VALIDATION REPORT

DAEGU & SINANJEUNGDO PV (PHOTOVOLTAIC) POWER PLANT PROJECT

REPORT NO. 2007-04

REVISION NO. 04.

KOREAN FOUNDATION FOR QUALITY

Report No : 2007-04 , rev. 04

VALIDATION REPORT

Date of first issue:	Date of this revision	Project No.
28 January ,2008	07 Oct, 2008	EC-792
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Summary:

Korean Foundation for Quality (KFQ) has been authorized by Korea District Heating Corporation (KDHC) to validate the Daegu & Sinanjeungdo PV (photovoltaic) Power Plant Project (hereafter called "The 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 small-scale CDM project, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation of this project has been performed in 3 stages, desk review, follow up interviews and resolution of clarification and corrective action requests.

The Daegu PV (photovoltaic) Power Plant (hereafter`"Daegu Project") is located in Daechundong Dalseogu Daegu city and Sinanjeungdo PV(photovoltaic) Power Plant(hereafter`"Sinan Project") is located in Jungdomyun Sinangun JollaNamdo of the Republic of Korea. The Project consists of a PV array, a Power conditioning system, a boosting transformer and electricity grid connected system, has a capacity of 0.9 MW including Daegu project and Sinan project generating 1,302 MWh annually. The expected CO_2 reduction is 827 ton per year.

As the result of the validation, it can be confirmed that the project, as described in the revised PDD of 30. September 2008 (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.12).

Work carried out by :	Work verified by :
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Abbreviations

BM	Build Margin
CARs	Corrective Action Requests
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CERs	Certified Emission Reductions
CLs	Clarification requests
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
PV	Photovoltaic
KDHC	Korea District Heating Corporation

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1 INTRODUCTION

Korean Foundation for Quality (KFQ) has been engaged by Korea District Heating Corporation (KDHC) to perform a validation of the 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 small-scale 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 CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

The Project is classified with sectoral scope 1- Energy Industries (Renewable Electricity: Generation for a grid) and the PV(Photovoltaic) Power plants are located in Daechundong Dalseogu Daegu city and Jungdomyun Sinangun JollaNamdo of the Republic of Korea. The Project has a capacity of 0.9 MW generating 1,302 MWh annually in Daegu and Sinan. The expected CO_2 reduction is estimated to be 827 tCO2e per year and 8,270 tCO2e over the 10 years 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 document is sound and reasonable and meets the stated requirements and identified criteria. The 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 the CERs.

1.2 Scope

The validation scope is defined as an independent and objective review of the PDD, the project's baseline study and 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 ,the simplified modalities and procedures for small-scale CDM project activities 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 recommendations in 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 clients. 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:

Sang Yong LEE (Audit team leader, GHG auditor)
Jong Mun PARK (Audit team member, GHG auditor)

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 Desk review of the project design document.
II Follow-up interviews with project stakeholders
III Resolution of Clarification and Corrective Action Requests

In order to ensure transparency, a validation protocol for small scale 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 the 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 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. CARs 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 the CDM project or that emission reductions will not be certified.

The term Clarification (CL) may be used where additional information is needed to fully clarify an issue.

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***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*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.*	*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.*

Validation Protocol Table 2: Requirement checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**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.*

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***
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.*	*The responses given by the Client or other project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation Protocol Tables

2.1 Desk Review of the PDD

The PDD (version 0) was submitted 07 November 2007 and reviewed with additional background documents related to the project design including baseline and additionality of the project.

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 identified in the KFQ's draft validation report
- Change of the project title from "Daegu & Sinan PV (photovoltaic) Power Plant Project" to "Daegu & SinanJeungdo PV (photovoltaic) Power Plant Project"

2.2 Follow-up Interviews

In the period of 19 November 2007 to 21 November, 2007, 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 organisation	Interview topics
Korea District Heating Corporation - Mr. Sung-Mook, LIM - Mr. Jong-Weon ,LIM - Mr Kyung-Joong, KIM(DAEGU) - Mr. Yeong-Min, KIM(DAEGU) - Mr Jae-Gyu,JU(SINAN) - Mr Gwan-Woo, JUNG(SINAN)	➢ Project design ➢ Project technology, operation, maintenance ➢ Sustainable development issues ➢ Monitoring plan ➢ Environmental impacts(incl. EIA approval) ➢ Stakeholder consultation process ➢ Applicability of selected methodology ➢ Baseline determination ➢ Emission reductions calculation ➢ Crediting Period ➢ Additionality ➢ Approval by the host country
Village chief & Stakeholders - Mr. Jae-Woo,JOE(SINAN) - Mr. Gil JEONG	➢ Environmental issues ➢ Stakeholder comments ➢ Sustainable development issues
DAEGU CITY& SINANGUN OFFICE - Mr. Yong –Sik, LEE(DAEGU CITY) - Mr.Woon-Gi ,PARK(SINANGUN) - Mr Dong-Hwan JANG(JeollaNamdo)	➢ Environmental issues ➢ Stakeholder comments ➢ Sustainable development issues

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation to resolve the requests for corrective actions and clarification and any other outstanding issues which needed to be clarified for KFQ's conclusion on the project design. The corrective Action Requests and Clarification Requests raised by KFQ were resolved during communications between the project participants and the validation team. 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.

