



VALIDATION REPORT

GIMCHEON PV POWER PLANT SITE 1
CDM PROJECT

REPORT No. 2009-02

REVISION No. 01

KOREAN FOUNDATION FOR QUALITY



VALIDATION REPORT

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Client: Gimcheon Enervix Co., Ltd.	Client ref.: Jung-Young Lee	

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Summary:

Project Title : Gimcheon PV Power Plant Site 1 CDM Project
Investor Country : -
Host Country : Republic of Korea
Project Participants : Gimcheon Enervix Co., Ltd.
Applied Methodology(ver) : AMS-I.D (ver.13)
Technology/Measure to be employed : 9.1 MW photovoltaic power
Crediting Period : 10 years
Estimated ER : 8,197 ton per year
Project Size : 9.1 MW
Validation Report Status
☐ CAR/CL Requested
☐ Resolution of Outstanding issues
☐ Before DNA approval
☒ Full approval and submission for registration

As the result of the validation, it can be confirmed that Gimcheon PV Power Plant Site 1 CDM Project, as described in the revised PDD of 5 June 2009 (Ver.05), meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the simplified baselines and monitoring methodology AMS-I.D (Ver. 13). KFQ thus requests the registration of the project as a CDM project activity.

Work carried out by :

Yu Shim JEONG (Audit team leader, GHG auditor)
 Ji Young SONG (Audit team member, GHG auditor)
 Pyung Hee JANG (Audit team member, Observer)

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide Equivalent
DNA	Designated National Authority
GHG	Greenhouse gas(es)
KEPCO	Korea Electric Power Company
KFQ	Korean Foundation for Quality
MoV	Means of verification
MP	Monitoring Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change

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1 INTRODUCTION

Korean Foundation for Quality (KFQ) has engaged by ‘Gimcheon Enervix Co., Ltd.’ to perform a validation of the ‘Gimcheon PV Power Plant Site 1 CDM Project’. This validation report summarizes the findings of the validation of the project, performed on the basis of UNFCCC and host party’s criteria for CDM project, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the small-scale CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

All the validation team’s conclusion and opinion on this project activity are made the PDD of version 05, 5 June 2009, as a basis. Final PDD has followed the structure and guidance in the latest relevant PDD template (CDM-SSC-PDD, Ver. 03) and the ‘Guidelines for Completing the simplified Project Design Document (CDM-SSC-PDD) and the Form for Proposed New Small Scale Methodologies (CDM-SSC-NM) (Ver. 05) for Small Scale CDM project.

The Project is classified with sectoral scope 1- Energy Industries (Renewable Electricity: Generation for a grid) and the project site is located in San 85, Okgye-ri, Eomo-myeon, Gimcheon City, Gyeongsangbuk-Do, Korea. The Project consist of 35,809 modules are installed which has a capacity of 9.1 MW generating annual average 13,324 MWh for the 10-year credit period.

The expected CO₂ reduction is estimated to be 8,197 ton CO₂e per year and 81,969 ton CO₂ over the 10 year crediting period.

1.1 Objective

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 countries 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 a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD), the project’s baseline study, monitoring plan and other relevant documents.

The information in these documents is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed on the Marrakech Accords and the relevant decisions by the CDM Executive Board including the approved baseline and monitoring methodology. KFQ has, based on the Validation and Verification Manual 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.

1.3 Validation Team

The validation team consisted as follows:

Yu Shim JEONG (Audit team leader, GHG auditor)

Ji Young SONG (Audit team member, GHG auditor)

Pyung Hee JANG (Audit team member, Observer)

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

2 METHODOLOGY

The validation consists of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III The resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol for CDM project was customized for the project, according to the Validation and Verification Manual. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1. The completed validation protocol for the Gimcheon PV Power Plant Site 1 CDM Project is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective Action Requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) validation protocol requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification (CL) is issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

The validation team has assessed the proposed CAR with a positive result and after the closure of these CAR and CL the proponent has issued the final version of the PDD. On the basis of this the final validation report and opinion were issued.

Validation Protocol Table 1: Mandatory Requirements for Clean Development Mechanism Project Activity			
Requirement	Reference	Conclusion	Cross reference/Comment
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.</i>	<i>Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.</i>

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in five different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>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.</i>	<i>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.</i>	<i>This is either acceptable based on evidence provided (OK), 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.</i>

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation conclusion
<i>If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.</i>	<i>The responses given by the Client or other project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1 Validation Protocol Tables

2.1 Desk review of the Documents

The Project Design Document (PDD) version 01 was submitted 7 November, 2008 and reviewed with additional background documents related to the project design including baseline and additionality of the project.

A complete list of all documents and proofs reviewed is attached as 6. References to this report.

Furthermore, main changes between the versions published for the 30 days stakeholders commenting period and the final version submitted for registration:

- Changes related to the CARs and CLs described in the KFQ's final validation report.

2.2 Follow-up Interviews with Project Stakeholders

In the period of 24 November 2008 to 25 November 2008, KFQ performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed Persons/Entities	Interview topics
Korean Teachers' Credit Union - Mr. Young Hag You - Mr. Ji Woong Ha	<ul style="list-style-type: none"> ➤ Project design ➤ Sustainable development issues ➤ Environmental impacts and issues ➤ Stakeholder consultation process ➤ Sustainable Development Issues ➤ Additionality ➤ Crediting period ➤ Estimated emission reductions
Samsung Everland Inc. - Mr. Young Choon Lee - Ms. A Ra Cho	<ul style="list-style-type: none"> ➤ Monitoring Plan ➤ Project Design ➤ Project operation & maintenance.
Gimcheon municipal office -Mr. Cheol Soo Kim	<ul style="list-style-type: none"> ➤ Environmental issues ➤ Stakeholder comments ➤ Sustainable development issues
Eomo-myeon Country Office - Mr. Duck Soo Lim	<ul style="list-style-type: none"> ➤ Environmental issues ➤ Stakeholder comments ➤ Sustainable development issues
Village chief - Mr. Ho Sung Cha	<ul style="list-style-type: none"> ➤ Environmental issues ➤ Stakeholder comments ➤ Sustainable development issues

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve any outstanding issues which need to be clarified prior to KFQ's positive conclusion on the project design. In order to guarantee the transparency of the validation process, the concerns raised by KFQ and responses provided by project participant are documented in Table 3 of the validation protocol in Appendix A.

For this project, Six (6) Corrective Action Requests (CAR) and Seven (7) requests for Clarification (CL) were identified. These requests were presented to the project participant in a CAR/CL report in 2 December, 2008. The additional information provided by the project participant to address theses requests and revised PDD of 5 June 2009 (Ver. 05) resolved the all Corrective Action Request and requests for Clarification to KFQ's entire satisfaction.

2.4 Internal Quality Control

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

3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

3.1 Participation Requirements

The project's host Party is Korea. Korea has ratified the Kyoto Protocol and meets all participation requirements. The DNA of Republic of Korea has established clear CDM approval procedures, which include a thorough assessment of the project's capacity to reduce GHG emission, its alignment with each party's national law, its environmental legislation and its sustainable development policies and approval of projects participants in the project activity.

The project participants are 'Gimcheon Enervix Co., Ltd.' as the project owner from the host Party, the Republic of Korea ('Korea').

The Letter of Approval (LoA) from Republic of Korea was obtained on 29 May 2009. The LoA confirms the project's contribution to sustainable development of Korea.

Validation team has checked the consistency of project participant's information in section A.3 and Annex 1 of the PDD and DNA approval letter.

Nevertheless, CAR 1 had to be raised in the course of the validation and was successfully closed (ref Annex: Validation Protocol- Table 3).

3.2 Project Design

The Gimcheon PV Power Plant Site 1 CDM Project is located in San 85, Okgye-ri, Eomo-myeon, Gimcheon City, Gyeongsangbuk-Do, Korea. The Project consist of 35,809 modules are installed which is capacity of 9.1 MW and is expected to supply 13,324 MWh to the KEPCO annually during the 10 year credit period (13,028 MWh annually during the 20 year operation period).

The purpose of the project is to meet the growing electricity demand in KEPCO by the generation of zero carbon emission electricity utilizing renewable photovoltaic resources. As the regional grid provide a coal based power generation, the project activity will result in an annual average of estimated emission reductions of 8,197 t CO₂e over the 10 year crediting period.

The project qualifies as a small-scale CDM project activity according to category I.D (less than 15 MW generation capacity) as defined in the simplified modalities for small-scale CDM project activities.

In the course of validation, the validation team checked on debundling requirement, 'Determining the occurrence of debundling', and the validation team found another CDM project (PP: Samsung Everland Inc.) which is within 1 km from the proposed project site with same technology. This another project * is also under validation by KFQ.

Project participant of another CDM project is 'Samsung Everland Inc.' Project participant of proposed project is 'Gimcheon Enervix Co., Ltd.' which shareholders are Korean teachers' Credit Union, Samsung Everland and Poscon. The big shareholder is Korean Teachers' Credit Union which has whole authority of decision making for the proposed project. As Samsung Everland, the PP of another project, is also involved as one of 3 shareholders and was subcontracted as operating company (taking in charge of CDM PDD writing as well), of the proposed project, the validation team investigated further documents regarding to legal entity, structure of decision making/ shareholder, project financing and EIA report. And KFQ got to know that development, design and implementation on these two projects have been conducted separately by different PP. On the basis of these two projects' legal and contract documents, and our thorough investigation, KFQ confirmed that 1 criteria (With the same project participants) among 4 criterion is not meet for concluding debundling.

Thus, the validation team made a conclusion the project activity is not a debundled component of a larger project activity as we could not say the PPs of these two projects are same.

All the descriptions of the project as contained in the PDD were identified through objective evidence such as information in the website of photovoltaic module provider, SunPower, Suntech and S-Energy, report of Environmental Impact Assessment and documents of permission of this project activity.

The starting date of the project is 3 March 2008 which is the date of Main equipment purchase contract with SunPower, Suntech and S-Energy. KFQ confirmed after reviewing documents below that this starting date is the earliest date at which either the implementation or construction or real action of a project activity begins.

* These two project sites are located in Guimcheon PV Power Generation Industrial Complex.

- Main equipment purchase contract: 3 March 2008
- Permission of electricity generation: 31 March 2008
- Construction contract: 17 July 2008

Expected operational lifetime of the project activity is 20 years and a fixed crediting period of 10 years has been chosen for the project, starting from 1 August, 2009 or the date of CDM registration, whichever takes place latter.

The funding for the project does not lead to a diversion of official development assistance as according to the information obtained by the validation team. Financing of this project activity was made by Equity from 3 shareholders, Korean teachers' Credit Union, Samsung Everland and Poscon, and PF loan from Samsung Life Insurance, Hyundai Insurance, Dongbu Insurance.

Nevertheless, CL 1, CL 2 and CL 6 had to be raised in the course of the validation and were successfully closed (ref Annex: Validation Protocol- Table 3).

3.3 Baseline Determination

The 'Gimcheon PV Power Plant Site 1 CDM Project' applies the approved consolidated baseline methodology AMS-I.D "Grid connected renewable electricity generation (Ver.13). The methodology is applicable to the project as the project activity is a grid-connected renewable power generation project activity that involves electricity capacity additions.

The applied baseline methodology is justified as it has been demonstrated that the 'Gimcheon PV Power Plant Site 1 CDM Project' ensures that:

- It is grid connected zero emission renewable power generation activity from solar energy as this project activity is operating through photovoltaic source and generated electricity is delivered to Korean Electricity System. Latter facts are identified by Ministry of Knowledge Economy (MKE) approval of electricity work.
- The project does not involve switching from fossil fuel to renewable energy at the project site as this proposed project activity is Greenfield project activity.
- The geographical and system boundaries for the relevant electricity grid are clearly defined and information on the characteristics is available.

: According to AMS I. D. (Version 13), the spatial extent of the project boundary includes the project site and is physically connected to the electricity system of Korea Electricity system of Korea Electric Power Corporation (KEPCO). The defined project boundary is in line with AMS-I. D. Data and information on the KEPCO are available by the KEPCO Statistics of Electric Power in Korea.

KFQ confirmed that the project activity can apply the approved consolidated baseline methodology AMS-I.D through reviewing documents such as permission of electricity

generation and approval of grid connection etc. and visiting physical site.

Thus, electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculated latter.

For calculation of Operating Margin, dispatch data analysis should be first choice according to AMS I. D. currently. But dispatch data analysis cannot be used because of data availability. Therefore simple OM method is chosen. The choice for simple OM is justified since low-cost/ Must-run resources constitute 41.6% which is less than 50% of the total grid generation in average of the five most recent years (2003~2007).

