on commissioning of the project activity and same values can be used henceforth. These values should be checked during the 1 st verification of the project activity. FAR#11 is raised.					
Acceptance and Close out by Lead Assessor: FAR 11 is raised					Date: 18/08/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CL	Number:	12	Reference:	B.6.3.
Lead Assessor Comment:					Date: 13/06/2009
The PP is requested to provide the documents/ references/evidences of the data used to calculate the baseline and project emissions.					
Project Participant Response:					Date: 10/07/2009
The PP has provided extensive documentation to the validator to document the data used in the calculations.					
Documentation Provided by Project Participant:					
Attachment 9 (Emission factor from electricity use) Attachment 10 (LNG information for calculating emission factor from LNG consumption) Attachment 13 (Historical data and raw data) Attachment 17 (Utility consumption) Attachment 19 (Production plan of LCD) Attachment 23 (Projection method)					
Information Verified by Lead Assessor:					
Historic data for the SF6 consumption and LCD substrate production in the supportive documents provided					
Reasoning for not Acceptance or Acceptance and Close Out:					

<p>(a) Please provide the SF6 purchase records for the years 2006 to 2008.</p> <p>(b) Please provide the documents to justify the historical production of LCD substrate for the years 2006-2008. As the documents submitted are in the local language, these values could not be traced. If possible please provide the English translation of the documents as well.</p> <p>(c) Please provide the documentary evidence for the consideration of 70% etch utilization efficiency and 10% heel value.</p>	
Acceptance and Close out by Lead Assessor: CL12 is open	Date: 28/07/2009
Project Participant Response:	Date: 07/08/2009
<p>(a) The SF6 purchase records were provided to DOE. Please refer to New-attachment 4.1 and 4.2. Attachment 4.1 is summary of SF6 purchase records during 2006~2008. The attachment contains every supply records during the period on monthly base which is also recorded in LGD's data system. Attachment 4.2 is an invoice issued by a gas supplier, DaeSung Industrial gas Corp. and provided as a sample raw material.</p> <p>(b) The document required and corrected/translated file were provided to DOE. Please refer to New-attachment 5 and 6. The New-attachment 5 is a translated version of attachment 13.4 of the Document Package which is a screen capture of an email containing monthly production summary and sent to heads of each production team of LGD. The attachment 6 contains actual number of sheet of LCD produced during above period and the data is converted into surface unit.</p> <p>(c) The values of 70% etch utilization efficiency and 10% heel value came from IPCC default values, IPCC Tier 2.b (new-attachment 7.1 and 7.2) Please refer to page 6.16 and 6.18 in the New-attachment 7.1. For your information, Ui means Use rate. According to the New-attachment 7.2, actual heel value of SF6 is smaller than 10%, so this assumption is conservative.</p>	
Documentation Provided by Project Participant:	
New-attachment 4.1, 4.2, 5, 6, 7.1 and 7.2	
Information Verified by Lead Assessor:	
Information of purchased quantity of SF6	
Reasoning for not Acceptance or Acceptance and Close Out:	
<p>(a) Please provide the inventory records of SF6 for the year 2005, 2006, 2007, and 2008 to verify the actual quantity of SF6 consumed. Open</p> <p>(b) The values of 'Production of LCD substrate during the project year y' i.e. the historical production of LCD substrate mentioned in the PDD are not matching up with the historical data provided (Attachment 6). Please justify. Open</p> <p>(c) As per the IPCC data, the emission factor SF6 gas is 0.3, this implies that the utilization efficiency of the SF6 gas in the etching process in LCD industry is 70%. Also the heel value for SF6 gas is 10%. Closed</p>	
Acceptance and Close out by Lead Assessor: CL 12 is open	Date: 19/08/2009
Project Participant Response:	Date: 26/08/2009
<p>(a) The inventory record was already provided as the attachment 13. However, PPs provide a sample of raw data of Inventory record of P6 for better clarification. The data has been managed by Central Gas Supply System (CGSS). Please refer to New-attachment 18.</p> <p>(b) Please be noted that the total production of LCD substrate of the year is calculated from Feb of the year to Jan of the next year. The values of New-attachment 6 and the PDD are exactly matching up.</p>	
Documentation Provided by Project Participant:	
New-attachment 18	
Information Verified by Lead Assessor:	
Information of purchased quantity of SF6	
Reasoning for not Acceptance or Acceptance and Close Out:	
<p>(a) The PP is requested to justify how the SF6 consumption figures have been calculated from the inventory records of SF6 and the purchased quantity of SF6. Open</p> <p>(b) The values of 'Production of LCD substrate during the project year y' i.e. the historical production of LCD substrate have been checked from the reference document provided and found correct. Closed</p>	