The four Corrective Action Requests and two requests for Clarification were identified. These requests were presented to the project participant in a draft validation report in 28 January 2008. The additional information provided by the project participant to address theses requests and revised PDD of 30 September 2008 resolved the Corrective Action Request and all requests for Clarification to KFQ's entire satisfaction.

2.4 Internal Quality Control

According to KFQ's Procedure for deciding whether to proceeding request for registration, the final validation report including 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

Republic of Korea as a non-Annex-I party meets all relevant participation requirements. In the Letter of Approval dated 20 June 2008, the Korea DNA confirmed the voluntary participation of Korea District Heating Corporation (KDHC) as Project Participant in the CDM project activity. The Korea DNA assessed the project's capacity to reduce GHG emission and its alignment with Korean law, its environmental legislation and its sustainable development policies.

3.2 Project Design

The Project Design is appropriately described in Section A of the PDD.

The proposed project can be classified as a bundled small-scale CDM project and Project Scope is 1-Energy Industries (Renewable -/Non-renewable sources).

The project sites are located in Daechundong Dalseogu Daegu city and Jungdomyun Sinangun JeollaNamdo, Korea.

The purpose of the project is to install a PV power plant inside of Daegu & SinanJeungdo Plant Area and to generate electricity utilizing photovoltaic. The generated electricity is connected to grid system to distribute electricity. Therefore, the project will displace electricity generated by fossil fuel ,and reduce anthropogenic GHG emissions which are caused by fossil fuel use .The

project will generated 1,302MWh (Daegu project:121MWh, Sinan project :1,181MWh) per year and the emissions reduction of GHG is evaluated as 827 tCO2 e per year .

1) The type and technology of the project

The project activity consists of the installation and operation of a grid connected PV power plant with 0.9MW (Daegu: 0.1MW, Sinan: 0.8MW) capacity. The PV power plant generates electricity using renewable energy and displaces electricity generated by fossil fuel. Being a renewable electricity generation project connected to grid with an output capacity of less than 15 MW, the project qualifies as a small-scale CDM project of Type I-D of 'Appendix B of the simplified modalities and procedures and procedures for small-scale CDM project activities'.
Solar cells of the PV power plant are produced by Solar World, which is one of the solar companies in Germany and provided by Kyungdong solar and Unison which are local company in Korea. This system is operated by remote control and it is possible to audit and measure the data at long distance.

2) The project's contribution to sustainable development

The project supports the government policy which promotes development of renewable energy technology in Republic of Korea.

The project contributes to sustainable development in the following ways:

- Generation by photovoltaic Power Plant decreases fossil use and will make nation-wide benefit.
- As one of renewable energy sources, photovoltaic power does not emit any GHG and pollutant into the air and contribute to improve local air quality.
- Photovoltaic power can be utilized as an energy source for future generations, because it alternates fossil fuel and does not impact in resource exhaustion.
- As a good practice for renewable energy use and environmental improvement, the project activity could be replicated across other district heating companies or heat suppliers in Korea
- The project contributes to the sustainable development of local communities with the creation of direct, indirect employment in the region.

3) Project duration and crediting time

This project applies for a renewable crediting period which starting date of first crediting period is 1 August 2008. The expected operational lifetime is 20 years. Duration of crediting time is set as 10 years.

4) Use of Official Development Assistance (ODA) fund

The funding for the project does not lead to a diversion of official development assistance. The validation team has reviewed the project financing information in which ODA is not involved.

3.3 Baseline Determination

The project applies the approved simplified baseline methodology for small-scale CDM project activities AMS-I.D (Version 12) titled "Grid connected renewable energy generation".

This project is satisfied with the condition like the below.

- This project is photovoltaic Power Plant. All capacity, 0.9MW including Daegu project and Sinan project are less than the applicable condition to small scale, 15MW.
- The capacity of this project is less than 15MW photovoltaic Power Plant. This project doesn't comprises any other fossil fuel.
- This project is not Combined heat and power (co-generation) systems, but electricity generation facility.
- This project is not the addition of renewable energy generation units, but the construction of new renewable energy generation.
- This Project is not to retrofit or modify an existing facility for renewable energy generation.

According to AMS I.D (Version 12), the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kgCO2e/kWh) calculated in a transparent and conservative manner as;

(a) A combined margin(CM), consisting of the combination of operating margin(OM) and build margin(BM) according to the procedures prescribed in the approved methodology ACM0002, or

(b) The weighted average emissions (in kgCO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

In order to determine the baseline of this project, (a) of the above baseline approaches is chosen. Therefore, the baseline of this project was established by ACM 0002/Version 06(19 May 2006).

This project baseline emission factor is calculated by the weighted average of the Operating margin emission factor and Build margin emission factor multiplied together.

According to ACM0002, dispatch data analysis should be the methodological choice for OM emission factor, but in Korea, dispatch data of the grid is not available. Thus this dispatch data analysis is not selected as an emission factor. Here, Simple OM method is selected for calculating emission factor. As indicated in ACM0002, the choice for Simple OM is justified since low-cost/must run resources constitute less than 50% of the total grid generation in average of the five most recent years (2002-2006).