To calculate the Build Margin emission, there are two different options to choose. Based on forecast for the electricity composition in the source energy, in base on fossil fuel, the capacity is expected not to fluctuate during the crediting period. From this consideration, option I, calculate the Build Margin emission factor ex-ante based on the most recent information available on plants for sample group m at the time of PDD submission, is selected for this project. For sample group m, the power plant capacity additions in the electricity system that comprise 20% of the system generation(in MWh) and that is selected since this group has larger annual generation(20.19%) than five plants that have been built recently (0.34%).

According to AMS- I. D. version 13, the default of W_{OM} and W_{BM} are applied in CM calculation as follows, W_{OM} : 0.75 and W_{BM} : 0.25. The Combined Margin is fixed ex-ante for the entire crediting period and thus, this emission factor will not need to be monitored.

Validation team has confirmed that the application, discussion and determination of the chosen baseline methodology are transparent and reasonable. And that baseline for this project activity is reasonably determined by the key assumption, calculations and rationales used in the PDD through checking the documents and sources referred to in the PDD.

Nevertheless, CAR 4 had to be raised in the course of the validation and was successfully closed (ref Annex: Validation Protocol- Table 3).

3.4 Additionality

The starting date of project activity is 3 March 2008 (date of main equipment purchase agreement) and it is the earliest date of implementation, construction and real action as PP has committed to expenditure related to the implementation or related to the constriction of the project activity.

The proofs for the prior consideration of applying for CDM to support project activity have been demonstrated by the project participants and verified by KFQ. In line with the guidance of EB 41 Annex 46 paragraph 5(a), further evidences requested from the project participants were evaluated by KFQ. A summary of these evidences is provided in the following paragraphs.

The consideration of CDM benefits prior to the starting date of the project activity has been found in approval letter by Korean Teachers' Credit Union which is the big shareholder of Gimcheon Enervix Co. Ltd. and has whole authority of decision making for the proposed project.

- On 15 January 2008, Korean teachers' Credit Union approved investment in and promotion of this project on condition of CDM after reviewing 'Report of PV Power Plant project plan' which is included analysis result for the revenue from this project with CDM, and a plan for establishment of new company, Gimcheon Enervix Co., Ltd
- Before this decision, a developer and consultancy, Samsung Everland Inc., reported the project promotion plan, 'Report of PV Power Plant project plan', to the major investor, The Korean Teachers' Credit Union. After decision making on 15 January 2008, the project participant, Gimcheon Enervix Co., Ltd. incorporated on 18 January 2008.

Finally the validation team could reach to the conclusion that the incentive from CDM was seriously considered in the course of decision to proceed the project activity prior to starting date.

To proceed with the application, Gimcheon Enervix Co. ordered feasibility study service to Korea Ratings Corporation for receiving loan on 15 February 2008. After this event, PP made a contract for main equipment purchase on 3 March 2008 which has been set as starting date of project. At the same month, PP got a Permission of electricity generation by Ministry of Knowledge and Economy on 31 March 2008. After the event, PP signed Indicated Term sheet on 17 May 2008. In June 2008, Environment Impact Assessment report was completed and submitted to Gyeongsangbuk-Do (Provincial government), and about one month later, PP got a Permission of solar plant construction by Gyeongsangbuk-Do (Provincial government) on 17 July and also construction contract was agreed on 17 July 2008. On August 2008, PP made agreement of subordinated capital loan and signed shareholder agreement and agreement of site operation on 27 August, and PDD writing was addressed by Samsung Everland Inc. in August 2008 under O&M contract. After one month, PP got a Permission released to grid company (KPX) on 24 September 2008, and Certification of installation by Korea Energy Management Corporation on 29 September 2008. And also signed insurances. On October, the PP made a validation contract with KFQ on 27 October 2008. and construction of PV power plant was completed on 30 October 2008. On 30 January 2009, construction work was completed and, the PP obtained LoA form Korea DNA on 29 May 2009.

Thus, KFQ confirmed that the project participant was aware of the CDM prior to the starting date of the project, and that the benefits of the CDM were as decisive factor in the decision to proceed with the project activity. Also the project participant have demonstrated through evidences and official documents that any real and continued actions were undertaken to secure CDM status in parallel with the implementation of the project.

The additionality of the project has been demonstrated by the existence of an investment barrier. The project's financial viability evaluation is based on the NPV. According to the 'Tool for the demonstration and assessment of additionality (version 05.2)', 6.7% was selected as discount rate. This discount rate is decided based on average 10-year government bond rate +150 bps. Average 10-year government bond rate for 3 years (2005~2007) was 5.15%. KFQ examined the 'Indicative Term Sheet' regarding to the proposed project, and average 10-year government bond rate for 3 years through public authority, Bank of Korea; Economic Statistics System, and average of the bond rate was 5.15%, and KFQ also checked pbs (added interest rate), and got to know it is generally applied 60bps~160bps in financial market in Republic of Korea. Thus KFQ confirmed the selected discount rate is reasonable and appropriate for this project.

As for Input values for investment analysis, the validation team reviewed following documents;

- GSP PDD, and IAR (Investment Analysis Report)
- 'Report of PV Power Plant project plan (hereinafter 'Project plan')' that was reported to Korean Teachers' Credit Union and investment decision was formally taken based on this report.

Input vales in these documents are slightly different. Thus, KFQ had to assess various values from these documents thoroughly and also crosscheck other similar projects to conclude its validity and appropriateness at the time of investment decision.

① Capacity of the project activity: 9.1 MW

The validation team confirmed grid connection document (Permission released by KPX on 24 September 2008) by physical on-site assessment.

② Electricity generation: 13,028 MWh/yr (Load Factor: 16.35 %)

Average electricity generation is expected approximately 13,028 MWh/yr. In estimation of electricity generation, expected annual capacity factor, 16.35% (Max. 16.97%, Min. 15.52%) is applied and this load factor was analyzed by considering module and system loss, total utility factor diminution and etc. for the operational life time (20 yrs) by 3rd party.(For reference, expected annual electricity generation for the 10 yrs crediting period is 13,324 MWh which is different as above figure as load factor is different every year).

Validation team checked the electricity generation in the GSP PDD (annual average of electricity generation and load factor for 20 years of operational life time is 13,307 MWh and 16.35%) and in the 'Project plan (annual average of electricity generation and load factor for 15 years of operational life time is 13,368 MWh and 15.26%), and found that this different was caused due to different operational lifetime and starting date of crediting period.

15 yrs operational life time is applied in 'Project Plan' and 20 yrs in the GSP PDD. The change of starting date of crediting period affects electricity generation as load factor is different every year. KFQ confirmed this application is reasonable based on our examination

- As for the operational lifetime : Refer to the below ⑥.
- As for the load factor : similar PV projects in Korea which are registered as CDM project and it shows that range of load factor of them is 13.5%~17.5% and found that selected load factor for this project, 16.35% is within this range.

In summary, PP selected 16.35% and 13,028MWh for investment analysis and validation team concluded that these figures are valid and applicable in a conservative manner even at the time of investment decision.

③ Investment cost (KRW 59,914 million (KRW 6,584 million/MW))

KRW 75,072 million, KRW 8,249 million/MW is applied in GSP PDD and Investment Analysis Report as Investment cost. The value is smaller than the value 6,584 million/MW from 'Report of PV Power Plant project plan' dated on 10 January 2008. KFQ have found these values are valid by crosschecking with other similar projects. Which shows investment in PV projects is KRW 5,100/MW~KRW 8,500 million/MW in Korea. In addition, according to 'Notification for the investment unit cost of renewable energy in 2007' noticed by Korea Energy Management Corporation), unit investment cost for PV power plant is KRW 9,550 million/MW (fixed type) and KRW 11,698/MW (Tracking type).

However, the validation team concluded this investment cost (KRW 59,914 million (KRW 6,584 million/MW) from 'Report of PV Power Plant project plan' is more appropriate for the project activity with a conservative view.

④ O&M cost (KRW 582 millions)

The value in GSP PDD (KRW 782 million) is smaller than the value in 'Project plan' (KRW 964.5 million). KFQ assessed validity of these values by crosschecking with other similar projects and comparing O&M Cost with references provided by 3rd party institution. O&M cost portion of other similar projects show less than 1.0% of the investment cost in Korea. The references * of 3rd party expertise institute and public authorized organizations are also shown annual O&M cost of PV power plant is approximately 1.0% of total investment cost. We

* 1) 'Economic analysis for PV power generation system' - Korea Energy Economic Institute in May 2007.

2) 'Study Report for new & renewable energy FIT (Feed-In Tariff) improvement and RPS connection plan' -Ministry of Knowledge Economy on 31 March, 2006

found that 1.6 %, 1.4% of total investment are in ‘Project plan’ and in GSP PDD respectively. Additionally, the validation team examined more documents such as maintenance expense, labour cost, indirect cost, insurance fee and general expense and rental for land one by one for the project activity.

We found that O&M Cost in ‘Report of PV Power Plant project plan’ is overestimated as compared to other similar projects and the references in Korea.

Hence, PP adjusted again O&M cost (KRW 582 millions, 0.97% of the investment cost) to more reasonable value after acknowledging overestimation at the time of decision

Thus, in a conservative view, KFQ concluded that O&M cost (KRW 582 million, 0.97% of investment cost) applied newly is valid and also applicable even at the time of investment decision.

⑤ Tariff (KRW 99.31/kWh for initial year and increasing every year)

PP applied the tariff in the GSP with undesirable reference and in the ‘Project plan’ with inappropriate value. Thus, to begin with, PP corrected the value.

Then KFQ have assessed tariff (KRW 99.31/kWh) for initial year by checking statistics provided by Korea Power Exchange (KPX) (<http://epsis.kpx.or.kr>). In the period, 1.1 ~ 12.31 2007 just before making decision, Tariff was KRW 85.91/kWh (KPX). Thus, considering inflation we got to conclusion PP’s higher value application, KRW 99.31/kWh is valid and appropriate in a conservative view at the time of decision timing.

It is also reasonable that electricity tariff increasing during operation lifetime based on estimation by regression analysis.

In summary, the applied tariff values are valid and appropriate at the time of investment decision.

⑥ Operational lifetime: 20 years

The PP expected operational life of the proposed project activity is 20 years in GSP PDD. Validation team checked this operational lifetime through reviewing documents such as limited warranty for PV modules. Those documents indicate lifetime of PV modules is 20 years and 25 years. The PP selected operation lifetime for 20 years in a conservative view. After examining to consider other similar project’s operational lifetime, we confirmed that it is appropriate based on our technical knowledge.

The validation team also checked all sources of the NPV calculation, as presented in B.5 in the PDD and all input values in investment analysis have been applied consistently.

KFQ therefore, is able to confirm that the input values in PP’s evaluation are valid and appropriate representing the economic situation of the project at the time of investment decision.

A sensitivity analysis has been carried out for parameter contributing more than 20% to revenues

or costs. Reasonable variations of the total investment, O&M cost, Tariff, Electricity Generation and discount rate were checked to confirm whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. It deems reasonable to use the applied method and substantial variation of these parameters have been moreover considered unlikely to occur:

KFQ reviewed the variation ranges:

- Total investment cost ($\pm 15\%$)
- O&M Cost ($\pm 10\%$)
- Tariff ($\pm 20\%$)
- Electricity Generation ($\pm 20\%$)
- Discount rate ($\pm 10\%$)

① Investment cost in this project is very dependent on exchange rate due to introducing of imported equipments from foreign companies. Thus the variation range of investment cost was assessed by considering the fluctuation of past exchange rate for past 10 years (1998~2007), and EB guidance. The validation team examined the fluctuation of past exchange rate by Korea Bank Economic Statistics System (<http://ecos.bok.or.kr/>). According to the statistics, the fluctuation range of exchange rate during last 10 years (1998~2007) was 9.9%. The EB guidance recommended that sensitivity analysis should at least cover a range of +10 and -10% unless this is not deemed appropriate in the context of the specific project circumstances. Therefore, KFQ concluded that $\pm 15\%$ of applied variation range for investment cost is suitable for the proposed project activity.

② O&M cost is strictly connected with inflation rate. Thus the variation range of O&M cost is decided by considering the fluctuation of inflation rate for past 5 years (2003~2007) in Korea. According to Bank of Korea Economic Statistics System, inflation rate was 2.16%. Thus validation team deemed more than + 10% of inflation rate is unlikely to occur. Therefore, KFQ concluded that $\pm 10\%$ of applied variation range for O&M cost is suitable for the proposed project activity.