Acceptance and Close out by Lead Assessor: CL 12 is open	Date:06/09/2009
Project Participant Response:	Date: 11/09/2009
<p>(a) SF6 inventory calculation : Please refer to New-attachment 18. Value marked in yellow are the remained SF6 of the month. The sum of the value in first sheet(Jan, Y06) is 2,118kg(1,500kg+618kg, 23rd row) and this is SF6 inventory of P6 at Jan, 2006. Similarly, 2,480kg, 2,769kg and 2,073kg are came out for Jan of 2007~2008 respectively. SF6 inventories of other plants, P2/3, P4/5 and P7 are also calculated in exactly same way and PPs have provided New attachment 18 as a sample to show how this data is came out.</p> <p>SF6 use : Please refer to attachment 13.1 of the 1st document package. The inventory values of P6 of each year are exactly same with above values. As per the methodology, AM0078, SF6 consumption of P6 is calculated as follow:</p> <p>Consumption = (Purchase – Inventory change (to next inventory from previous inventory-)) X 90%(10% of heel value is considered as the validator recommended.)</p> <p>(i.e. for P6, Year-3, purchase 61,500 – (to next inventory 2,480 – from previous inventory 2,118) * 90% = 55,024)</p> <p>Other raw data for SF6 purchase or heel values have also been provided as attachment 13.2~13.5 and New-attachment 7.1~7.2</p>	
Documentation Provided by Project Participant:	
No additional document required.	
Information Verified by Lead Assessor:	
Information of SF6 consumption in the PDD and ER calculation sheet	
Reasoning for not Acceptance or Acceptance and Close Out:	
The SF6 consumption is calculated based on the purchased quantity of SF6, inventory data and considering a heel value of 10%. The calculations are done as per the applied methodology AM0078 version 01.1. This is acceptable.	
Acceptance and Close out by Lead Assessor: CL 12 is closed	Date:22/09/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	13	Reference:	B.7.1.
Lead Assessor Comment:			Date: 13/06/2009		
Please provide the emission reduction calculation sheet.					
Project Participant Response:			Date: 10/07/2009		
The calculation sheets have been provided to the validator.					
PPs considered “10% heel value” in historical SF6 consumption in accordance with assessor’s comment					
Documentation Provided by Project Participant:					
Attachment 9 (Emission factor from electricity use)					
Attachment 10 (LNG information for calculating emission factor from LNG consumption)					
Attachment 13 (Historical data and raw data)					
Attachment 17 (Utility consumption)					
Attachment 19 (Production plan of LCD)					
Attachment 23 (Projection method)					
Attachment 29 (Emission Reduction calculation sheet)					
Information Verified by Lead Assessor:					
Emission reduction calculations.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(a) The PP is requested to follow a conservative approach in calculating the baseline and project emissions (Baseline emissions should be rounded down and Project emission should be rounded up).					
(b) Please provide the reference for the considered value of 90% for the destruction efficiency.					
(c) Please justify the approach of estimating the project emissions for plants P2/3, P4/5, P7 from the data applied for Plant P6.					
(d) Please clarify why the actual data for calculating the emission reductions is not applied for plant P2/3, P4/5 and P7.					
(e) Please provide the reference documents for the flow rates specified in the CER calculation sheet. Also please clarify whether the flow rates are at the inlet or outlet of the Abatement System?					

Acceptance and Close out by Lead Assessor: Open	Date: 28/07/2009
Project Participant Response:	Date: 07/08/2009
<p>(a) The PP have searched the EB Guidance for Completing the Project Design Document 4 V07 and found no Guidance on how the EB expects the PPs to round figures (i.e. rounding to which integer? for which calculations?, etc.). We found no clarification on how to proceed with such a deviation from the methodology with regard to rounding. The guidance instead seems to indicate the PPs should follow the methodology and not deviate. The methodology AM0078 does not call for such rounding in the calculations. Can the DOE validator please explain why they are suggesting such a deviation from the methodology and specifically how they are asking for the deviation to be carried out in regards to AM0078 or direct us to the to the pertinent guidance from the EB on rounding? The PPs are concerned that this change could delay or prevent Registration.</p> <p>(b) The guaranteed value for DRE by the manufacturer is 95%. However, for conservative approach, PP's applied 90% of DRE, IPCC default value for SF6 destruction(New-attachment 7.1, please refer to page 6.20) Smaller DRE value will increase project emission so 90% of DRE is more conservative than 95% of DRE</p> <p>(c) The project emission of each plant is mainly depends on the consumption of electricity and LNG except not destroyed SF6. Quantity of Utility consumption will be in proportion to the capacity of combustion equipment. Main operating mechanism of the combustion equipment is treating SF6 on steady and high temperature and energy needed for keeping temperature steady is proportional to the total volume of gas to be treated.</p> <p>(d) LG is now investing only in P6 and other plants will be invested next year or later. Considering that Suppliers need detailed technical drawings for calculating exact utility consumption, PP's assumption that utility consumption of each plant will be proportional to the capacity of equipments to be installed is reasonable and most appropriate approach at this stage.</p> <p>(e) The measured values of the flow rate of each plant were already provided to DOE. Please refer to the attachment 25 in the Document Package. And the values therein are inlet flow rate. Please be noted that the gas flow will be increased after pre-treatment as some process air is injected during the pre-treatment process.</p>	
Documentation Provided by Project Participant:	
New-attachment 7.1	
Information Verified by Lead Assessor:	
Information of purchased quantity of SF6	
Reasoning for not Acceptance or Acceptance and Close Out:	
<p>(a) As such there is no EB guidance on how to round off the values, but as a conservative approach baseline emissions should be round down and project emissions should be round up, so as to avoid the over estimation of the data. Please note that the GWP of SF6 is 23,900, so even a change of 0.0001% in baseline or project emissions, would led to a change of 2.39 CERs. If PP do not wish to follow the conservative approach, then please use the actual figures i.e. no rounding off of any parameter in the calculation should be done. Open</p> <p>(b) A default value of 90% of destruction efficiency of SF6 is being considered as per the IPCC. The value is more conservative that the manufacturers guaranteed value of 95%. Closed</p> <p>(c) The quantity of electricity and LNG consumption for plants other than P6 has been estimation based on the flow of SF6 supplied to the destruction process. This is conservative. Closed</p> <p>(d) As per the information provided above, we understand that till the end of 2009, only plant P6 can be operational and based on this, the start date of the crediting period is taken as December 1 2009. However, the estimated emission reduction has been calculated for all the plants from the year 1 itself. Please clarify. Open</p> <p>(e) The flow rates of SF6 gas mentioned in the CER calculation sheet does not match with the data provided (Attachment 25.2). Please clarify. Open</p>	
Acceptance and Close out by Lead Assessor: CAR 13 is open	Date: 19/08/2009
Project Participant Response:	Date: 26/08/2009
(a) As the Attachment 29 shows, PP did not round up or down any value for the emission reduction	