Build Margin(BM) emission factor, between the options suggested in ACM0002, option 1-calculated based on the most recent information available on plants already build for sample group m at the time PDD submission is chosen. For sample group m, the power plant capacity additions in the electricity system that comprise 20% of the system generation(in MWh) and that have been built most recently is selected since this group has larger annual generation than five power plants that have been built most recently.

Operating Margin (OM) and Build Margin (BM) are calculated by using the data from existing power plants that provide electricity with the current grid-connected electricity generation, and with this result, the EFy (Emission Factor: CM) is be calculated.

In the baseline scenario the electricity delivered from the project activity to the grid would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. This is reflected in the combined margin (CM) the weighted average of the operating margin (OM) emission factor and the build margin (BM) emission factor.

According to ACM 0002, the default of WOM and WBM 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.

In accordance with ,it validated that this project was applicable to the methodology AMS I.D.
and it can be confirmed that the application, discussion and determination of the chosen baseline methodology is transparent.

3.4 Additionality

The additionality of the project has been demonstrated according to attachment A to Appendix B of simplified modalities and procedures for small-scale CDM projects activities. The project participants provided explanation to show that the project activity would not have occurred anyway due to investment, technological and prevailing barrier.

- **Prior consideration of CDM**

Stating date of this project activity is decided as 13 December 2005 by PP. This date is prior to the commencement of validation thus validation team reviewed history of the project activity for confirming the requirements such as "If the project activity starts date is prior to the commencement of validation it shall be demonstrated that the incentive from the CDM was seriously considered in the decision to proceed with the project activity"

History of the project activity was as follows:

- 11 August 2005 ~ 10 September 2005: Feasibility study for this project activity
- 05 October 2005: Based on the result of feasibility study, this project activity decided to proceed as CDM project in KDHC's management review
- 13 December 2005 : Approval of electricity generation business from Sinanjeungdo PV (photovoltaic) Power Plant Project by local government, JollaNamdo of the Republic of Korea.
- 22 February. 2006: Approval of electricity generation business from Daegu PV (photovoltaic) Power Plant Project by Daegu city of the Republic of Korea and so on.

Validation team also reviewed whether KDHC considered the incentive from CDM in the decision to proceed with the project activity. This is reviewed including selling CERs in KDHC's management review in October 2005.

Validation team identified that starting date of this project activity is reasonable and appropriate by reviewing objective evidence provided by PP which are related to above facts.

Based on the objective evidence submitted by PP, DOE confirmed that investment to this project activity was decided at at the 6th management meeting on 5 October 2005 as requesting approval of this project activity to local government was performed which was preceded based on the minutes of the 6th management meeting. Also staring of construction, completion of construction and starting date of commercial operation were reviewed based on the evidence provided by PP.

And PP was requested to explain above facts clearly in the PDD and submitted those evidences to DOE.

NO	DATE	SUBJECT
2-1	'06.10.19	- The Daegu PV Power Plant Construction Completion Report (대구 태양광발전 설치완료 보고)
2-2	'07.12.21	- The result of the permit on the completion of SinanJeungdo PV (신안증도 태양광발전설비 구매 준공검사 결과보고)
2-3	'06.09.22	- Notification recognition of the commissioning of the Daegu PV Power Plant (대구 태양광발전소 사업개시신고 수리)
2-4	'07.11.13	- Notification recognition of the commissioning of the PV Power Plant (전기사업 개시신고 수리)

[List of documents regards construction]

Based on the objective the evidences submitted by PP, DOE confirmed that "the evidences that continuing and real actions were taken to secure CDM status for the project activity in parallel with its implementation".

Validation team confirmed like below that continuing and real actions were taken to secure CDM status for the project activity in parallel with implementation based on objective evidence provided by PP.

In the course of taking real actions for project activity after deciding to do this project as CDM in the 6th management meeting on 5 October 2005, there was a little delay. The reason of it was explained by PP and validation team accepted it.
The reason is as below:
"Expected emission reductions from Daegu PV Power Plant were less than 100tCO2, it was not reasonable to register the project by itself on economic point of view. Thus KDHC decided to bundle Daegu PV Power Plant project and SinanJeungdo PV Power Plant Project. When KDHC decided to proceed this project, there was an economic barrier to promote the project as CDM. Daegu and SinanJeung PV Power Plants each had very small capacity, so KDHC had to bundle those projects for saving the cost. Even though those projects would be registered as bundling CDM, the CERs would be still very small. Thus KDHC tried to register this project by themselves for saving the cost and raising their ability for dealing CDM. KDHC has focused on the training of employees and KDHC employees working at CDM has been educated steadily. They have attended various educations, conferences and seminars. Especially the educations conducted by DOE and consulting company have been helpful for raising their ability related with CDM and Green House Gas."

Above facts were crosschecked and reviewed with the documents on the list below, and validation conclude that real actions were taken in parallel with its implementation after decision-making for proceeding this project activity.