③ As for Electricity tariff, analyzed trend of past 3 years (2005~2007) based on statistics from KPX (<http://epsis.kpx.or.kr>). Annual average of rising trend for past 3 years was 17.21%. As the tariff over 20 years operational lifetime is already applied increasingly based on estimation by regression analysis with this 3 years trend. validation team concluded that $\pm 20\%$ of variation range is reasonably enough for the proposed project.

④ The variation of electricity generation is assessed considering the fluctuation of amount of daylight during past 15 years (1992~2006). According to the statistics of Korea

Meteorological Administration (<http://www.kma.go.kr/>), fluctuation of amount of daylight is less than 4.9 %. Additionally, with comparison of other similar projects' highest load factor (17.5%), + 14% variation of the projects' load factor is considered. Thus, validation team deemed $\pm 20\%$ of rising trend for amount of daylight is unlikely to occur. We concluded the applied $\pm 20\%$ range is reasonable.

- ⑤ The variation of discount rate is assessed considering the fluctuation of 10-year government bond rate for past 5 years (2003~2007). KFQ analyzed the variation range based on Bank of Korea Economic Statistics System and annual fluctuation rate of 10-year government bond rate is less than 3.27%. Therefore, KFQ concluded that $\pm 10\%$ of applied variation range for discount rate is suitable for the proposed project activity.

KFQ confirmed that NPV of the project activity with the applied range of parameters are all lower than zero (0) even considering those circumstances which could bring various variations.

Finally, The NPV calculations were verified and found to be correct by the validation team.

In summary, KFQ checked the applied values thoroughly based on its local and sectoral expertise.

Based on KFQ's careful assessment, KFQ concluded the input values for investment analysis appear to be valid at the time of investment decision was made. And this conclusion is consistently support by Sensitivity analysis.

Based on the data in investment analysis report, the project NPV without CER revenues has been assessed to be -KRW 39,279 million which is well lower than zero (0). This shows that the project is not financially attractive in the absence of CDM benefits.

Considering of the CERs sales revenues, the NPV will be -KRW 38,398 million with 11 EURO/ t CO₂ and -KRW 38,078 million with 15 EURO/ t CO₂.

Hence, we can state that the proposed project activity is additional as it would not have happened in the absence of CDM based on the available information.

Nevertheless, CAR 2, CAR 3, CAR 6, CL 3 and CL 4 had to be raised in the course of the validation and were successfully closed (ref Annex: Validation Protocol- Table 3).

3.5 Monitoring Plan

The monitoring methodology is in line with the approved monitoring methodology, AMS-I.D 'Grid connected renewable electricity generation (Ver.13)'. The selected monitoring

methodology is applicable for the project activity as it involves grid-connected renewable power generation using wind energy.

The methodology is appropriate for the project activity because:

- There is suitable capacity for addition of electricity coming from solar energy sources
- There is sufficient and clear information given to identify the geographic and system boundaries for the relevant electricity grid in which the project activity is to be developed
- Data to calculate project emissions is obtainable

Information that needs to be monitored shall include Net electricity generation from the proposed project activity, as mentioned above, measured automatically by the established 2 meters (check the amount of electricity to grid from grid).

Electricity supplied by the project activity to the grid will be measured hourly and recorded monthly and will be cross-checked with the sales receipt which is in compliance with the methodology .

Additionally, the amount of electricity consumed in the plant will be measured by separate electricity power meter and be deducted from Electricity supplied by the project activity to the grid when calculation of emission reduction of the proposed project

The metering instruments will be calibrated every 2 years in accordance with Measure Act and Rules on Electricity Market Management and accuracy level of these meters are $\pm 0.5\%$ (departure meter) and $\pm 2.0\%$ (receive meter). Data will be kept for 2 years after the end of the crediting period.

Gimcheon Enervix Co., Ltd. has the overall authority and responsibility for the project activity. And monitoring of every parameter for the accounting of emission reduction amount and reporting will be conducted by Samsung Everland Inc. as O&M contact for operation and monitoring of the project site was made with Gimcheon Enervix Co., Ltd.. The validation team confirmed this by reviewing contract document during on-site assessment.

The PP has already made O&M contract with Samsung Everland Inc. which employed 3 staffs involved in the operation and CDM project monitoring in place. One staff concerned has been undertaking the monitoring tasks including collecting electricity data and completing records, checking and analyzing the data, archiving relevant records and reporting. The staffs completed fundamental training for operation and will be joined further training as per training plan to ensure the implementation of this monitoring plan.

Through interviewing with staffs employed and documented procedures provided by Project proponent. We confirmed that this monitoring plan is in accordance with AMS-I. D., and that the monitoring arrangements described in the PDD can be properly implemented.

Nevertheless, CAR 5 and CL 5 had to be raised in the course of the validation and were successfully closed (ref Annex: Validation Protocol- Table 3).

3.6 Calculation of GHG Emissions

According to AMS-I.D. version 13, emission reduction is calculated as following equation:

$$ER_y = BE_y - PE_y - L$$

- BE_y (t CO₂): Baseline Emission
- PE_y : Project Emissions
 - No project emissions need to be considered, as the project activity is a renewable energy project
- L : Leakage
 - According to AMS-I.D., no leakage has to be considered for the proposed project activity

Baseline emission is calculating as net electricity supplied by the project activity to the grid (EG_y in MWh) times baseline emissions factor (EF_y in ton CO₂/MWh).

First, Electricity supplied to the Korean grid by the project activity (EG_y) is expected annual average 13,324 MWh/yr for the 10-year credit period. In estimation of electricity generation, expected capacity factor, annual average 16.35% (Max. 16.97 %/ Min. 15.52%), is applied.

In relation to the capacity factor, validation team has checked the capacity factor as mentioned in section 3.4.

Validation team thus has reached to the conclusion that electricity supplied by the project activity to the grid (EG_y in MWh) is estimated reasonably and not be considered as overestimated.

Second, the baseline emissions factor (EF_y in the CO₂/MWh) is calculated through the following steps. OM (Operating Margin) and BM (Build Margin) are calculated by using the data from existing power plants that provide electricity with the current grid-connected electricity generation:

- OM is calculated to be 0.7117 ton CO₂/MWh.
- BM is calculated to be 0.3258 ton CO₂/MWh.
- CM is calculated to be 0.6152 ton CO₂/MWh and is fixed ex-ante for the entire crediting period and this emission factor which is not need to be monitored.

The 8,197 ton CO₂ (annual average for 10-year credit period) and 81,969 ton CO₂ (total for 10-year credit period) are estimated as emission reduction over the crediting period of emission.

Validation team concluded that the GHG calculation is transparent and the amount of estimated emission reduction is reasonable. Also validation team confirmed that all the assumptions and data used by PP are considered reasonable and the methodology has been applied correctly to calculate Vaseline emission and emission reduction.

Nevertheless, CAR 4 had to be raised in the course of the validation and was successfully closed (ref Annex: Validation Protocol- Table 3).

3.7 Environmental Impacts

According to ‘Enforcement Decree of the Act on Assessment of Impacts of Works on Environment, Traffic, Disaster. Etc., any plant facility whose power source is solar power, wind power of fuel cell which is more than 100,000kW and the area of land is larger than 250,000m² shall be carried out EIA. As Gimcheon PV Power Plant Site 1 CDM Project whose facility capacity is 9.1MW, however the project area of land is larger than 250,000m². Thus, The Environment Impact Assessment report for the project activity was conducted according to the law.

Environment Impact Assessment was reviewed by Gyeongsangbuk-Do (Provincial government) and construction also permission by the government on 17 July 2008 based on EIA.

The Environment Impact Assessment report covers the sectors of natural environment, residential environment, and social/economical environment. There are few facts to be considered such as influence on air, water, soil/topography, ecology and life environment. Every effort has been made to take into account and respond to all recommendations made to the EIA in the course of government approval.

As an example, the EIA report includes a recommendation from Gyeongsangbuk-Do (Provincial government) regarding the soil pollution by waste oil which is from a car in a process of construction. In order to protect soil pollution, PP prohibited changing oil of a car inside the project site. Accordingly, this issue was solved.

Through above investigation, the validation team concluded that the PP completed EIA according to the Korea law and the proposed project activity is not likely to cause significant impacts on the environment.

3.8 Comments by Local Stakeholders

To receive stakeholder’s comments related with the Gimcheon PV Power Plant Site 1 CDM Project, the PP held several project presentations to the stakeholders and newspaper report.

Summary of comments received are shown below:

- Impact to vehicle and residents around the site caused by sunlight reflection from the solar cell
- A rise in temperature by sunlight reflection

KFQ validation team has looked through the public hearing minutes and interviewed local stakeholders and has found all participants in the public hearing were agreed and supported this project activity and, look for development of local economy.

Validation team confirmed that all relevant local stakeholders have been invited to consultation via appropriate media, the summary of comments received as provided in the PDD are appropriate, and due accounts was taken properly and described in the PDD well.

Nevertheless, CL 7 had to be raised in the course of the validation and is successfully closed (ref Annex: Validation Protocol- Table 3).

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

Korean Foundation for Quality published the project documents on <http://cdm.unfccc.int/Projects/Validation> on 22 November, 2008 and invited comments within 21 December, 2008 by Parties, stakeholders and non-governmental organisations.

No comment was received.

5 VALIDATION OPINION

Korean Foundation for Quality (KFQ) has performed a validation of the ‘Gimcheon PV Power Plant Site 1 CDM Project’ in Republic of Korea. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and subsequent decision by the CDM Executive Board.

The validation is based on the information made available to us and the engagement conditions. And it has provided KFQ with sufficient evidence to determine the fulfillment of stated criteria. The validation consisted of the following 3 phases : i) a desk review of the project design, the baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the Resolution of outstanding issues and the issuance of the final validation report and opinion.

The host party, Republic of Korea, fulfils the participation criteria and have approved the project and authorized the project the participation. The DNA of KOREA has confirmed that the project will assist in achieving sustainable development.

The validation did not reveal any information that indicated that the project can be seen as a diversion of official development assistance (ODA) funding towards Republic of Korea.

By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. An analysis of the investment demonstrates that the proposed project activity 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.

Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions. Additionally the assessment team reviewed the estimation of the projected emission reductions.

We can confirm that the indicated amount of emission reductions of 81,969 ton CO₂ over a fixed crediting period of 10 years, resulting in a calculated annual average of 8,197 ton CO₂, represents a reasonable estimation using the assumptions given by the project documents.

The responsibilities and authorities of monitoring and maintenance are clearly defined and a detailed monitoring plan has been developed. There is no need to monitor the grid CO₂ emission coefficient as it is fixed ex-ante for the selected 10 years crediting period.

In our opinion, the Gimcheon PV Power Plant Site 1 CDM Project, as described in the revised PDD of 5 June 2009(version 5), meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AMS I. D. _Version 13. Thus the ‘Gimcheon PV Power Plant Site 1 CDM Project’ ‘will hence be recommended by KFQ for registration as a CDM project to UNFCCC.