calculation. Excel program just shows to defaulted decimal places to display values but actual values are applied in calculation. The calculated baseline emission is 1,607,956.22064726 and project emission is 218,611.629583846. Therefore, maximum theoretical error is less than 0.5 CER and it is 0.000036% of total estimated quantity, 1,389,345 CER. In addition, flow rate of each plant which are used for the calculation of the project emission are greater than actually measured values and it is conservative. As the maximum theoretical error is less than one CER and there is no requirement in the Guidance from EB 41 Annex 12 to undertake such a structured rounding effort as suggested and has not been required for any other validation undertaken to date including those involving SF6, the PPs would suggest they are in full compliance with the EB Guidance and this issue should be closed.

(d) PP will start investing in other plants after the project registration and as this date is very uncertain it is unclear how far the construction of the other plants will be behind P6, if at all, The construction period depends on many factors such as raw material supply, equipment capacity and funding schedule so construction completion dates can be different to each other even in the case that all plant are invested at the same time. PP expects it will take 5~10 months depending on various conditions which may or may not correspond to the registration period. Therefore, even if PP considers the time gap of each implementation, the actual reduction would also be different from estimated value. In consideration of the values used, 1) that the estimated reduction in the PDD is ex-ante calculation so it does not affect actual reduction occurred and 2) that the pro-rate estimation needs many new assumptions and makes calculation very complicated without substantial improvement of accuracy, so therefore, the PP simply assumes that all facilities will start operation at the same time as this is as likely a scenario as any since no one knows the actual time required for the registration and other implementation details. As the main purpose of ex-ante calculation is to show how actual emission reduction will be calculated, this approach is easier to understand with equal uncertainty as to other options.

(e) The measured flow rates of each plant are 57.7, 130.6, 32.3 and 47.4 CMM and values applied in the CER calculation are 60, 130, 34 and 50 CMM respectively. Applied values are greater than measured values except P4/5 (0.46% lower). The flow rates are used to assume the utility consumption of each facility and greater flow rates leads increase of the project emission. PP modified the flow rate for simpler and more conservative calculations.

Documentation Provided by Project Participant:

No new document required

Information Verified by Lead Assessor:

Estimated emission reduction calculations, Information of purchased quantity of SF6

Reasoning for not Acceptance or Acceptance and Close Out:

- (a) The CER calculations have been analysed by considering the actual values of the parameters used. The theoretical error in the overall CERs is found to be less than 0.5 CERs. Hence the present CER calculations can be accepted. Closed
- (b) The PP is requested to consider the most likely commissioning dates of all plants (including P6) in estimation of CERs. Open
- (c) The ratio of volumes is used in the estimation of electricity consumption and LNG consumption in the process, hence considered figures of 60, 130, 34, 50 CMM are actually bringing the project emissions down. The PP is requested to justify how the considered figures and project emission calculation is conservative. Open

Acceptance and Close out by Lead Assessor: CAR 13 is open **Date:**04/09/2009

Project Participant Response: **Date:** 11/09/2009

(b) PPs revised Section A of PDD to clearly state that the most likely scenario would be all plants installed and commissioned in 2010.

(c) PP revised the calculation of Project emission by using measured flow rate value for each plant as the validator requested.

Documentation Provided by Project Participant:

Revised PDD and Emission reduction calculation sheet.

Information Verified by Lead Assessor:

Estimated emission reduction calculations, estimation of electricity consumption and LNG consumption in the process.