3-1	'06.10.17	- The new CDM Project planning report (신규 CDM사업 추진계획 보고)
3-2	'06.10.31	- The memorandum of understanding (기후변화협약 업무협력 합의서)
3-3	'06.11.21	- Notification of the education to cultivate Exerts for UNFCCC in 2006 (2006년도 기후변화대책 전문가과정 교육 시행)
3-4	'07.03.22	- Report the present propulsion condition of CDM Project (CDM사업 추진현황 보고)
3-5	'07.04.05	- Articles of newspapers (보도자료)
3-6	'07.05.16	- The result of business trip for research about tendency of would carbon market and CDM cases (세계 탄소시장의 동향 및 CDM 해외사례 조사를 위한 해외출장 결과보고)
3-7	'07.07.23	- CDM project plan report of Daegu & SinanJeungdo PV Power Plant (대구&신안 태양광발전 CDM사업 추진방안 보고)
3-8	'07.08.20	- Request of assistance in photovoltaic power generation CDM (태양광발전 CDM사업 추진관련 협조 요청)
3-9	'07.08.31	- The certificate of training for verification GHG reductions (교육 수료증)
3-10	'07.08.31	- Notification of Renewable energy CDM experts cultivation education and workshop (신재생에너지 CDM사업 전문가양성 교육 및 담당자 워크샵 시행)
3-11	'07.09.21	- The instruction to cultivate experts and the results of workshop (신재생에너지 CDM사업 전문가 양성 교육 및 담당자 워크샵 결과보고)
3-12	'07.10.29	- The contract for validation (계약서)
3-13	'08.01.31	- The certificate of training for GHG CDM expert education (교육 수료증)
3-14	'08.06.25	- Notification at homepage (홈페이지 공지사항 게시)

[List of documents regards real action taken]

- **Investment Barrier**

The project NPV (Net Present Value) of the project activity is selected as the financial indicator. The NPV for proposed CDM project is negative (Daegu project: -818 million KRW, SinanJeungdo project: -6,517 million KRW). This shows that the project is not financially attractive in the absence of CDM benefits.

In order to arrive at the conclusions regarding the robustness of the financial attractiveness to reasonable variations in the critical assumptions, sensitivity analysis is opted.

Below parameters are considered in sensitivity analysis.
: Utilization rate with -10% ~ 30% variation ranges

: Price of purchasing electricity (SMP) with ±10% variation range
: Discount rate changing with 3% and 10%

According to sensitivity analysis, NPVs for proposed project activity are still negative.

Based on the investment analysis above, the project is not proved financially attractive and the project activity is not a likely baseline scenario. Thus emission reduction from the project activity is additional.

Validation team has been verified all financial data and information for investment analysis and also validated relevant assumptions such as the utilization rate and variation range for sensitivity analysis in a reasonable and conservative manner.

- **Technical Barrier**

In Korea, renewable energy generation constitutes only small portion of overall electricity market. In year 2006, the generation of renewable energy reached 489,366 MWh, 0.134% of total generation 365,368,969MWh. Also there is yet a little experience of operating, managing and repairing renewable energy facilities. The developers of renewable energy facilities in Korea did not have an opportunity to improve their capacity because of lack of experiences. This made the market share of renewable energy in Korea had been very low. In such circumstances, Korea lacks technology or experience in renewable energy facilities including the PV(photovoltaic) facilities.

- **Prevailing Barrier**

There is a social dis-satisfication/doubt of government policies relate to the supporting renewable energy project. These policies have been adopted irregular. Irregular policy changed lead to uncertainties in revenue generation and thus more on the project risk. The renewable power plant owners in turn had no prior intimation of any change in the renewable energy policy. That is why there are a few renewable energy facilities in Korea and this is act as prevailing barrier to this project activity.

Thus, the validation team arrived at the point that the project activity can be assessed to be additional and is not a BAU case.

3.5 Monitoring Plan

The project applies the monitoring methodology AMS I.D: Grid connected renewable electricity generation (Version 12) and the latest version of Appendix B to the simplified M & P for small scale CDM project activities.

The monitoring methodology designed for the real measurements of export of electricity to Korean gird. The electric power generated by this project activity will be measured using electricity meters with ±0.5% uncertainty.

Daegu & SinanJeungdo PV Plant will be operated and monitored by KDHC Daegu branch's operation teams through the remote operating and monitoring system. The remote operating and monitoring system of the PV Power Plant makes possible to audit and measure the data by sending electric characteristics such as power generation, voltage, electric current and frequency of photovoltaic generation of electric power to the main computer. It is also possible to audit and measure the data at a distant place by a LAN or a modem.

Electricity supplied to the Korean grid by the project activity, EG_Y, is the only parameter to be monitored for calculation for emission reduction and this will be measured hourly and recorded monthly. The data is saved on PV management system PC permanently. Electricity is supplied to the grid directly. The supplied amount is confirmed monthly by KEPCO through the meter. Monitored data will be reported to the Manager on a monthly basis. The procedure for calibration and maintenance of monitoring equipment are prepared on the site and this is clearly mentioned in the PDD. Data will be kept for two years after the last issuance of the CERs and all collected information will be stored electronically.

There is no need to monitor the grid CO_2 emission coefficient as it is fixed ex-ante for the selected 10 years crediting period.

3.6 Calculation of GHG Emissions

According to ACM 0002(Version 06), emission reduction is calculated as following equation:

$$ERy = BEy – PEy – L = BEy$$

- BEy (t CO_2): Baseline Emissions

- PEy : Project Emissions
  - No project emissions need to be considered, as the project activity is a renewable energy project
- L : Leakage
  - According to ACM 0002, no leakage has to be considered for the proposed project activity

Baseline emissions are calculating as electricity supplied by the project activity to the grid (EGy in MWh) times baseline emissions factor (EFy in ton CO_2/MWh).