6 REFERENCES

Reference No.	Documentation and/or website	Remarks
1	PDD 1: Gimcheon Enervix Co., Ltd. – Gimcheon PV Power Plant Site 1 CDM Project: 28 October 2008 (Ver.01), PDD 2: Gimcheon Enervix Co., Ltd. – Gimcheon PV Power Plant Site 1 CDM Project: 5 June 2009 (Ver.05),	
2	Sheet 1: Gimcheon Enervix Co., Ltd. -Baseline Emissions Factor Excel Sheet: 21 November 2008(Ver.01) Sheet 2: Gimcheon Enervix Co., Ltd. -Baseline Emissions Factor Excel Sheet: 24 December 2008(Ver.02)	
3	Sheet 1: Gimcheon Enervix Co., Ltd. -Investment Analysis Report Excel Sheet: 21 November 2008(Ver.01) Sheet 2: Gimcheon Enervix Co., Ltd. -Investment Analysis Report Excel Sheet: 5 June 2009(Ver.05)	
4	Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories (Ver. 12) CDM-EB, AMS-I.D_Ver.13 – Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories CDM-EB, Annex 12 , Methodological _Ver. 01.1– Tool to calculate the emission factor for an electricity system Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities CDM-EB, Annex 45 , Guidance on the Assessment of Investment Analysis (Version 02) CDM-EB, Annex 46 , Guidance on the Demonstration and Assessment of Prior consideration of the CDM Guidelines for completing the simplified project design document (CDM-SSC-PDD) and the form for proposed new small scale methodologies (CDM-SSC-NM) (Version 05) Methodological Tool: Tool for the demonstration and assessment of additionalilty (Ver. 05.2) Glossory of CDM terms (Version 04) Determining the occurrence of debundling CDM-EB, Annex 3, Clean Development Mechanism Validation and Verification Manual (Version 01)	
5	Report of PV Power Plant project plan: 10 January 2008	
6	Approval by Korean Teachers' Credit Union: 15 January 2008	
7	Business license of Gimcheon Enervix Co., Ltd.: 18 January 2008	
8	Main equipments purchase contract: 3 March, 2008	
9	Permission of electricity generation by Ministry of Knowledge Economy: 31 March, 2008	
10	Indicative Term Sheet: 17 May 2008	

11	Environment Impact Assessment Report : June, 2008	
12	Permit guarantee insurance by Seoul Guarantee Insurance Co., Ltd.: 17 July, 2008	
13	Permission of solar power plant construction by Gyeongsangbuk-do(Provincial government): 17 July, 2008	
14	Construction contract: 17 July 2008	
15	Feasibility study report by Korea Rating: July, 2008	
16	Agreement of subordinated capital loan: 27 August, 2008	
17	Shareholder agreement: 27 August, 2008	
18	O&M contract: 27 August, 2008	
19	Permission released by grid company that the generated electricity had been delivered to KPX : 24 September, 2008.	
20	Certification of installation had been approved by Korea Energy Management Corporation: 29 September 2008.	
21	Written application of weather insurance by Samsung Life Insurance Co., Ltd. : 29 September, 2008	
22	Agreement of priority capital loan : 30 September, 2008	
23	Written application of Consolidated Machinery Insurance (CMI) by Hyungdai Insurance Co., Ltd: 30 September, 2008	
24	Written application of Operational Indemnity Insurance by Hyungdai Insurance Co., Ltd: 30 September, 2008	
25	Equipment specification by Suntech, Sunpowr, S-energy	
26	Staff's training plan: 31 October, 2008	
27	Plant operation plan: 25 November, 2008	
28	Public hearing attendance list: 23 May, 2008	
29	Limited warranty for PV module for Suntech, Sunpower and S-Energy	

30	http://epsis.kpx.or.kr : Korea Power Exchange; Electricity power exchange information system	
31	http://www.kepco.co.kr/ : Korea Electric Power Corporation; Electricity generation statistics references	
32	http://www.nso.go.kr/ :Korea National Statistics Office; National statistics information	
33	http://www.ksda.or.kr/ : Korea Securities Dealers Association; Government bond rate information	
34	http://www.kma.go.kr/ : Korea Meteorological Administration; daylight statistics information	
35	http://likms.assembly.go.kr/law/jsp/main.jsp : The National Assembly of the Republic of Korea; National regulation information system	
36	http://www.koami.or.kr/ : Korea Association of Machinery Industry; Photovoltaic power generation statistics information	
37	http://www.keei.re.kr/index.html : Korea Energy Economics Institute; Information of Economic Feasibility of photovoltaic power generation	
38	“Status of photovoltaic power generation and analysis of coefficient of utilization in Korea” sourced by KPX dated in November, 2008	
39	Monthly Newsletter “analysis of investment cost for photovoltaic power in Korea” sourced by Korea Association of Machinery Industry in September, 2008	
40	Economic Feasibility of photovoltaic power generation source by Korea Energy Economy Institute on 4 May, 2007	

Appendix A

Validation protocol for Small-Scale CDM project activities

Table 1. Mandatory Requirements for Small-Scale Clean Development Mechanism(CDM) Project Activity

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art. 12. 2	OK	The project has been proposed as a unilateral project.
2. The project shall assist non-Annex 1 Parties in contributing to the ultimate objective of UNFCCC.	Kyoto Protocol Art. 12. 2	OK	Table 2, Section A.2
3. The project shall have written approval of voluntary participation from the designated national authorities of each party involved.	Kyoto Protocol Art. 12.5a/ CDM Modalities and Procedures §40a	NO OK	Table2, A.2.6 DNA approval of host party, Republic of Korea, is not submitted to DOE from PP. Approval letter of Republic of Korea (29 May 2009) has been submitted to DOE by the PP
4. The emission reductions shall be real, measurable and give long-term benefits to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK	Table 2, Section B.6
5. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity.	Kyoto Protocol Art. 12.5c/ CDM Modalities and Procedures §26	OK	Table 2, Section B.5
6. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a debundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Secton A.4.6.
7. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and use the simplified baseline and monitoring methodology for that project category.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section A.4.2 and B. The proposed project belongs to the category of I. D, ‘Grid connected renewable electricity generation.’
8. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section D

9. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	Table 2, Section A.4.5. The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Korea.
10. Parties participating in the CDM shall be designated a national authority for the CDM.	CDM M&P 29	OK	The office for government policy coordination is DNA in Korea for CDM.
11. The host party and the participating Annex I party shall be a Party to the Kyoto Protocol.	CDM M&P 30/31b	OK	Host party, Republic of Korea has ratified the Kyoto Protocol on 8 November 2002.
12. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM M&P 31b	OK	The project has been proposed as a unilateral project.
13. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM M&P 31b	OK	The project has been proposed as a unilateral project.
14. Comments by local stakeholders are invited, a summary of these provided and how due account was taken of any comments received.	CDM M&P 37b	OK	Table 2, Section E
15. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts and considered significant by the project participants of the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM M&P 37c	OK	Table 2, Section D.
16. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM M&P 37e	OK	Table 2, Section B.1.1 and B.7.1

17. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM M&P 37f	OK	Table 2, Section B.7
18. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 day, and the project design documents and comments have been made publicly available.	CDM M&P 40	OK	Table 2, Section E.1.1 They were invited to provide comments through the CDM website during 30 days from 22 November, 2008 to 21 December, 2008. No comment was received.
19. A baseline shall be established in a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM M&P 45c,d	OK	Table 2, Section B.5
20. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity of due to force majeure.	CDM M&P 47	OK	Table 2, Section B.5.
21. The PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website.	CDM M&P Appendix B, EB Decision	OK	CDM-PDD is in conformance with the UNFCCC CDM-PDD format Version 03 and Guidelines for completing the simplified project design document (CDM-SSC-PDD) and the form for proposed new small scale methodologies (CDM-SSC-NM) (Version 05).

Table 2. Requirements Checklist

MoV =Means of Verification, DR=Document Review, I=Interview

Question	Ref.	MoV	Comments	Draft. Concl.	Final Concl.
A. General Description of Project Activity					
A.1 Title of the project activity					
A.1 1 Does the used project title clearly enable to identify the unique CDM activity?	PDD A.1	DR	The project title is Gimcheon PV Power Plant Site 1 CDM Project The project titled with the name of the project location and the energy source of the project. Hence, it can be clearly identified.	OK	OK
A.1 2 Are there any indication concerning the revision number and the date of the revision?	PDD A.1	DR	The available GSP PDD is indicated as 01 version dated 28 October 2008, GSP started on 22 November 2008.	OK	OK
A.2 Description of the small-scale project activity					
A.2 1 Is the description delivering a transparent overview of the project activities?	PDD A.2,	DR, I	Yes. The proposed project is a photovoltaic power project in San 85, Okgye-ri, eomo-myeon, Gimcheon City, Gyeongsangbuk-Do, Republic of Korea. The total installed capacity of the project is 9.1 MW. The project activity is expected an average annual power generation of 13,324 MWh during credit period. And also expected emission reduction as 8,197 tonCO ₂ e during credit period. This project is connected to the electricity system of Korea Electric Power Corporation (KEPCO) which is the unique grid system in Korea. The overview of the project is transparently provided in PDD. During the on-site audit, the project activities described in the PDD have been proven by the audit team. The validation team concluded that PDD contain a clear description of the project which provides the reader with a clear understanding of the nature of the project activity and the technical aspects of its implementation.	OK	OK

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A.2 2 What proofs are available demonstrating that the project description is in compliance with the actual situation or planning?	PDD Sec.A /B	DR, I	<p>The project activity is the displacement of electricity generated by coal-fired power plants with electricity generated by photovoltaic power plant. During the on-site assessment, numerous proofs for the described project activity were evidenced.</p> <p>The following documents were delivered as evidences for the project activity:</p> <ul style="list-style-type: none"> -Main equipment purchase contract: 3 March 2008 -Environment Impact Assessment report: June 2008 -Feasibility study report by Korea Rating : 25 July 2008 -Permission of solar plant construction: 17 July 2008 (Gyeongsangbuk-do (Provincial government)) -Construction contract: 17 July 2008 - Staff training plan: 31 October 2008 <p>This data have been evidenced during validation work. The required data are delivered in the PDD.</p> <p>According to the requirement of Guidelines for completing the simplified project design document (CDM-SSC-PDD), it's recommended to describe the timeline in section B. 5 of the PDD.</p>	CL 1	OK
A.2 3 Is all information presented consistent with details provided by further chapters of the PDD?	PDD	DR	The information given in the PDD, such as, net electricity delivered to grid and annual emission reduction, are all consistent with the further chapters. .	OK	OK
A.2 4 Is the brief explanation how the project will reduce greenhouse gas emission transparent and suitable?	PDD A.4.3	DR	Because the project activity is a renewable energy project, which will produce power for the substitution of grid electricity mainly from coal fired plants. Doubtless, this technology will reduce GHG emission significantly.	OK	OK
A.2 5 Will the project create other environmental or social benefits than GHG emission reductions?	PDD A.2	DR, I	Yes, as a renewable energy project, the project may substitute some coal fired power plant and produce positive environmental and economic benefits and contribute to the local sustainable development. And also contribute to enhancing the local investment environment.	OK	OK
A.2 6 Has the host country confirmed that the project assists it in achieving sustainable development? And Is the letter(s) of approval is unconditional?	PDD A.2	DR, I	<p>This document is a prerequisite for registration as per CDM Modalities and Procedures 40(a).</p> <p>The LoA from the DNA of Korea has not been provided yet.</p>	CAR 1	OK

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A.2.7 Do DNAs' approval letters refer to the precise the proposed CDM project activity title in the PDD?	PDD A.2	DR, I	The LoA from the DNA of Korea has not been provided yet.	CAR 1	OK
A.3 Participation requirements					
A.3.1 Which Parties and project participants are participating in the project?	PDD A.3	DR, I	The host party involved in the project is Republic of Korea. Gimcheon Enervix Co., Ltd. is the project participant from the Host Party. This information is consistent with the contact details provided in annex 1 of the PDD	OK	OK
A.3.2 Is all information in participants/ Parties provided in consistency with details provided by further chapters of the PDD (in particular Annex I)?	PDD A.3, Annex I	DR, I	Yes, the information provided is in consistent with further chapters of the PDD, the party listed in host party is identical with those listed under A.3.	OK	OK
A.3.3 Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by and involved party?	PDD A.3	DR, I	No. The host party involved in this project is Republic of Korea. However DNA approval letter of host party has not been submitted to DOE. Please deliver the LoA issued by host party.	CAR 1	OK
A.4. Technological description of the small-scale project activity					
A.4.1 Location of the project activity					
A.4.1.1 Does the information provided on the location of the project activity allow for a clear identification of the site?	PDD A.4.1.4	DR	Yes. The project location could be clearly identified according to the PDD. The project is in San 85, Okgye-ri, Eomo-myeon, Gimcheon City, Gyeongsangbuk-Do. And location of the project is given using geographical coordinates obtained with a Global Positioning System (GPS) receiver. They are: 36°14' N, 128°05' E.	OK	OK
A.4.1.2 How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (Ownership, Licenses, Contracts etc.)?	PDD A.4.1.4	DR	Implementation of this project activity at this site is demonstrated through documents such as EIA report, Permission of electricity generation, Permission of solar plant construction, Permission released (Grid connected), Main equipment purchase contract, Certification, Construction contract etc. through physical site assessment. Furthermore, the photovoltaic power plant has been constructed. The risk of not-implementing this project	OK	OK