Reasoning for not Acceptance or Acceptance and Close Out:

(b) Most likely all the plants would be commissioned in 2010. The information is mentioned in section A of the PDD version 09. Closed	
(c) The project emissions are now calculated based on the actual flow rates rather than the rounded off data used previously. The necessary corrections have been made in the calculation. Closed	
Acceptance and Close out by Lead Assessor: CAR 13 is closed	Date: 22/09/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	14	Reference:	B.7.3.
Lead Assessor Comment:			Date: 13/06/2009		
Please provide the information on projection methods used to evaluate the value of parameters used (based on historical data) in baseline and project emission calculations.					
Please incorporate the relevant information in PDD as well.					
Project Participant Response:			Date: 10/07/2009		
Values for year one are based on expected consumption and production patterns including market expectations and historical trends. Years 2-10 are simply assuming similar values to year 1 for each additional year. Documentation of these projections and values are provided in Attachment 23.					
Documentation Provided by Project Participant:					
Attachment 23.(projection method)					
Information Verified by Lead Assessor:					
Information on methods used to project the production of LCD TFT for the year 2009.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(a) In attachment 19: Production plan in 2009, few cells are unlinked, due to which the reference could not be traced. Please make necessary corrections.					
(b) Also the presentation and reference provided cover the LG display market as a whole; here we are specifically looking for the information related to the LCD TFT market. Hence the project proponent is requested to provide the concise information on the projection methods used to estimate the production of LCD TFT in the plants falling under this project activity.					
(c) The PDD does not reflect the theoretical explanation on the projection methods used. Please justify.					
Acceptance and Close out by Lead Assessor: CAR 14 is open			Date: 29/07/2009		
Project Participant Response:			Date: 07/08/2009		
(a) The corrected file was provided to DOE. Please refer to New-attachment 8 which has same format with the New-attachment 6.					
(b) The attachment 23.2 already provided is a forecast report on display market issued by “DISPLAY SEARCH” which is the most dominant market research firm in the Display industry. Please refer to AMLCD (Active Matrix LCD) part in Slide No. 40~46 for finding detailed LCD TFT market forecasting. LCD TFT is one of AMLCD.					
(c) Relevant explanation was inserted in the PDD					
Documentation Provided by Project Participant:					
New-attachment 8 and revised PDD					
Information Verified by Lead Assessor:					
Information on methods used to project the production of LCD TFT for the year 2009.					
Reasoning for not Acceptance or Acceptance and Close Out:					
Please explain how the PP has arrived at the projected poduction figure for the year 2009.					
Acceptance and Close out by Lead Assessor: CAR 14 is open			Date: 18/08/2009		
Project Participant Response:			Date: 26/08/2009		
As PP explained in attachment 23, projection method, LGD set up 2009 Business Plan of total production quantity based on clients’ advanced orders. According to LGD’s production summary from January to May this year (please refer to attachment 19), the average rate is higher than 100% as the Business Plan reflected only the advanced order and did not consider ongoing orders. Less production quantity causes decrease of baseline emission, therefore, this approach is conservative.					
Documentation Provided by Project Participant:					

Revised PDD	
Information Verified by Lead Assessor:	
Information on methods used to project the production of LCD TFT for the year 2009.	
Reasoning for not Acceptance or Acceptance and Close Out:	
The projected production figure for the year 2009 is based on the market expectations and advanced orders placed in for the year 2009. According to the market survey the LGD sale would go on a higher side in coming years, so for the rest of the crediting period, the PP is using the same figures, so as to be more conservative in projected emission reduction calculations. This is acceptable	
Acceptance and Close out by Lead Assessor: CAR 14 is closed	Date: 04/09/2009

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	15	Reference:	B.10.1.
Lead Assessor Comment:			Date: 13/06/2009		
(A) Please clearly specify the following details for each of the monitored parameter in the monitoring plan:					
viii. Monitoring frequency of the parameter					
ix. Calibration frequency of the meter/device used					
x. Data storage/archiving procedure (electronic or on paper)					
xi. Relative positioning of the meter/device (if possible)					
xii. QA/QC procedures followed for each parameter					
xiii. Internal audits					
xiv. Also please specify the procedures that will be followed to calculate the emission reductions, in case of data redundancy.					
(B) The electricity consumption is not among the list of monitoring parameters in section B.7.1 of the PDD. Please justify.					
Project Participant Response:			Date: 10/07/2009		
(a) The requested information has been provided to the validator.					
(b) The parameter has been included in the revised PDD as per EB Guidance on nomenclature.					
Documentation Provided by Project Participant:					
Attachment 24 (Monitoring specification)					
Information Verified by Lead Assessor:					
Revised PDD and monitoring details.					
Reasoning for not Acceptance or Acceptance and Close Out:					
(A) Please address the following issues.					
(a) The monitoring detail provided does not reflect in the revised PDD. Please clarify.					
(b) The unit of Outlet gas velocity (Vs,out) specified on page 35 of the PDD is incorrect. Please justify.					
(c) The 'equation number' (for e.g. Equation 8) mentioned in the 'description' of some of the monitoring parameters could not be traced in the PDD. Please clarify.					
(d) Please specify the procedures that will be followed to calculate the emission reductions in the PDD, in case of data redundancy.					
(B) This is Ok. Closed.					
Acceptance and Close out by Lead Assessor:			Date: 28/07/2009		
CAR 15 is open					
Project Participant Response:			Date: 07/08/2009		
(a) Additional monitoring detail has been added to the PDD in the Annex 4.					
(b) unit has been changed in revised PDD					
(c) These erroneous references have been removed and equations included in PDD.					
(d)The PDD has been updated in the monitoring section to explain the most conservative result will be used in the case of redundant data.					
Documentation Provided by Project Participant:					
Revised PDD					