First, electricity supplied to the Korean grid by the project activity (EGy) is expected approximately 1,302 MWh/yr.

Second, the baseline emissions factor (EFy in the CO_2/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 0.7195 ton CO_2/MWh.
- BM is calculated to be 0.3810 ton CO_2/MWh.
- CM (Refer to B.6 in PDD,CM=0.75× OM + 0.25×BM) is calculated to be 0.6349 ton CO_2/MWh and is fixed ex-ante for the entire crediting period and this emission factor which is not need to be monitored.

The 8,270ton CO_2 is estimated as emission reduction over the crediting period (for 10 years) of emission reduction. Validation team concluded that the GHG calculation is complete and transparent and estimated reasonably.

3.7 Environmental Impacts

According to the Act on Assessment of Impacts of Works on Environment, Traffic, Disasters, etc., Korea government does not require an EIA (Environmental Impact Assessment) for the project activity. Although the government does not require an EIA, KDHC considered

environmental impacts from this project activity – Air quality, water quality and noise etc. in the designing stage. The Daegu project is located within KDHC Daegu branch and the SinanJeungdo project is located in Sinan which were chosen as the optimum area for PV Power Plant. In the 'Previous Environmental Impact Business handbook' published by the Ministry of environment, there is no any environmental impact by this project. Sinangun administration authorities investigated environmental impact by this project on 27 September 2006 and decided that there is no any special environmental impact.

Validation team concluded that there is no any special environmental impact in the project through reviewing related documents during validation.

3.8 Comments by Local Stakeholders

To receive stakeholder' comments related with this project, PP held a project presentations to the stakeholders and reported in the newspaper.

For Daegu projecy, it was reported on the newspaper such as Gas Industry Newspaper (27 February 2007), Korea Energy (3 March 2006) and Dongailbo(28 February 2006). As a result of these media announcement, the project participants have received favorable comments for the project

And for SinanJeungdo project, KDHC explained the purpose, background, present condition and construction schedule of this project to the stakeholders and received comments on 23 February 2007. In this public hearing, local stakeholders had a positive attitude toward this project but raised concerns about the possibility of affecting the fishery by the construction's noise. KDHC had communicated and compensated about this matter by mutual agreement with stakeholders.

Validation team has looked through the public hearing minutes and interviewed local stakeholder to verify project proponent used appropriate media to invite comments on proposed project activity and due accounts was taken properly. Also validation team has found all participants in the public hearing were agreed and supported this project activity and, look for development of local economy.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

Korean Foundation for Quality published the project documents on http://cdm.unfccc.int/Projects/Validation on 21 November 2007 and invited comments within 20 December 2007 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 'Daegu & SinanJeungdo PV (photovoltaic) Power Plant Project of Korea District Heating Corporation (KDHC)' in 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 includes article 12 of the Kyoto Protocol, the modalities and procedures for CDM, the relevant decisions by COP/MOP and 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, fulfilled the participation criteria and has approved the project and authorized the project participation. The DNA of Korea has confirmed that the project will assist in achieving sustainable development.

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

By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. An analysis of the additionalilty 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 validation team reviewed the estimation of the projected emission reductions. We can confirm that the indicated amount of emission reductions of 8,270 ton CO_2 over a fixed crediting period of 10 years, resulting in a calculated annual average of 827 ton CO_2, represents a reasonable estimation using the assumptions given by the project documents.

The monitoring responsibilities 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 Daegu & SinanJeungdo PV(photovoltaic) Power plant Project in Korea, as described in the revised PDD of 30 September 2008, 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.12 and ACM0002. Thus the project will hence be recommended by KFQ for registration as a CDM project with the UNFCCC.

6 REFERENCES

Category 1 Documents:

List documents provided by the Client that relate directly to the GHG components of the project,

/1/ Project Design Document for "Daegu & Sinanjeungdo PV(Photovaltaic) Power Plant Project (07 Nov 2007, ver.0, 18 Nov 2007, rev.1, 19 Feb 2008, ver.2, 30 September 2008 ver.5)"

/2/ Project Design Document Form CDM-SSC-BUNDLE for "Daegu & Sinan PV(Photovaltaic) Power Plant Project (07 Nov 2007, ver.0, 18 Nov 2007, rev.1, 19 Feb 2008, ver.2, 30 May 2008 ver.3)".

/3/ KDHC, One supporting Excel spreadsheets of emission factor calculations (APPENDIX_1_Emission Factor)

/4/ KDHC, One supporting Excel spreadsheets for economic analysis (APPENDIX_2_NPV Analysis)

/5/ KDHC, One supporting documents for additional information of the Project (APPENDIX_3_additional information)

Category 2 Documents:

List background documents related to the design and/or methodologies employed in the design or other reference documents.