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			at the site seems insignificant.		
A.4.2 Categories of the small-scale project activity					
A.4.2.1 To which type(s) does the project activity belong to? Is the category correctly identified and indicated?	PDD A.4.2	DR	<p>Yes. The capacity of the project is 9.1 MW and the generated electricity by solar source is supplied to grid. Hence this project activity belongs to sectoral scope 1: Energy Industries (Renewable Source)- Renewable Electricity Generation for a Grid.</p> <p>The chosen baseline methodology refers to category I. D ‘Grid connected renewable electricity generation’ according to Appendix B of Annex II ‘Simplified modalities and procedures for small-scale CDM project activities’.</p> <p>Proposed project activity meets following applicability criteria:</p> <ul style="list-style-type: none"> - Renewable energy generation units: YES - The capacity of the entire unit is lower than 15 MW: YES - Emission reduction of less than or equal to 60 ktCO₂ equivalent annually: YES <p>Thus, baseline and monitoring methodology is the most applicable for this project among the existing approved baseline methodologies.</p>	OK	OK
A.4.3 Technology to be employed by the small-scale project activity					
A.4.3.1 Does the project design engineering reflect current good practices?	PDD A.4.2	DR, I	<p>The proposed project is adopted PV modules from Suntech, Sunpower and S-Energy.</p> <p>S-energy’s modules are using silicon nitride polycrystalline cells and proceeded by IEC 61215 standards. Suntech’s modules have strong points for high efficiency, superior conversion rate and exceptional low-lit performance. Sunpower’s modules are employed highest efficiency technology and designed all back-contact solar cells and an optimized panel design. Also this project is installed with tracking systems which have higher efficiency. Thus, the validation team has justified that PP has reflected current good practice.</p> <p>However, this section is not clearly included a description of how environmentally safe and sound technology and know how is being applied by the project activity.</p>	CL 2	OK

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A.4.3.2 Does the description of technology to be applied provide sufficient and transparent input/information to evaluate its impact on the GHG balance?	PDD A.4.2	DR, I	Yes. The project activity comprises the use of solar energy for the substitution of grid supplied electricity mainly from coal fired plants. There is no doubt that this technology will reduce the GHG emissions significantly.	OK	OK
A.4.3.3 Does the implementation of the project activity require any technology transfer from Annex-I-countries to the host country(ies)?	PDD A.4.2	DR, I	Yes. Please refer A.4.3.1 of this protocol.	OK	OK
A.4.3.4. Is the technology implemented by the Project activity environmentally safe?	PDD A.4.2	DR, I	Yes. Referring to the approval EIA, it will not cause any significant environmental impact. The EIA report has been confirmed by the validation team on physical site visit.	OK	OK
A.4.3.5. Is the information provided in compliance with actual situation or planning?	PDD A.4.2	DR, I	Yes. It is compliance with actual situation. The information provided in the PDD has been evidenced by various proofs. Please kindly refer A.4.1.2 of this protocol.	OK	OK
A.4.3.6 Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	PDD A.4.2	DR, I	Yes. The common practice for electricity generation is still coal-fired power plant. Hence, the project definitely would result in a better performance than the common practice.	OK	OK
A.4.3.7. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	PDD A.4.2	DR, I	We do not expect that there will be a substitution because the photovoltaic module and other equipment will be newly commissioned. And the plant is under operation since September 2008. The life time of the project is under normal circumstances longer than the crediting period.	OK	OK
A.4.3.8 Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled during the project period?	PDD A.4.2	DR, I	Yes. The O&M contractor had established training plan and has a plan to conduct this training from 10 Nov. 2008~13 Dec. 2008	OK	OK
A.4.3.9 Does the project make provisions for meeting training and maintenance needs?	PDD A.4.2	DR, I	The training about operation and maintenance will be established at least 6 months periodically in the training plan which is consisted of technical regulation and safety sectors.	OK	OK
A.4.4 Estimated amount of emission reductions over the chosen crediting period					

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A.4.4.1 Is the form required for the indication of projected emission reductions correctly?	PDD A.4.3	DR	Yes. The form is correctly applied according to the version 3 of PDD template.	OK	OK
A.4.4.2 Are the figures provided consistent with other data presented in the PDD?	PDD	DR	Yes. The annual emission reduction is estimated to be 8,197 t CO ₂ which is the result of emission factor of the times the annual electricity fed to the grid. The same figure is quoted in the entire PDD.	OK	OK
A.4.5 Public funding of the project activity					
A.4.5.1 Public funding for the project from parties in Annex I shall not be a diversion of official development assistance.	PDD A.4.4	DR, I	Yea. The validation did not reveal any information that indicates that the project can be seen as diversion of official development assistance (ODA) funding towards Republic of Korea. Financing of this project activity was made by Equity from 3 shareholders, Korean teachers' Credit Union, Samsung Everland and Poscon, and PF loan from Samsung Life Insurance, Hyundai Insurance, Dongbu Insurance.	OK	OK
A.4.6 Confirmation that the small-scale project activity is not a debundled component of a large scale project activity					
A.4.6.1 Is there a registered small-scale CDM project activity or an application to register another small-scale CDM project activity: with the following characteristics:	PDD A.4.5	DR,I	<p>The following criteria were checked to confirm that the proposed project activity is not a debundled component of a large scale project activity.</p> <ul style="list-style-type: none"> - The same project participants? : No - In the same project category and technology/measure? : Yes - Registered within previous two years? Or in registration process? : Yes - Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration? : Yes <p>In the course of validation, the validation team checked on debundling requirement, 'Determining the occurrence of debundling', and the validation team found another CDM project (PP: Samsung Everland Inc.) which is within 1 km from the proposed project site with same technology. This another project is also under validation by KFQ.</p> <p>Project participant of another CDM project is 'Samsung Everland Inc.' Project participant of proposed project is 'Gimcheon Enervix Co., Ltd.' which shareholders are Korean teachers' Credit Union, Samsung Everland and Poscon. The big shareholder is Korean Teachers' Credit Union which has whole authority of decision making for the proposed project. As Samsung Everland, the PP of another project, is also involved as one of 3 shareholders and was subcontracted as operating company (taking in charge of CDM PDD writing as well), of the proposed project, the validation team investigated further documents regarding to legal entity, structure of decision making/ shareholder, project financing and EIA report. And KFQ got to</p>	OK	OK

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			<p>know that development, design and implementation on these two projects have been conducted separately by different PP. On the basis of these two projects' legal and contract documents, and our thorough investigation, KFQ confirmed that 1 criteria (With the same project participants) among 4 criterion is not meet for concluding debundling.</p> <p>Thus, the validation team made a conclusion the project activity is not a debundled component of a larger project activity as we could not say the PPs of these two projects are same.</p>		
A.4.6.2 If the answer to all the above question is 'Yes' then does the total size of the small scale project activity combined with previously registered small scale CDM project activity exceeds the limits of small scale CDM project activities?	PDD A.4.5	DR,I	N/A	OK	OK
B. Application of a baseline and monitoring methodology					
B.1 Title and reference of the approved baseline and monitoring methodology applied to the project activity.					
B.1.1 Are reference number, version number, and title of the baseline and monitoring methodology clearly indicated?	PDD B.1	DR	<p>Yes. As clearly indicated the applied methodology is AMS-I.D version 13 which is approved by CDM Executive Board (http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html). And the 'Tool to calculate the emission factor for an electricity system (Ver. 01.1)' and 'Tool for the demonstration and assessment of additionality (Ver.05.1)' are used in the PDD correctly.</p>	OK	OK
B.1.2 Is the applied version the most recent one and/or is this version still applicable?	PDD B.1	DR	<p>Yes. The 13rd version of AMA-I.D is the latest one where the PDD was prepared and published for the GSP. Tool to calculate the emission factor for an electricity system (Ver 01.1) and Tool for the demonstration and assessment of additionality (Ver.05.2) are the most recent version when completing this report.</p> <p>Baseline and monitoring methodologies selected by the PP comply with the methodologies previously approved by the CDM Executive Board.</p>	OK	OK
B.2 Justification of the choice of the project category					

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B.2.1 Is the applied methodology considered the most appropriate one?	PDD B.2	DR	<p>The project is a grid-connected generation from a renewable energy source and does not involve on-site fuel switch from fossil fuels to a renewable source.</p> <p>This proposed project activity met the applicability criteria stated in the methodology AMS-I.D (Ver 13) and justification of the choice of the methodology is provided in B.2 of the PDD.</p> <ul style="list-style-type: none"> - The new proposed power project is 9.1 MW photovoltaic power project. - Utilization of solar power resource - Not involving switching from fossil fuels to renewable energy at the project site - The geographic and system boundaries can be clearly identified and the information of this grid is available. <p>Thus, baseline and monitoring methodology is the most applicable, and had been correctly applied for this project among the existing approved baseline methodologies on the basis of sectoral and professional knowledge.</p>	OK	OK
B.2.2 Are the applicability criteria in the baseline methodology all fulfilled and described in the PDD?	PDD B.2	DR	Refer to B.2.1.	OK	OK
B.3 Description of the sources and gases included in the project boundary					
B.3.1 Do the spatial and technological boundaries as verified on-site comply with the discussion provided by the PDD?	PDD B.3	DR	<p>Yes, the spatial and technological boundaries as verified onsite comply with the discussion provided by the PDD.</p> <p>This project is connected to the electricity system of Korea Electric Power Corporation (KEPCO) which is the unique grid system in Korea. Thus the validation team confirmed the power plant and the KEPCO are defined as the project's system boundary through reviewing a document such as grid connection documents (24 Sep. 2008) during on-site assessment.</p>	OK	OK
B.3.2 Are all aspects related to direct and indirect GHG emissions captured in the project design?	PDD B.3	DR	All direct and indirect GHG sources for baseline are considered and it is described in the PDD.	OK	OK
B.4 Description of how the baseline scenario is identified and description of the identified baseline scenario					

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B.4.1 What is the baseline scenario? Has the baseline scenario been determined according to the methodology?	PDD B.4	DR, I	According to AMS-I.D, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the calculation of Combined Margin. The baseline is represented by the combined margin of the grid the activity will be connected to. According to 'Tool for the demonstration and assessment of additionality' (version 05.2)', Alternatives to the project activity should be identified realistic and credible alternative(s) available to the project participants or similar project. Thus the PP should clearly define alternatives to the project activity in the PDD.	CL 3	OK
B.4.2 What other alternatives scenario have been considered and why is the selected scenario the most likely one?	PDD B.4	DR, I	For a renewable energy project of photovoltaic power, no other alternative scenarios than the existing grid and without CDM are required. Refer section B.5 of this protocol.	OK	OK
B.4.3 Does PDD provide all the assumptions and data used by the project participants including reference and sources? And is all the documentation used for establishing the baseline scenario and correctly quoted and interpreted in the PDD?	PDD B.4	DR, I	Yes. All the assumptions and data used by the PP including reference and sources are provided in the PDD. And all the documentation is used for establishing the baseline scenario and correctly quoted and interpreted in the PDD	OK	OK
B.4.4 All the assumptions and data used by the project participants are listed in the PDD? Is it justified appropriately, supported by evidence and can be deemed reasonable?	PDD B.4	DR, I	Yes. The assumptions and data used by the PP are listed in B.4 in the PDD. It is justified appropriately and supported by evidence. And also it deems reasonable.	OK	OK
B.5 Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):					
B.5.1 If the starting date of the project activity is before the date of validation, is evidence available to prove that incentive from the CDM was seriously considered in the decision to proceed with the project activity?	PDD B.5	DR, I	PP selected the starting date on 31 March 2008. However, the PP did not provide evidence available to prove that incentive from the CDM was seriously considered in the decision to proceed with the project activity. Thus the PP shall explain in the PDD that proposed project activity was fully considered as CDM project prior consideration before the starting date. Please provide the documents with signature from decision maker of this project.	CAR 2	OK

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B.5.2 Is a complete list of barriers developed that prevents the project activity to occur?	PDD B.5	DR, I	Yes. The investment barrier is identified.	OK	OK
B.5.3 Does this list include at least one of the following barriers?	PDD B.5	DR, I	<ul style="list-style-type: none"> - Investment : Yes - Technical : No - Due to prevailing practice: No - Other: No 	OK	OK
B.5.4 Does the discussions sufficiently take into account relevant national and/or sectoral policies?	PDD B.5	DR, I	Yes. According to the EB 16 th meeting Report, Annex 3, page 1 ‘Clarifications on the treatment of National and/or Sectoral policies and regulations (paragraph 45 (e) of the CDM Modalities and Procedures) in determining a baseline scenario’, which is “Type E-“national and/or Sectoral policies or regulations that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11November 2001) may not be taken into account in developing a baseline scenario (i.e. the baseline scenario should refer to a hypothetical situation without the national and/or Sectoral policies or regulations being in place)”, this analysis is performed based on this hypothetical situation without regarding the ‘Alternative Energy Development Promotion Act amended on March, 20021.’ According to the above decision, purchase price of electricity, which excludes subsidy through compensation for difference between generation costs by MOCIE, was applied to the investment analysis.	OK	OK
B.5.5 Is transparent and documented evidence provided on the existence and significance of these barriers?	PDD B.5	DR, I	<p>Yes. Input values for the NPV calculation has been presented in Table B.5.3 of PDD.</p> <p>The spreadsheet and related documents have been verified by the validation team. And we confirmed its calculation is correct.</p> <p>KFQ assessed all input values are valid and appropriate at the time of investment decision</p> <p>According to AMS-I. D. (Ver. 13), PP shall correct the PDD and supporting documents following up below findings on investment analysis.</p> <p>1) The PP should demonstrate that input values applied in the investment analysis are valid and applicable at the time of the investment decision. Input values at the time of the investment decision and input values in GSP PDD are different.</p> <p>2) The PP should explain that discount rate (6.7%) applied is valid and appropriate.</p> <p>.</p>	CAR 3 CL 4	OK