Information Verified by Lead Assessor:	
The information on monitoring procedures specified in the PDD.	
Reasoning for not Acceptance or Acceptance and Close Out:	
(a) The information on monitoring parameters (as mentioned in attachment 24) is not reflected against the respective parameter in section B.7.1 of the PDD. Please clarify. Open	
(b) The unit of Outlet gas velocity ($V_{s,out}$) is corrected in section B.7.1 of the PDD. Closed	
(c) Necessary corrections have been made in the PDD. Closed	
(d) The conservative approach which results in fewer emissions would be followed in case of data redundancy. Closed	
Acceptance and Close out by Lead Assessor: CAR 15 is open	Date: 18/08/2009
Project Participant Response:	Date: 26/08/2009
(a) The attachment 24 is revised and provided as New-attachment 16. Please refer to New-attachment 16	
Documentation Provided by Project Participant:	
New-attachment 16	
Information Verified by Lead Assessor:	
Monitoring frequency of the monitoring parameters.	
Reasoning for not Acceptance or Acceptance and Close Out:	
The monitoring frequency of few parameters (as defined in attachment provided) is not clearly mentioned against the respective parameter in PDD version 07. Please clarify. Open	
Acceptance and Close out by Lead Assessor: CAR 15 is open	Date: 06/09/2009
Project Participant Response:	Date: 11/09/2009
The table for monitoring frequency of parameters is inserted in the Annex of PDD as the validator requested and the monitoring frequencies have all been inserted into the various parameter tables in the PDD as well.	
Documentation Provided by Project Participant:	
Revised PDD	
Information Verified by Lead Assessor:	
Monitoring frequency of the monitoring parameters.	
Reasoning for not Acceptance or Acceptance and Close Out:	
The monitoring frequency of the monitoring parameters is mentioned in section B.7.1 of the PDD version 09. This is in compliance with the approved monitoring methodology AM 0078 version 01.1.	
Acceptance and Close out by Lead Assessor: CAR 15 is closed	Date: 22/09/2009

Date:	13/06/2009		Raised by:	Nikunj Agarwal/ Mayank Kumar Jain	
Type:	CAR	Number:	16	Reference:	B.13.3.
Lead Assessor Comment:				Date: 13/06/2009	
Please provide a description on the measurement equipments used in the process and maintenance of the abatement system in Annex 4 of the PDD. This is the requirement as per AM 0078, version 01.1.					
Project Participant Response:				Date: 10/07/2009	
These sections have been added to Annex 4. Additional detailed information including operations manuals for the equipment has been provided to the validator.					
Documentation Provided by Project Participant:					
Attachment 2 (Abatement system information)					
Attachment 3 (Annubar information)					
Attachment 4 (FTIR information)					
Attachment 5 (QMS information)					
Information Verified by Lead Assessor:					
The information on maintenance and on measurement equipments.					
Reasoning for not Acceptance or Acceptance and Close Out:					
The information on maintenance and on measurement equipments has been included in the PDD. This is as per the manufactures data/requirements.					
Acceptance and Close out by Lead Assessor: CAR 16 is closed				Date: 27/07/2009	

Date:	13/06/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CL	Number:	17	Reference:	B.14.1.
Lead Assessor Comment:			Date: 13/06/2009		

Please specify the date of completion of the application of the baseline study and monitoring methodology in section B.8 of the PDD	
Project Participant Response:	Date: 10/07/2009
Date has been included.	
Documentation Provided by Project Participant:	
Change made to PDD. No additional documentation needed.	
Information Verified by Lead Assessor:	
Information on date of completion of baseline and monitoring methodology	
Reasoning for not Acceptance or Acceptance and Close Out:	
As mentioned in the PDD, the baseline and monitoring methodology study was completed on 1st April, 2009.	
Acceptance and Close out by Lead Assessor: CL 17 is closed	Date: 27/07/2009

Date:	13/06/2009		Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CL	Number:	18		Reference:	E.1.4.
Lead Assessor Comment:				Date: 13/06/2009		
Please provide an elaborative description on summary of the comments received in the stakeholder process undertaken for the proposed CDM project activity.						
Project Participant Response:				Date: 10/07/2009		
Comprehensive documentation of the stakeholder events, participants, comments and actions has been provided to the validator in attachment 12.						
Documentation Provided by Project Participant:						
attachment 12 (Public hearing report)						
Information Verified by Lead Assessor:						
The documents provided on Local stakeholder consultation process held in the cities of Paju and Gumi						
Reasoning for not Acceptance or Acceptance and Close Out:						
The project participant has provided the information on the date of local stakeholder consultation and comments received, however the same does not reflect in the PDD. Please clarify.						
Acceptance and Close out by Lead Assessor:				Date: 27/07/2009		
CL 18 is open						
Project Participant Response:				Date: 07/08/2009		
PDD has been revised to include list of comments and actions taken.						
Documentation Provided by Project Participant:						
Revised PDD						
Information Verified by Lead Assessor:						
The documents provided on Local stakeholder consultation process held in the cities of Paju and Gumi						
Reasoning for not Acceptance or Acceptance and Close Out:						
The list of comments received have been included in the PDD.						
Acceptance and Close out by Lead Assessor: CL 18 is closed					Date: 18/08/2009	