/1/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF) : Validation and Verification Manual. http://www.vvmanual.info

/2/ CDM-EB, AMS-I.D_Ver.12 – Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

/3/ Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities

/4/ CDM-EB,

- Revision to the approved consolidated baseline methodology ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 06)
- Revision to the approved consolidated monitoring methodology ACM 0002: Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable source (Version 06)

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 I Parties in achieving sustainable development and the project has obtained confirmation by the host country that the project assists in achieving sustainable development.	Kyoto Protocol Art. 12. 2/SSC M&P 23a	OK	Table 2, Section A.3
3. 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 B.7
4. The project shall have written approval of voluntary participation from the designated national authorities of each party involved.	Kyoto Protocol Art. 12. 5a/SSC M&P 23a	~~CAR1~~ OK	~~The DNA approval for the host country needs to be provided.~~ . The DNA approval of the host country submitted.
5. 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.7
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity.	Kyoto Protocol Art. 12.5c /SSC M&P 26	OK	Table 2, Section B.3
7. Potential public funding for the project form Parties in Annex I is not a diversion of official development assistance.	D 17/CP.7 CDM M&P Appendix B. 2	OK	No public funding is involved.
8. 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
9. The host country is a Party to the Kyoto Protocol.	CDM M&P 30	OK	Republic of Korea has approved Kyoto Protocol on 8 November. 2002.
10. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in 6(c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity.	SSC M&P 12a, c	OK	Table 2, Section A.1
11. The PDD shall conform to the SSC PDD format.	SSC M&P, Appendix A	OK	The Simplified Project Design Document for Small-Scale Project Activities; SSC PDD format Version 03 (22 December 2006) is used.

12. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category.	SSC M&P 22e	OK	Table 2, Section A.1, B.1 and B.8. The project activity fall under category I.D "Grid connected renewable electricity generation (Ver. 12)" and uses the simplified baseline and monitoring methodology for that project category.
13. Comments by local stakeholders are invited, a summary of these provided and how due account was taken of any comments received.	SSC M&P 22b	OK	Table 2, Section E
14. If required by the host party, an analysis of the environmental impacts of the project activity is carried out and documented.	SSC M&P 22c	OK	According to the Act on Assessment of Impacts of Works on Environment, Traffic, Disasters, etc., Korea government does not require an EIA (Environmental Impact Assessment) for the project activity. Although the government does not require an EIA, KDHC considered environmental impacts from this project activity such as Air quality, water quality and noise etc. in the designing stage. Refer to D.1~D.4 of Table 2 in this report.
15. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available.	SSC M&P 23b, c	OK	They were invited to provide comments through the CDM website during 30 days from 21 NOV 2007 to 20 DEC 2007. No comment was received.

Table 2. Requirements Checklist

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

Question	Ref.	MoV	Comments	Draft. Concl.	Final Concl.
A. Project Description *The project design is assessed.*					
A.1. Small scale project activity *It is assessed whether the project qualifies as small scale CDM project activity.*					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6(c) of decision 17/CP.7 on the modalities and procedures for the CDM?	PDD A.2	DR,I	The installed capacity is 0.9 MW , that is satisfied the qualification of small-scale project activities as threshold of small-scale project activities of less than or equal to 15 MW The project activity fall under the ' Type I: Renewable energy projects' and category I.D Version 12: ' Grid connected renewable electricity generation' .	**OK**	**OK**
A.1.2 The small scale project activity is not a debundled component of a larger project activity?	PDD A.4.5	DR,I	It has been verified that the criteria of Appendix C of the simplified modalities and procedures were satisfied. It is not a debundled project activity since there is no CDM project activity in the same category by the same project proponent within 1km of the present project activity in last two years.	**OK**	**OK**
A.1.3 Does proposed project activity confirms to one of the project categories defined for small scale CDM project activities?	PDD A.4.2	DR	Yes, the project activity confirms to category I.D "Grid connected renewable electricity generation (Ver. 12)".	**OK**	**OK**
A.2. Project Design. Validation of project design focuses on the choice of technology and the design documentation of the project.					
A.2.1 Are the project's spatial (geographical) boundaries clearly defined?	PDD A.4.1	DR,I	Full detail of the location of the project activity to identify geographical boundaries is not clearly described in the PDD.	**CL1**	**OK**

A.2.2 Are the project's system(components and facilities used to mitigate GHG's) boundaries clearly defined?	PDD A.4.1, B.3	DR,I	The PDD (A.4.2) states that the project boundary includes the product site and all the power plants connected physically to the electric system of KEPCO.	**OK**	**OK**
A.2.3 Does the project design engineering reflect current good practices?	PDD A.4.2	DR,I	The type of solar cell is crystal silicone that is one of the most advanced technology and practical one. The system is operated by remote control and it is possible to be audit and measure the data at a distance place. It means that the project design engineering reflects current good practices.	**OK**	**OK**
A.2.4 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	The Solar Cell is manufactured by Solar World in Germany and electricity generation system by using Solar Cells is environmentally safe & sound technology. This project is used an innovative new module from Solar World. In conclusion, KFQ confirmed that this project is used art technology more than any commonly used technologies in KOREA.	**OK**	**OK**
A.2.5 Does the project make provisions for meeting training and maintenance needs?	PDD A.4.2	DR,I	The operating team was trained for operating, monitoring, maintaining and managing of PV generation system by Manufacturing Company, Solar World.	**OK**	**OK**
A.2.6 Has the PDD form been duly filled?	PDD	DR	Table 8 of B.6.4 in the PDD form is not filled completely.	**CAR4**	**OK**
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed*					
A.3.1 Will the project create other environmental benefits than GHG emission reductions?	PDD A.2	DR,I	Yes, PV project does not emit any air pollutant or GHG unlike other fossil fuel power generations, this project can be seen as an environment friendly project. In conclusion, this project has environmental benefits besides GHG emission reduction.	**OK**	**OK**
A.3.2 Has the host country confirmed that the project assists it in achieving sustainable development?	PDD A.2	DR,I	Host Government Approval has not obtained. This document is a prerequisite for registration as per CDM Modalities & Procedures 40(a).	**CAR1**	**OK**
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					