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			<p>3) Tariff on GSP PDD and spreadsheet was average tariff from whole electricity generation source such as heavy oil, coal, nuclear etc. As it is wrong approach, the PP should apply average tariff for PV electricity generation.</p> <p>4) As a general point of departure variations in the sensitivity analysis shall at least cover a range of +10% and -10%, and the PP should explain that the range of variations is reasonable.</p> <p>CL 4: In order to avoid misunderstanding, the PP should explain the reasons that the feasibility study was requested to Korea Ratings at February, 2008.</p>		
B.5.6. Is it appropriately explained how the approval of the project activity will help to overcome the identified barriers?	PDD B.5	DR, I	The project activity has negative NPV without CDM revenues and it is still economically unattractive.	OK	OK
B.6 Emission Reductions					
B.6.1. Explanation of methodological choices					
B.6.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity?	PDD B.6.1	DR, I	<p>The calculation of the emission reduction is applied according to the steps described in AMS-I.D and the methodological tool was used in calculation of emission factor in a transparent manner.</p> <ul style="list-style-type: none"> - Calculation of the Operating Margin Emission Factor - Calculation of the Build Margin Emission Factor - Calculation of the Combined Margin Emission Factor <p>These steps are described in a transparent manner. The ex-ante approach is chosen for the calculation of the emissions factor.</p>	OK	OK
B.6.1.2. Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site?	PDD B.6.1	DR, I	<p>The justification of choosing the simple OM and option 1 for BM calculation has been clearly demonstrated in PDD.</p> <p>All the data are referring to the latest available 'Statistic of Electric Power in Korea' for year 2005 ~ 2007(KEPCO) and IPCC 2006 default values.</p>	OK	OK

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B.6.1.3. Are the formulae required for the determination of project emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	PDD B.6.1	DR, I	According to the methodology, the project emission due to project activity needs not to be considered.	OK	OK
B.6.1.4. Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	PDD B.6.1	DR, I	Yes. The formulae to calculate the baseline emissions are correctly presented. They are in compliance with the ones in the defined methodology AMS-I. D. version 13.	OK	OK
B.6.1.5. Is the choice of options to determine the emissions factor (OM, BM) justified in a suitable and transparent manner?	PDD B.6.1	DR, I	<p>Yes, the choices of options to determine the Emission Factor are fully justified in the PDD.</p> <p>For the calculation of the operating margin (OM) the simple OM emission factor calculation method is selected due to a lack of availability. Following EB guidance, the average emission factor for the grid for each fuel type is calculated based on a 3-year average of the most recent statistics available. The simple OM emission factor is calculated as 0.7117 t CO₂/MWh.</p> <p>For the calculation of the build margin (BM), electricity generation of the five power plants that have been built most recently and the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently are not correct as grid unconnected power plants were considered in this calculation. The BM is calculated as 0.3258 t CO₂/MWh.</p> <p>The combined margin of 0.6152 t CO₂/MWh is fixed ex-ante for the entire first credit period. In summary, the emission factor calculation is in a complete and transparent manner.</p> <p>However, in the PDD and Emission Factor calculation excel sheet, validation team found out calculation errors as follow.</p> <p>1) In the calculation of emission factor, the caloric value should be calculated by NCV.</p> <p>2) In the calculation of OM, the amount of heavy oil used at Jeju plant #3 in 2006 is error.</p> <p>-3,276,799 kℓ is sub total of heavy oil in 2006</p>	CAR 4	OK

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B.6.1.6. In case of alternative weighing factors for the Combined Margin: Is the quantification of the alternative weighing factor justified in a suitable and transparent manner?	PDD B.6.1	DR, I	The default weights for wind power projects in the methodological tool version 01.1 (OM:0.75 and BM 0.25 respectively) are used.	OK	OK
B.6.1.7. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	PDD B.6.1	DR, I	No leakage is considered according to the methodology.	OK	OK
B.6.1.8. Are formulae required for the determination of emission reductions correctly presented?	PDD B.6.1	DR, I	Formulae in the PDD are clearly presented of the determination of the emission reduction. As the project emission and leakage are both zero, the emission reduction is equal to the baseline emission.	OK	OK
B.6.2. Data and parameters that are available at validation					
B.6.2.1. Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied Methodology?	PDD B.6.2	DR, I	Yes. Lists of data and parameters are presented according to AMS-I.D. version 13.	OK	OK
B.6.2.2. Is the choice of ex-ante or ex-post vintage of OM and BM factors clearly specified in the PDD?	PDD B.6.2	DR, I	For the calculation of the emission reductions, the ex-ante approach is chosen which is clearly stated in B.6.2 of PDD.	OK	OK
B.6.2.3 Are all Parameters included properly. - Title in line with methodology? - Data unit correctly expressed? - Appropriate description? - Source clearly referenced? - Correct value provided? - Has this value been verified? - Choice of data correctly justified? - Measurement method correctly described?	PDD B.6.2	DR, I	Yes. All listed parameters are properly described.	OK	OK
B.6.3. Ex-ante calculation of emission reductions					
B.6.3.1. Is the projection based on the same procedures as used for future monitoring?	PDD B.6.3	DR, I	Yes, the ex-ante approach is adopted for calculation of the emissions grid factor and will not be changed during fixed crediting period. Therefore, the net electricity fed to the grid will be the key parameter to determine the annual baseline emission, namely, the annual projection.	OK	OK

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B.6.3.2. Are the GHG calculations documented in a complete and transparent manner?	PDD B.6.3	DR, I	Yes, the calculation processes are completely demonstrated and consistent with the ones of Annex 3.	OK	OK
B.6.3.3. Is the data provided in this section consistent with data as presented in other chapters of the PDD?	PDD B.6.3	DR, I	The emission factor of the defined grid and annual emission reductions are consistent with the figures in other chapters of the PDD.	OK	OK
B.6.4. Summary of the ex-ante estimation of emission reductions					
B.6.4.1. Will the project results in fewer GHG emissions than the baseline scenario?	PDD B.6.4	DR, I	Yes. Being a photovoltaic power project, no emissions will result due to the project activity under normal circumstances.	OK	OK
B.6.4.2. Is the form/table required for the indication of projected emission reductions correctly applied?	PDD B.6.4	DR, I	Yes, the table is complete. It includes the emission due to the project activity, baseline emission, leakage emissions and the overall emission reductions. .	OK	OK
B.6.4.3. Do these values comply with small-scale criteria for every year?	PDD B.6.4	DR, I	Yes, as the calculations are based on the capacity installed of 9.1 MW.	OK	OK
B.6.4.4. Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	PDD B.6.4	DR, I	Yes. Validation team found that construction process is completed and has been operated form September 2008. Lifetime of the project is expected to be 20 years form limited warranty for PV modules which are provided by PV manufacturers, and the renewable crediting period of 10 years without renewal is chosen. The emission reductions for each year and total emission reductions are indicated in the Table of B.6.4 of the PDD.	OK	OK
B.6.4.5. Is the data provided in this section in consistency with data as presented in other chapters of the PDD?	PDD B.6.4	DR, I	Yes. The data is consistent throughout the whole PDD.	OK	OK
B.6.4.6. Does all estimate of the baseline emission replicate using the data and parameter values provided in the PDD?	PDD B.6.4	DR, I	Yes. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.	OK	OK
B.7. Application of the monitoring methodology and description of the monitoring plan					

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B.7.1. Data and parameters monitored					
B.7.1.1. Is the list of parameters presented by chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology?	PDD B.7.1	DR, I	Because the ex-ante approach for the calculation of the emissions factor is implemented, the net electricity fed into the grid is the key parameters required to be monitored. This parameter has been included in table B.7.1 in the PDD	OK	OK
B.7.1.2 Are the parameter included properly? - Title in line with methodology? - Data unit correctly expressed? - Appropriate description of parameter? - Source clearly referenced? - Correct value provided for estimation? - Has this value been verified? - Measurement method correctly described? - Correct reference to standards? - Indication of accuracy provided? - QA/QC procedures described? - QA/QC procedures appropriate?	PDD B.7.1	DR, I	Yes. According to methodology and tools, all parameters are listed in chapter. However, EG _y should express as net electricity supplied to the grid and imported electricity from the grid should be reflected in.	CAR 5	OK
B.7.2. Description of the monitoring plan					
B.7.2.1. Is the operational and management structure clearly described and in compliance with the envisioned situation?	PDD B.7.2	DR, I	Yes. Figure B.7.2 gives a clear representation of the electricity metering.	OK	OK
B.7.2.2. Are responsibilities and institutional arrangements for data collection and archiving clearly provided?	PDD B.7.2	DR, I	Yes. According to the PDD, the annual output from the power plant will be monitored and recorded. Electricity sales invoices will also be obtained as an additional check. However, responsibilities and institutional arrangements are not clearly explained in the monitoring plan. Please provide detailed monitoring plan for data collection and archiving.	CL 5	OK
B.7.2.3. Does the monitoring plan provide current good monitoring practice?	PDD B.7.2	DR, I	Yes. Following information is included in a monitoring plan. - Monitoring equipments - Monitoring of electricity generation - Calibration	CL 5	OK

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			However, it is recommended to included further information such as accuracy level of the meter relevant with laws and regulation and location map of meters in the PDD		
B.7.2.4. If applicable: Does annex 4 provide useful information enabling a better understanding of the envisioned monitoring provisions?	PDD B.7.2	DR, I	N/A	OK	OK
B.8. Date of completion of the application of the baseline study and monitoring methodology an the name of the responsible person(s)/entity(ies)					
B.8.1. Is there any indication of a date when the baseline was determined?	PDD B.8	DR	Yes. The baseline of the first version of PDD was determined on 1 August 2008.	OK	OK
B.8.2. Is this consistent with the time line of the PDD history?	PDD B.8	DR	Yes, The first version of PDD was completed on 28 October 2008 which is also used for GSP and on site assessment.	OK	OK
B.8.3. Is the information on the person(s) / entity(ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation?	PDD B.8	DR	Yes, The responsible person indicated in PDD are also the ones being interviewed for baseline verification during the on site assessment.	OK	OK
B.8.4. Is information provided whether this person/entity is also considered a project participant?	PDD B.8	DR	Yes. The above mentioned person is from project consulting company.	OK	OK
C. Duration of the Project/ Crediting Period					
C.1 Are the project's starting date and operational life time clearly defined and evidenced?	PDD C.1	DR, I	The starting date indicated in PDD (date of permission to generate electricity: 31 March 2008) is not in accordance with Glossary (Ver.04) which requires The start date should be decided the earliest date at which either the implementation or construction or real action of a project activity begins, however, the start date of proposed project activity was not decided based on the requirement. The starting date shall be decided the earliest date at which either the implementation or construction or real action of a project activity begins according to Glossary of CDM terms (Version 04). Thus the PP shall decide	CAR 6	OK

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			<p>the start date of proposed project activity based on the requirement.</p> <p>The operational lifetime is expected to be 20 years. Validation team checked this operation lifetime through reviewing documents such as limited warranty for PV modules. They are indicated lifetime of PV modules for 20 years and 25 years. The PP selected operation lifetime for 20 years in a conservative view. After examining to consider other similar project's operational life time, we confirmed that it is reasonable based on our technical knowledge.</p>		
C.2. Choice of the crediting period and related information					
C.2.1. Is the assumed crediting period clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max.10 years)?	PDD C.2	DR	Yes. Fixed crediting period, 10 yrs has been selected and it is reasonable as operational life time of this project activity is expected to be 20 years.	OK	OK
C.2.2 Is the start of the crediting period clearly defined and reasonable?	PDD C.2.1. 1	DR, I	e starting date of the crediting period should be later or on the date of registration of the project activity. Thus the PP should define the starting date of the credit period in the PDD again.	CL 6	OK
D. Environmental Impacts					
D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts					
D.1.1 Has an analysis of the environmental impacts of the project activity been sufficiently described?	PDD D.1	DR,I	Yes. The environmental impacts of the project activity such as influence of air, water, soil/topography, ecology and life environment have been clearly described in the EIA report and these are fully presented in the PDD.	OK	OK
D.1.2 Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	PDD D.1	DR, I	According to 'Enforcement Decree of the Act on Assessment of Impacts of Works on Environment, Traffic, Disaster. Etc., any plant facility whose power source is solar power, wind power of fuel cell which is more than 100,000kW and the area of land is larger than 250,000m ² shall be carried out EIA. The proposed project area of land is larger than 250,000m ² . Thus, The Environment Impact Assessment report for the project activity was conducted according to the law. Therefore, the project participant had implemented and analyzed Environmental Impacts Assessment and indicated it clearly in PDD.	OK	OK