Date:	30/07/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	FAR	Number:	19	Reference:	LAC
Lead Assessor Comment:			Date: 29/07/2009		

To meet the applicability criteria's of the methodology AM 0078 version 01.1, the PP is requested to provide the documents and clarify the issues mentioned below:

- (a) Criteria 2. The total flow capacity figures of the abatement device and maximum SF6 entering the abatement system is not reflected in the PDD. Please further justify the applicability criteria 2.
- (b) Criteria 3. Please provide the documents/references (English translated) on the existing laws and regulations on SF6 destruction/decomposition/recycle/substitution in South Korea. Also further justify the applicability criteria 3 in the PDD
- (c) Criteria 5. Please further justification is required in the PDD on why the concentration of SF6 is decreasing between the point A and B in the flow diagram (Attachment 2.4 provided)
- (d) Criteria 6. As per the flow diagram provided the I.D of the stack is 0.6 m, however in the PDD the I.D is mentioned as 0.35 m. Please clarify and justify Criteria 6 in the PDD.
- (e) Criteria 8. Further justification and assurance is required from the PP that the SF6 will not be stored temporarily.
- (f) Explanation on Applicability Criteria 9 is missing in the PDD. Please justify.
- (g) Please further justify in the PDD that the project activity complies with the applicability conditions of the tools referred.

Project Participant Response:
Date: 07/08/2009

- (a) Relevant explanation was inserted in the revised PDD
- (b) The translated version was provided to DOE. Please refer to New-attachment 9.1 and 9.2. And further justification was inserted in the revised PDD.
- (c) The reason is that some process air (approximately 3NCMM) is injected during pre-treatment process. Flow rate is increased by newly injected air so it causes decrease of SF6 concentration. The purpose of inject air is insulation. (sealing air) This is why inlet FTIR and QMS are installed after the pre-treatment device.
- (d) According to applicability specified in EPA method, both of diameters of inlet and outlet pipe should be greater than 0.3m. According to the technical drawing, Inlet pipe ID(Ain) is 0.35m and outlet pipe ID(Aout) is 0.6m. Please check the PDD again.
- (e) Temporary storage of SF6 is technically impossible. The abatement system will be installed as "in-line". The system will be directly connected to process chamber and there is no bypath except the line connected to the existing acid scrubber which will be used only for emergency and existing scrubber does not have any storage tank. Furthermore, several blowers will be installed to push SF6 to the system. Most importantly, maintaining constant pressure is very critical for LCD manufacturing, therefore, if SF6 is stored, it will cause huge damage to LCD manufacturing system.
- (f) Added to the revised PDD.
- (g) Added to the revised PDD.

Documentation Provided by Project Participant:

New attachment 9.1, 9.2 and revised PDD

Information Verified by Lead Assessor:

Explanation to justify the applicability criteria's

Reasoning for not Acceptance or Acceptance and Close Out:

The PP has included necessary explanation to justify the applicability criteria's of the methodology AM 0078 version 01.1 in the PDD. This is acceptable.

Notices and clearances obtained from Korean Gas Safety Corporation (letter dated 04/11/2009) and Korean Occupational Safety Health Association (ref. no: PSM 2009 1110 and ref. no: 110637) have been checked and found OK.

- The usage and supply of SF6 from exhaust of dry etching process should be verified during the 1st verification. FAR#01(a) is raised.
- 'No temporarily storage of SF6' should be verified during the 1st verification. FAR#01(b) is raised.
- The capacity of the abatement system other than plant P6 will be checked during first verification. Hence, FAR#01(c) is raised.

Acceptance and Close out by Lead Assessor:
FAR#019(a), FAR#019(b) and FAR#019 (c) are raised
Date: 02/12/2009

Date:	30/07/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain
Type:	CAR	Number:	20
		Reference:	LAC

Lead Assessor Comment:	Date: 30/07/2009
Please provide the Letter of Approval(s) issued by the relevant DNA.	
Project Participant Response:	Date: 07/08/2009
To apply for the approval of Korean DNA, a draft validation report is required. This will be submitted later.	
LG 02/12/2009: The letter of approval obtained from South Korean DNA and UK DNA are submitted to SGS.	
Documentation Provided by Project Participant:	
Letter of approval(s) obtained from South Korean DNA and UK DNA	
Information Verified by Lead Assessor:	
Requirements of VVM version 01 in the letter of approval.	
Reasoning for not Acceptance or Acceptance and Close Out:	
The letter of approval dated 02 nd December, 2009 obtained from South Korea DNA by the project participants (LG International and LG Display) and LoA dated 29 th October, 2009 obtained from UK DNA, have been submitted by the project participants. These have been verified as per the requirement of VVM version 01 and found OK. Hence CAR 20 is closed.	
Acceptance and Close out by Lead Assessor: CAR 20 is closed	Date: 03/12/2009