B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology*					
B.1.1 Does the project apply an approved methodology and the correct version thereof?	PDD B.1	DR	Yes, the project applies the approved AMS-I.D(Ver 12) .They have been clearly demonstrated in B.1 of the PDD	**OK**	**OK**
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	PDD B.2/ B.6.1	DR	Yes, the baseline methodology is in line with the baseline methodology provided with category. The project activity is confirming to ' Type I: Renewable energy projects' and category I.D/Version 12: ' Grid connected renewable electricity generation'. And the applicability criteria of ACM 0002 are fulfilled.	**OK**	**OK**
B.2. Baseline Scenario Determination *The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.*					
B.2.1. What is the baseline scenario?	PDD B.4	DR	The project applies one of the simplified baseline methodologies proposed for the small-scale project activity category I.D, i.e the baseline is the annual kwh generated by the project times an emission factor calculated in accordance with ACM 0002.	**OK**	**OK**
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	PDD B.4	DR	According to ACM 0002, the baseline scenario is the electricity delivered to the grid by the project 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) calculations	**OK**	**OK**
B.2.3. Has the baseline scenario been determined according to the methodology?	PDD B.4	DR,I	For the baseline emission calculation, the CM (combined margin) is not correctly calculated as well as OM (operating margin) & BM (build margin).	**CAR2**	**OK**

B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	PDD B.4	DR,I	In case of the SinanJeungdo project, utilization rate of PV generation is not explained sufficiently how to get the utilization data of 15.0% for fixed type), 17.6% for tracking both axis type and 19.5% for tracking one axis type.	**CAR3**	**OK**
B.2.5 Does the baseline scenarios sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	PDD B.4	DR	According to EB 16th meeting report, this project activity is applied to Type E-'national and/or sectoral policies or regulations that have been implemented since the adoption by the COP of the CDM M&P may not be taken into account in developing a baseline scenario and this analysis is performed based on this hypothetical situation without regarding the 'Alternative Energy Development Promotion Act amended on March 2002'. According to this decision, purchase price of electricity, which excludes subsidy through compensation for difference between generation costs by MOCIE, was applied to the investment analysis. Additionally, based on 26th meeting report, 'Clarification on the consideration of national and/or sectoral policies and circumstances in baseline scenarios". Based on electricity law, SMP (System marginal price of the grid promote) price is adopted from solar power unit cost prior to the notice of official price. Government subsidy for generation of electricity power difference ruled by 'Renewable energy development and supply promotion Law' is excluded. It is also excluded from the unit cost of purchase in the investment analysis.	**OK**	**OK**
B.2.6 Is the baseline scenario determination compatible with the available data and is all literature and sources clearly referenced?	PDD B.4	DR	The source of OM & BM is compatible with the available data and is all literature and sources clearly referenced.	**OK**	**OK**
B.2.7 Have the major risks to the baseline been identified?	PDD B.4	DR	Refer to B.2.3	**CAR2**	**OK**
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					

B.3.1 Is the project additionality assessed according to the methodology?	PDD B.5	DR	According to the attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project additionality were assessed by investment analysis and sensitivity analysis that the evidences are provided in section B.5 in the PDD. The project NPV (Net Present Value) of the project activity is selected as the financial indicator. The NPV for proposed CDM project is negative (Daegu project: -818 million KRW, SinanJeungdo project: -6,517 million KRW). This shows that the project is not financially attractive in the absence of CDM benefits. To reach a conclusion as above, validation team validated the data and figures in Appendix 2(NPV Analysis) of the PDD provided by PP. Main input figures in Appendix 2 are as follow: ① Construction cost : For Daegu-100kw : 835 million won(excluding V.A.T) is crosschecked with the cost in '2nd clause of the Daegu PV Power Plant Construction Completion Report(Refer appendix 3)' and related bills For SinanJeungdo-800kw: 6,637 Million won(excluding V.A.T) is crosschecked against contract between PP and construction company, Unison Co.,Ltd. Also 'The result of the permit on the completion of SinanJeungdo PV power plant' in appendix 3 is reviewed whether these figures are correct and reasonable. ② maintenance cost : Validation team found and accepted that the maintenance cost is approximately 1% of total investment cost for decision making in a general way. And 1% of total investment cost is reflected as maintenance cost in other project too. ③ Electricity generation : Electricity generation is directly related to the utilization rates. PP adopted 13.8% for fixed type of Daegu, 15% for SinanJeungdo, 17.6% for tracking one axis and 19.5% for tracking two axis as utilization rate. - 13.8% for fixed type of Daegu: This utilization rated is selected from 'Daegu project's actual operation and prediction' dated July 2007 which is based on real operational data. In the course of validation, validation team identified utilization rate against real operational data and accepted the selected figure. - 15% for SinanJeungdo, 17.6% for tracking one axis and 19.5% for tracking two axis: This figures are selected from 'The final report of business feasibility analysis by Josun University'. Validation team	**OK**	**OK**