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			This EIA report was submitted and reviewed by Gyeongsangbuk-Do (Provincial government), and Permission of solar power plant construction was issued on 17 July 2008. All the documents have been reviewed by DOE.		
D.1.3 Will the project create any adverse environmental effects?	PDD D.1	DR, I	According to EIA, its approval and interview with local stakeholders, the project will create no significant environmental impacts.	OK	OK
D.1.4 Are transboundary environmental impacts considered in the analysis?	PDD D.1	DR, I	The proposed photovoltaic plant is located within Republic of Korea, and it has no transboundary environmental impacts: hence this section is not applicable.	OK	OK
D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Part					
D.2.1 Have identified environmental impacts been addressed in the project design?	PDD D.1	DR, I	Referring to the EIA report, the impacts on the environment are not significant. Please refer D.A of protocol.	OK	OK
D.2.2 Does the project comply with environmental legislation in the host country?	PDD D.1	DR, I	Yes. The project is in conformity with the environmental legislation of Republic of Korea and after reviewing the EIA report, Gyeongsangbuk-Do (Provincial government) approved solar power plant construction of this project.	OK	OK
E. Stakeholder Comments					
E.1. Brief description how comments by local stakeholders have been invited and compiled					
E.1.1 Have relevant stakeholders been consulted?	PDD E.1	DR, I	Yes. The stakeholder consultation for the project activity took place from January 2008 to June 2008. The consultation activities were implemented such as receiving resident's proposal on 30 Jan. 2008, public inspection of the report on prior environmental review from 19 Mar.2008 to 2 Apr. 2008, presentation of the report on prior environmental review on 16 Mar. 2008, notice on decision of city management plant of Gimcheon and topographical map on 26 May 2008, public inspection and presentation of the report on environmental analysis on 23 May 2008 and public inspection of permission oh the execution plan on 11 Jun. 2008. The stakeholder consultation process is fully described in the PDD and the validation team reviewed by on-site assessment. Thus the validation team got a conclusion the local stakeholder consultation is the adequacy of implementation in the process of the	OK	OK

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			proposed project activity.		
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	PDD E.1	DR, I	Yes. Please kindly refer E.1.1 of protocol.	OK	OK
E.1.3 If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	PDD E.1	DR, I	There are no regulations/laws in Republic of Korea for carrying out the stakeholder consultation process for this project activity.	OK	OK
E.1.4. Is the undertaken stakeholder process that was carried out described in a complete and transparent manner?	PDD E.1	DR, I	Yes. Please kindly refer E.1.1 of protocol.	OK	OK
E.2. Summary of the comments received					
E.4 Is a summary of the stakeholder comments received provided and is the stakeholders commented identified?	PDD E.2	DR, I	The validation team has validated that there are no negative comments.	OK	OK
E.5 Has due account been taken of any stakeholder comments received?	PDD E.3	DR, I	In the course of local stakeholder interview, a resident expressed his concern on sunlight reflection. The PP already had countermeasure, and have plan to monitor and respond continuously for this issue. However the PP should clearly indicate the countermeasure and its plan for the issue in the PDD sufficiently.	CL 7	OK
F. Annexes 1-4					
Annex 1: Contact Information					
F.1.1 Is the information provided consistent with the one given under section A.3?	PDD A.3/ Annex 1	DR	Yes, the information provided is consistent with one given under section A.3.	OK	OK

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F.1.2 Is the information on all private participants and directly involved Parties presented?	PDD A.3/ Anne x 1	DR	Yes.	OK	OK
Annex 2: Information regarding public funding					
F.1.3 Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project participants?	PDD A.4.5/ Annex 2	DR, I	It is stated that the project does not receive any public funding from Annex I countries as this project activity is unilateral project.	OK	OK
F.1.4. If necessary: Is an affirmation available that any such funding from Annex – countries does not result in a diversion of ODA?	PDD A.4.5/ Annex 2	DR	N/A	OK	OK
Annex 3: Baseline information					
F.1.5. If additional background information on baseline data is provided: Is this information consistent with data presented by other section of the PDD?	PDD B.5/An nex 3	DR, I	Yes. Please kindly refer to B.5 of protocol. All the data used for baseline calculation are consistent throughout the PDD.	OK	OK
F.1.6. Is the data provided verifiable? Has sufficient evidence been provided to the validation team?	PDD B.5/An nex 3	DR, I	Pls. see B.5 of protocol.	OK	OK
F.1.7. Does the additional information substantiate/support statements given in other section of the PDD?	Annex 3	DR	Annex 3 presents all the data used for the emission factor calculation.	OK	OK
Annex 4: Monitoring information					
F.1.8. If additional background information on monitoring is provided: Is this information consistent with data presented in other section of the PDD?	PDD B.7.2/A nnex 4	DR, I	N/A	OK	OK
F.1.9. Is the information provided verifiable? Has sufficient evidence been provided to the validation team?	PDD B.7.2/A nnex 4	DR, I	N/A	OK	OK

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F.1.10.Do the additional information and/or documented procedures substantiate/support statements given in other section of the PDD?	PDD B.7.2/A nnex 4	DR, I	N/A	OK	OK
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Table 3. Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response and validation team	Validation team conclusion
CAR 1 : DNA approval of host party, Republic of Korea, is not submitted to DOE from PP.	A.2.6/A3.3/ A.3.3	Approval letter of Republic of Korea (29 May 2009) has been submitted to DOE by the PP. And this LoA is issued by Korea DNA (Ministry of Knowledge Economy). The validation team confirmed followings. -Title of project activity is correctly indicated in the LoA. - Republic of Korea has ratified the Kyoto Protocol on 8 November 2002. -Voluntary participant.. -Contribution of the project to the sustainable development of Republic of Korea. And Korea DNA didn't provide any negative comment on this proposed project activity.	CAR 1 is closed.

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<p>CAR 2 :</p> <p>PP shall explain in the PDD and demonstrate that proposed project activity was fully considered as CDM project prior consideration before the starting date Please provide the documents who made signature when investment decision.</p>	<p>B.5.1</p>	<p>PP has submitted documents which are related to prior consideration of the CDM have been submitted to DOE. Validation team has checked the documents as follow.</p> <ul style="list-style-type: none"> - Report of PV Power Plant project plan: 10 January 2008 -Approval by Korean Teachers' Credit Union.: 15 January 2008 - Main equipment purchase contract: 3 March 2008 <p>The proofs for the prior consideration of applying for CDM to support project activity have been demonstrated by the project participants and verified by KFQ.</p> <p>On 10 January 2008, a developer and consultancy, Samsung Everland Inc., reported the project promotion plan, 'Report of PV Power Plant project plan', to the major investor, The Korean Teachers' Credit Union.in order to take an approval for the proposed project. The report This report contains analysis result for the revenue from this project with CDM, and a plan for incorporation of new company for CDM project. On 15 January 2008, Korean teachers' Credit Union approved investment in and promotion of this project on condition of CDM after reviewing 'Report of PV Power Plant project plan' which is included analysis result for the revenue from this project with CDM, and a plan for incorporation of new company for CDM project.</p> <p>After decision making, the project participant, Gimcheon Enervix Co., Ltd. incorporated on 18 January 2008.</p> <p>Thus, KFQ confirmed that the project participant was aware of the CDM prior to the starting date of the project, and that the benefits of the CDM were as decisive factor in the decision to proceed with the project activity.</p>	<p>CAR 2 is closed.</p>
<p>CAR 3 :</p> <p>PP shall correct the PDD and supporting documents following up below findings on investment analysis.</p> <p>1) The PP should demonstrate that input values applied in the investment analysis are valid and applicable at the time of the investment decision. Input values at the time of the investment decision and input</p>	<p>B.5.5</p>	<p>1) The input values adjusted referencing to 'Report of PV Power Plant project plan' (hereafter 'Project plan') to Korean Teachers' Credit Union dated on 10 Jan. 2008 and considering its validity and applicability again and revised the investment analysis spread sheet. The validation team has checked the each input value is acceptable and the calculation is correct</p> <p>① Capacity of the project activity: 9.1 MW The validation team confirmed grid connection document (Permission released by KPX on 24 September 2008) by physical on-site assessment.</p>	<p>CAR 3 is closed.</p>