Date:	30/07/2009	Raised by:	Nikunj Agarwal/ Mayank Kumar Jain		
Type:	CAR	Number:	21	Reference:	LAC
Lead Assessor Comment:				Date: 30/07/2009	
As per attachment 26.2 provided by the PP, the sustainable development is defined under 3 criteria's namely, Environmental, Social, Technology Transfer & Economic effect. However the explanation on project activities contribution to sustainable development is missing in the PDD. Please clarify					
Project Participant Response:				Date: 07/08/2009	
A summary of the project's sustainability benefits has been added to Section A.2 of the PDD as per the EB Guidance.					
Documentation Provided by Project Participant:					
Revised PDD					
Information Verified by Lead Assessor:					
Explanation on sustainable development criteria in the PDD.					
Reasoning for not Acceptance or Acceptance and Close Out:					
The PP has provided a profound description on sustainable development criteria in the PDD. This is acceptable. However, this has to be further verified through Host Country Approval.					
SGS 03/12/2009: The Host Country Approval dated 02 nd December, 2009 confirms that the project activity contributes to sustainable development. Hence CAR21 is closed.					
Acceptance and Close out by Lead Assessor: CAR 21 is closed.				Date: 03/12/2009	

Date:	30/07/2009		Raised by:	Nikunj Agarwal/ Mayank Kumar Jain	
Type:	CL	Number:	22	Reference:	LAC
Lead Assessor Comment:				Date: 30/07/2009	
Please provide a copy of the document justifying that EIA is not required for SF6 abatement project in South Korea.					
Project Participant Response:				Date: 07/08/2009	
Relevant document was provided to DOE. Please refer to New attachment 12.1 and 12.2					
Documentation Provided by Project Participant:					
New-attachment 12.1 and 12.2					
Information Verified by Lead Assessor:					
Documents on EIA act in South Korea.					
Reasoning for not Acceptance or Acceptance and Close Out:					
The project activity does not fall in the list of projects that require EIA. This has been verified from the documents on host country EIA act.					
Acceptance and Close out by Lead Assessor: CL 22 is closed				Date: 20/08/2009	

A.4 Annex 4: Team Members Statements of Competency

Statement of Competence

Name: **Sharma, Kunal** SGS Affiliate: **SGS India**

Status

- Lead Assessor	<input checked="" type="checkbox"/>	- Expert	<input checked="" type="checkbox"/>
- Assessor	<input checked="" type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input checked="" type="checkbox"/>	- Technical Reviewer	<input type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
2. Energy Distribution	<input type="checkbox"/>
<i>Sub scope(s):</i>	
3. Energy Demand	<input type="checkbox"/>
<i>Sub scope(s):</i>	
4. Manufacturing	<input checked="" type="checkbox"/>
<i>Sub scope(s): Lime Production and Use</i>	
5. Chemical Industry	<input type="checkbox"/>
<i>Sub scope(s):</i>	
6. Construction	<input type="checkbox"/>
<i>Sub scope(s):</i>	
7. Transport	<input type="checkbox"/>
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
9. Metal Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
<i>Sub scope(s):</i>	
12. Solvent Use	<input type="checkbox"/>
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	<input checked="" type="checkbox"/>
<i>Sub scope(s): Wastewater and sludge treatment</i>	
14. Afforestation and Reforestation	<input type="checkbox"/>
<i>Sub scope(s):</i>	
15. Agriculture	<input type="checkbox"/>
<i>Sub scope(s):</i>	

Approved Member of Staff by: **Siddharth Yadav** Date: **28/10/2009**

Statement of Competence

Name: Nikunj Agarwal

SGS Affiliate: SGS India Pvt. Ltd.

Status

- | | | |
|---------------------------|-------------------------------------|--------------------------|
| - Product Co-ordinator | <input checked="" type="checkbox"/> | |
| - Operations Co-ordinator | | <input type="checkbox"/> |
| - Technical Reviewer | <input type="checkbox"/> | |
| - Expert | <input checked="" type="checkbox"/> | |

Validation

Verification

- | | | |
|---------------------------------------|-------------------------------------|-------------------------------------|
| - Local Assessor | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| - Lead Assessor | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| - Assessor
/ Trainee Lead Assessor | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Scopes of Expertise

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Energy Industries (renewable / non-renewable) | <input checked="" type="checkbox"/> | |
| 2. Energy Distribution | <input checked="" type="checkbox"/> | |
| 3. Energy Demand | <input checked="" type="checkbox"/> | |
| 4. Manufacturing | <input checked="" type="checkbox"/> | |
| 5. Chemical Industry | <input type="checkbox"/> | |
| 6. Construction | <input type="checkbox"/> | |
| 7. Transport | <input type="checkbox"/> | |
| 8. Mining/Mineral Production | <input type="checkbox"/> | |
| 9. Metal Production | <input type="checkbox"/> | |
| 10. Fugitive Emissions from Fuels (solid,oil and gas) | | <input type="checkbox"/> |
| 11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride | | <input type="checkbox"/> |
| 12. Solvent Use | <input type="checkbox"/> | |
| 13. Waste Handling and Disposal | <input type="checkbox"/> | |
| 14. Afforestation and Reforestation | <input type="checkbox"/> | |
| 15. Agriculture | <input type="checkbox"/> | |