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<p>values in GSP PDD are different.</p> <p>2) The PP should explain that discount rate (6.7%) applied is valid and appropriate.</p> <p>3) Tariff on GSP PDD and spreadsheet was average tariff from whole electricity generation source such as heavy oil, coal, nuclear etc. As it is wrong approach, the PP should apply average tariff for PV electricity generation.</p> <p>4) As a general point of departure variations in the sensitivity analysis shall at least cover a range of +10% and .10%, and the PP should explain that the range of variations is reasonable.</p>	<p>② Electricity generation: 13,028 MWh/yr (Load Factor: 16.35 %)</p> <p>Average electricity generation is expected approximately 13,028 MWh/yr. In estimation of electricity generation, expected annual capacity factor, 16.35% (Max. 16.97%, Min. 15.52%) is applied and this load factor was analyzed by considering module and system loss, total utility factor diminution and etc. for the operational life time (20 yrs) by 3rd party.(For reference, expected annual electricity generation for the 10 yrs crediting period is 13,324 MWh which is different as above figure as load factor is different every year).</p> <p>Validation team checked the electricity generation in the GSP PDD (annual average of electricity generation and load factor for 20 years of operational life time is 13,307 MWh and 16.35%) and in the 'Project plan (annual average of electricity generation and load factor for 15 years of operational life time is 13,368 MWh and 15.26%), and found that this different was caused due to different operational lifetime and starting date of crediting period.</p> <p>15 yrs operational life time is applied in 'Project Plan' and 20 yrs in the GSP PDD. The change of starting date of crediting period affects electricity generation as load factor is different every year. KFQ confirmed this application is reasonable based on our examination</p> <ul style="list-style-type: none"> - As for the operational lifetime : Refer to the below ⑥. - As for the load factor : similar PV projects in Korea which are registered as CDM project and it shows that range of load factor of them is 13.5%~17.5% and found that selected load factor for this project, 16.35% is within this range. <p>In summary, PP selected 16.35% and 13,028MWh for investment analysis and validation team concluded that these figures are valid and applicable in a conservative manner even at the time of investment decision.</p> <p>③ Investment cost (KRW 59,914 million (KRW 6,584 million/MW))</p> <p>KRW 75,072 million, KRW 8,249 million/MW is applied in GSP PDD and Investment Analysis Report as Investment cost. The value is smaller than the value 6,584 million/MW from 'Report of PV Power Plant project plan' dated on 10 January 2008. KFQ have found these values are valid by crosschecking with other similar projects. Which shows investment in PV projects is KRW 5,100/MW~KRW 8,500 million/MW</p>
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		<p>in Korea. In addition, according to ‘Notification for the investment unit cost of renewable energy in 2007’ noticed by Korea Energy Management Corporation), unit investment cost for PV power plant is KRW 9,550 million/MW (fixed type) and KRW 11,698/MW (Tracking type).</p> <p>However, the validation team concluded this investment cost (KRW 59,914 million (KRW 6,584 million/MW) from ‘Report of PV Power Plant project plan’ is more appropriate for the project activity with a conservative view.</p> <p>④ O&M cost (KRW 582 millions)</p> <p>The value in GSP PDD (KRW 782 million) is smaller than the value in ‘Project plan’ (KRW 964.5 million). KFQ assessed validity of these values by crosschecking with other similar projects and comparing O&M Cost with references provided by 3rd party institution. O&M cost portion of other similar projects show less than 1.0% of the investment cost in Korea. The references (‘Economic analysis for PV power generation system’- Korea Energy Economic Institute in May 2007 and ‘Study Report for new & renewable energy FIT (Feed-In Tariff) improvement and RPS connection plan’ -Ministry of Knowledge Economy on 31 March, 2006) of 3rd party expertise institute and public authorized organizations are also shown annual O&M cost of PV power plant is approximately 1.0% of total investment cost. We found that 1.6 %, 1.4% of total investment are in ‘Project plan’ and in GSP PDD respectively. Additionally, the validation team examined more documents such as maintenance expense, labour cost, indirect cost, insurance fee and general expense and rental for land one by one for the project activity.</p> <p>We found that O&M Cost in ‘Report of PV Power Plant project plan’ is overestimated as compared to other similar projects and the references in Korea.</p> <p>Hence, PP adjusted again O&M cost (KRW 582 millions, 0.97% of the investment cost) to more reasonable value after acknowledging overestimation at the time of decision</p> <p>Thus, in a conservative view, KFQ concluded that O&M cost (KRW 582 million, 0.97% of investment cost) applied newly is valid and also applicable even at the time of investment decision.</p> <p>⑤ Tariff (KRW 99.31/kWh for initial year and increasing every year)</p> <p>PP applied the tariff in the GSP with undesirable reference and in the ‘Project plan’ with inappropriate value. Thus, to begin with, PP</p>	
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		<p>corrected the value.</p> <p>Then KFQ have assessed tariff (KRW 99.31/kWh) for initial year by checking statistics provided by Korea Power Exchange (KPX) (http://epsis.kpx.or.kr). In the period, 1.1 ~ 12.31 2007 just before making decision, Tariff was KRW 85.91/kWh (KPX). Thus, considering inflation we got to conclusion PP's higher value application, KRW 99.31/kWh is valid and appropriate in a conservative view at the time of decision timing.</p> <p>It is also reasonable that electricity tariff increasing during operation lifetime based on estimation by regression analysis.</p> <p>In summary, the applied tariff values are valid and appropriate at the time of investment decision.</p> <p>⑥ Operational lifetime: 20 years</p> <p>The PP expected operational life of the proposed project activity is 20 years in GSP PDD. Validation team checked this operational lifetime through reviewing documents such as limited warranty for PV modules. Those documents indicate lifetime of PV modules is 20 years and 25 years. The PP selected operation lifetime for 20 years in a conservative view. After examining to consider other similar project's operational life time, we confirmed that it is appropriate based on our technical knowledge.</p> <p>2) The PP selected 6.7% was selected as discount rate. This discount rate is decided based on average 10-year government bond rate +150 bps. Average 10-year government bond rate for 3 years (2005~2007) was 5.15%. KFQ examined the 'Indicative Term Sheet' regarding to the proposed project, and average 10-year government bond rate for 3 years through public authority, Bank of Korea; Economic Statistics System, and average of the bond rate was 5.15%, and KFQ also checked pbs (added interest rate), and got to know it is generally applied 60pbs~160pbs in financial market in Republic of Korea.</p> <p>Thus KFQ confirmed the selected discount rate is reasonable and appropriate for this project</p> <p>3) The PP applied tariff for PV electricity generation.</p> <p>4) The PP adjusted and demonstrated the variation range for each parameter in sensitivity analysis and validation team investigated various</p>	
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		<p>documents and references and we confirmed it is reasonable</p> <ul style="list-style-type: none"> - Total investment cost ($\pm 15\%$): comparison with exchange rate - O&M Cost ($\pm 10\%$): comparison with inflation rate - Tariff ($\pm 20\%$): comparison with fluctuation of SMP - Electricity Generation ($\pm 20\%$): comparison with daylight and similar projects - Discount rate ($\pm 10\%$) : comparison with fluctuation of 10-year government bond rate <p>① Investment cost in this project is very dependent on exchange rate due to introducing of imported equipments from foreign companies. Thus the variation range of investment cost was assessed by considering the fluctuation of past exchange rate for past 10 years (1998~2007), and EB guidance. The validation team examined the fluctuation of past exchange rate by Korea Bank Economic Statistics System (http://ecos.bok.or.kr/). According to the statistics, the fluctuation range of exchange rate during last 10 years (1998~2007) was 9.9%. The EB guidance recommended that sensitivity analysis should at least cover a range of +10 and -10% unless this is not deemed appropriate in the context of the specific project circumstances. Therefore, KFQ concluded that $\pm 15\%$ of applied variation range for investment cost is suitable for the proposed project activity.</p> <p>② O&M cost is strictly connected with inflation rate. Thus the variation range of O&M cost is decided by considering the fluctuation of inflation rate for past 5 years (2003~2007) in Korea. According to Bank of Korea Economic Statistics System, inflation rate was 2.16%. Thus validation team deemed more than + 10% of inflation rate is unlikely to occur. Therefore, KFQ concluded that $\pm 10\%$ of applied variation range for O&M cost is suitable for the proposed project activity.</p> <p>③ As for Electricity tariff, KFQ analyzed trend of past 3 years (2005~2007) based on statistics from KPX (http://epsis.kpx.or.kr). Annual average of rising trend for past 3 years was 17.21%. As the tariff over 20 years operational lifetime is already applied increasingly based on estimation by regression analysis with this 3 years trend. Validation team concluded that $\pm 20\%$ of variation range is reasonably enough for the proposed project.</p> <p>④ The variation of electricity generation is assessed considering the</p>	
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		<p>fluctuation of amount of daylight during past 15 years (1992~2006). According to the statistics of Korea Meteorological Administration (http://www.kma.go.kr/), fluctuation of amount of daylight is less than 4.9 %. Additionally, with comparison of other similar projects' highest load factor (17.5%), + 14% variation of the projects' load factor is considered. Thus, validation team deemed ±20% of rising trend for amount of daylight is unlikely to occur. We concluded the applied ±20% range is reasonable.</p> <p>⑤ The variation of discount rate is assessed considering the fluctuation of 10-year government bond rate for past 5 years (2003~2007). KFQ analyzed the variation range based on Bank of Korea Economic Statistics System and annual fluctuation rate of 10-year government bond rate is less than 3.27%. Therefore, KFQ concluded that ±10% of applied variation range for discount rate is suitable for the proposed project activity.</p>													
<p>CAR 4:</p> <p>Validation team found out errors for Baseline Emission Factor calculation on the basis of Tool to calculate the emission factor for an electricity system (Version 01.1), Please clearly calculate for Baseline Emission factor.</p> <p>1) In the calculation of emission factor, the caloric value should be calculated by NCV.</p> <p>2) In the calculation of OM, the amount of heavy oil used at Jeju plant #3 in 2006 is error.</p> <p>-3,276,799 <i>kl</i> is sub total of heavy oil in 2006</p> <table><tr><td colspan="2">Plant name</td><td>heavy oil (<i>kl</i>)</td></tr><tr><td>Jeju</td><td>#3</td><td>3,276,799</td></tr></table>	Plant name		heavy oil (<i>kl</i>)	Jeju	#3	3,276,799	<p>B.6.1.5</p>	<p>1) According to AMS-I.D.(Ver. 13), NCV data is used in OM and BM calculation. As there are no NCV data of the fuel in Korea, PP converted GCV to NCV based on the Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. And the GCV data used to calculate the OM and BM is based on the 'Power Generation Statistics on Electricity Generation of year '2005 ~ 2007' from Korea Electric Power Corporation. In IPCC 1996 and 2006 guideline, the IEA assumes that net calorific values are 5 per cent lower than gross calorific values for oil and coal, and 10 percent for natural gas. (See Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual) Thus, PP considered this in OM and BM calculation. And validation team confirmed that conversion approach of this is reasonable under Korea situation as it derives more conservative value</p> <p>2) Amount of heavy oil at Jeju plant #3 is revised and OM is also recalculated by PP. It is confirmed by validation team.</p> <table><tr><td colspan="2">Plant name</td><td>heavy oil (<i>kl</i>)</td></tr><tr><td>Jeju</td><td>#3</td><td>117,464</td></tr></table> <p>For the calculation of the operating margin (OM) the simple OM emission</p>	Plant name		heavy oil (<i>kl</i>)	Jeju	#3	117,464	<p>CAR 4 is closed.</p>
Plant name		heavy oil (<i>kl</i>)													
Jeju	#3	3,276,799													
Plant name		heavy oil (<i>kl</i>)													
Jeju	#3	117,464													

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		<p>factor calculation method is selected due to a lack of availability. Following EB guidance, the average emission factor for the grid for each fuel type is calculated based on a 3-year average of the most recent statistics available. The simple OM emission factor is calculated as 0.7117 t CO₂/MWh.</p> <p>For the calculation of the build margin (BM), electricity generation of the five power plants that have been built most recently and the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently are not correct as grid unconnected power plants were considered in this calculation. The BM is calculated as 0.3258 t CO₂/MWh.</p> <p>The combined margin of 0.6152 t CO₂/MWh is fixed ex-ante for the entire first credit period. In summary, the emission factor calculation is recalculated in a complete and transparent manner.</p>	
<p>CAR 5:</p> <p>EG_y should express as net electricity supplied to the grid and imported electricity from the grid should be reflected in PDD.</p>	B.7.1.2	<p>EG_y in B.7.1 of the revised PDD described as 'Net amount of electricity supplied to the grid by project activity' and reflected in monitoring plan. The PP will monitor the amount of electricity in the project activity from grid and to grid respectively with 2 meters</p>	CAR 4 is closed.
<p>CAR 6 :</p> <p>The start date shall be decided the earliest date at which either the implementation or construction or real action of a project activity begins according to Glossary of CDM terms (Version 04). Thus the PP shall decide the start date of proposed project activity based on the requirement.</p>	C.1	<p>The date on which the project participant made the first supply contract for modules has been decided as the starting date according to Glossary of CDM terms (Version 04). Validation team has reviewed events relating to implementation, construction and real actions</p> <ul style="list-style-type: none"> - Main equipment purchase contract: 3 March 2008 - Permission of electricity generation :31 March 2008 - Construction contract: 17 July 2008 <p>And we confirmed that starting date of the project activity is 3 March 2008 which is date of main equipment purchase contract, and it is the earliest date at which either the implementation of construction or real action of a project activity begins.</p>	CAR 6 is closed.

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CL 1: It's recommended to describe the timeline in section B. 5 of the PDD	A.2.2	Time line of the project activity is well indicated in section B.5 of the PDD.	CL 1 is closed.
CL 2: It is recommended that the PP should clearly indicate a description of how environmentally safe and sound technology and know how is being applied by the project activity.	A.4.3.1	The PP has indicated clearly how environmentally safe and sound technology and know how is being applied by the project activity in the PDD, and confirmed by validation team.	CL 2 is closed.
CL 3: Alternatives to the project activity should be identified realistic and credible alternative(s) available to the project participants or similar project. Thus the PP should clearly define alternatives to the project activity in the PDD.	B.4.1	Referring to 'Tool for the demonstration and assessment of additionality (Ver. 05.2)', three alternatives to the project were identified by PP. a) Construction of a fossil fuel power plant with equivalent amount of installed capacity b) Generating electricity by current grid-connected power plant without CDM project activity c) Generating electricity by another type of renewable energy Validation team has confirmed that the alternatives identified are completed on the basis sectoral and professional knowledge.	CL 3 is closed.
CL 4: In order to avoid misunderstanding, the PP should explain the reasons that the feasibility study was requested to Korea Ratings at February, 2008.	B.5.5	PP explained the reason why the project participant ordered feasibility study service on the project to Korea Ratings Corporation. The project participant ordered the service to the 3rd party for the objective validity. Validation team got a conclusion it is acceptable.	CL 4 is closed.
CL 5: Responsibilities and institutional arrangements are not clearly described in the monitoring plan. Please explain detailed monitoring plan for data collection and archiving, and recommended to included further information such as accuracy level of the meter	B.7.2.2/ B.7.2.3	Validation team has confirmed responsibilities and institutional arrangements are clearly indicated in monitoring plan. In addition PP has described accuracy level of meter, relevant regulation, location map of meter according to the requirement.	CL 5 is closed.

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relevant with laws and regulation and location map of meters in the PDD.			
CL 6: The starting date of the crediting period should be indicated prior to the date of registration of the project activity and through any guidance by the Executive Board, available on the UNFCCC CDM web site. Thus the PP should clearly identify the starting date of the credit period in the PDD.	C.2.2	The PP has indicated the start of the crediting period as 1 August 2009 and the date of registration of the project activity whichever is later. Thus validation team confirmed it's applicable and reasonable.	CL 6 is closed.
CL 7: The starting date of the crediting period should be later or on the date of registration of the project activity. Thus the PP should define the starting date of the credit period in the PDD again.	E.5	The PP has indicated the start of the crediting period as 1 August 2009 and the date of registration of the project activity whichever is later. Thus validation team confirmed it's applicable.	CL 6 is closed.

Appendix B
Qualification of Validation Team

APPENDIX B. QUALIFICATION OF VALIDATION TEAM