Approved Member of Staff by Sanjeev Kumar & Siddharth Yadav

Date: 16/04/2009

** Nikunj was the previous Lead Assessor for this project

Statement of Competence

Name: Jain, Mayank SGS Affiliate: SGS India

Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input type="checkbox"/>
- Assessor	<input checked="" type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input checked="" type="checkbox"/>	- Technical Reviewer	<input type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
2. Energy Distribution	<input type="checkbox"/>
<i>Sub scope(s):</i>	
3. Energy Demand	<input type="checkbox"/>
<i>Sub scope(s):</i>	
4. Manufacturing	<input type="checkbox"/>
<i>Sub scope(s):</i>	
5. Chemical Industry	<input type="checkbox"/>
<i>Sub scope(s):</i>	
6. Construction	<input type="checkbox"/>
<i>Sub scope(s):</i>	
7. Transport	<input type="checkbox"/>
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
9. Metal Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
<i>Sub scope(s):</i>	
12. Solvent Use	<input type="checkbox"/>
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	<input type="checkbox"/>
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	<input type="checkbox"/>
<i>Sub scope(s):</i>	
15. Agriculture	<input type="checkbox"/>
<i>Sub scope(s):</i>	

Approved Member of Staff by: Siddharth Yadav Date: 19/10/2009

Statement of Competence

Name: Mahawar, Abhishek SGS Affiliate: SGS India

Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input type="checkbox"/>
- Assessor	<input checked="" type="checkbox"/>	- Financial Expert	<input checked="" type="checkbox"/>
- Local Assessor	<input checked="" type="checkbox"/>	- Technical Reviewer	<input type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
2. Energy Distribution	<input type="checkbox"/>
<i>Sub scope(s):</i>	
3. Energy Demand	<input type="checkbox"/>
<i>Sub scope(s):</i>	
4. Manufacturing	<input type="checkbox"/>
<i>Sub scope(s):</i>	
5. Chemical Industry	<input type="checkbox"/>
<i>Sub scope(s):</i>	
6. Construction	<input type="checkbox"/>
<i>Sub scope(s):</i>	
7. Transport	<input type="checkbox"/>
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
9. Metal Production	<input type="checkbox"/>
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
<i>Sub scope(s):</i>	
12. Solvent Use	<input type="checkbox"/>
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	<input type="checkbox"/>
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	<input type="checkbox"/>
<i>Sub scope(s):</i>	
15. Agriculture	<input type="checkbox"/>
<i>Sub scope(s):</i>	

Approved Member of Staff by: Siddharth Yadav Date: 12 November 2009

Statement of Competence

Name: **Kumar, Senthil** SGS Affiliate: **SGS India**

Status

- Lead Assessor	x	- Expert	x
- Assessor	x	- Financial Expert	
- Local Assessor	India	- Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	x
<i>Sub scope(s): Combined heat and Power & Waste Heat and Biomass based Thermal/ Electricity Utilization</i>	
2. Energy Distribution	
<i>Sub scope(s):</i>	
3. Energy Demand	
<i>Sub scope(s):</i>	
4. Manufacturing	
<i>Sub scope(s):</i>	
5. Chemical Industry	
<i>Sub scope(s):</i>	
6. Construction	
<i>Sub scope(s):</i>	
7. Transport	
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	
<i>Sub scope(s):</i>	
9. Metal Production	
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	x
<i>Sub scope(s): Emissions from production of other fluorinated compounds</i>	
12. Solvent Use	
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	
<i>Sub scope(s):</i>	
15. Agriculture	
<i>Sub scope(s):</i>	

Approved Member of Staff by: **Siddharth Yadav** Date: **13 January 2010**

Statement of Competence

Name: Kim, KyungHoon. SGS Affiliate: SGS Korea

Status

- Lead Assessor		- Expert	
- Assessor	x	- Financial Expert	
- Local Assessor	Republic of Korea	- Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	
<i>Sub scope(s):</i>	
2. Energy Distribution	
<i>Sub scope(s):</i>	
3. Energy Demand	
<i>Sub scope(s):</i>	
4. Manufacturing	x
<i>Sub scope(s): Cement Manufacture</i>	
5. Chemical Industry	
<i>Sub scope(s):</i>	
6. Construction	
<i>Sub scope(s):</i>	
7. Transport	
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	
<i>Sub scope(s):</i>	
9. Metal Production	
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	
<i>Sub scope(s):</i>	
12. Solvent Use	
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	
<i>Sub scope(s):</i>	
15. Agriculture	
<i>Sub scope(s):</i>	

Approved Member of Staff by: Siddharth Yadav Date: 20/01/2010