			accepted these utilization rates according to professional advice and module specification in Appendix 2. - ④ price of purchasing electricity(SMP) SMP for this project activity is 82.116 won/kWh which announced publicly on KPX website. Validation team crosschecked this price with the data from website and calculated average SMP for making decision whether the SMP is reasonable. And validation team decided this SMP is reasonable. But, calculated electricity sales and gross sales in 'The report "Daegu project's actual operation and prediction' of the Appendix 3 are different as SMP because of electricity sales and gross sales is including compensation according to subsidy for renewable energy facility. And this is reported to PP internally. In 2002, subsidy for renewable energy facility was established first with Alternative Energy Development Promotion Act(No. 6672) and in 2004 the law was revised with Alternative Energy Development Promotion Act(No. 7284) ⑤ Discount rate is 7%. Discount rate is 7% and PP selected this rate based on the '2nd Basic Plan of Long Term Electric Supply & Demand (2004, Ministry of Commerce, Industry and Energy). Validation team checked discount rate, 7%, with the evidence submitted by PP and confirmed the rate is appropriate. Without subsidy for renewable energy facility, IRR for photovoltaic power project in Korea is very low even through expanding sensitivity of main parameters such as construction cost, maintenance cost, electricity generation, SMP and discount rate In spite of that, In order to arrive at the conclusions regarding the robustness of the financial attractiveness to reasonable variations in the critical assumptions, sensitivity analysis is opted. Below parameters are considered in sensitivity analysis. : Utilization rate with -10% ~ 30% variation ranges - According to research report of MOCIE, even through under good condition, utilization rate of PV plant may not be exceeded 30%. Also it may not -10% below than selected utilization rate. : Price of purchasing electricity (SMP) with ±10% variation range		

			: Discount rate changing with 3% and 10% - 3-year yield of treasury bonds (Government bond rate) for 2006 was 4.83% and corporate bond was not exceed 10%. According to sensitivity analysis, NPVs for proposed project activity are still negative. Based on the investment analysis above, the project is not financially attractive and the project activity is not a likely baseline scenario. Thus emission reduction from the project activity is additional. Validation team has been verified all financial data and information for investment analysis and also validated relevant assumptions such as the utilization rate and variation range for sensitivity analysis in a reasonable and conservative manner. Checked input values related to the sensitivity analysis by DOE is as follows: ① Yields of treasury bonds(3-year) in market interest rates was 4.83% (2006, The Bank of Korea) and Yields of Korean company's bond have been not over 10% during current 3 years. Evidence of 4.83% is information provided in 2006 by 'The bank of Korea' and interest rate of corporate bond, 10% is confirmed by the latest Balance Sheets of KDHC that was published on 2008. And validation team accepted that selected discount rate, 3%, is reasonable in conservative manner as yields of treasury bounds in market interest rate was 4.83% ② Utilization rate with -10% ~ 30% variation ranges According to research report of MOCIE, utilization rate of photovoltaic power project in Korea is 13.7% at the minimum and 22.7% at the maximum. Thus PP selected variation range as -10%(13.5% at the minimum) and +30%(25.4% at the maximum) of standard value and DOE accepted this range for sensitivity analysis. ③ Price of purchasing electricity (SMP) with ±10% variation range. Variation range for SMP sensitivity analysis is ±10%. Published SMP for photovoltaic power by KPX has not exceeded 90 won/kWh until the time for validation Based on this SMP, 90.328 won/kWh(+10% of 82.116 won/kWh) is decided as maximum SMP and 73.9 won/kWh(-10% of 82.116 won/kWh) as minimum SMP by PP. Validation team identified these figures via KPX website and accepted it. ④ Discount rate changing with 3% and 10% PP decided variation range for discount rate as 3% and 10% because of 3-		

			year yield of treasury bonds (Government bond rate) for 2006 was 4.83% and corporate bond was not exceed 10%" Validation team identified these figures with 2006 government bond rate provided by The Bank of Korea and The Balance Sheet of KDHC(2008), and concluded selected figures are appropriate. Also validation team decided that selected minimum range for sensitivity analysis of discount rate, 3%, is reasonable in conservative manner		
B.3.2 Are all assumptions stated in a transparent and conservative manner?	PDD B.5	DR	Refer to B.2.4	**CAR3**	**OK**
B.3.3 Is sufficient evidence provided to support the relevance of the arguments made?	PDD B.5	DR,I	Refer to B.3.1	**OK**	**OK**
B.3.4 If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	PDD B.5	DR,I	Stating date of this project activity is decided as 13 December 2005 by PP. This date is prior to the commencement of validation thus validation team reviewed history of the project activity for confirming the requirements such as "If the project activity starts date is prior to the commencement of validation it shall be demonstrated that the incentive from the CDM was seriously considered in the decision to proceed with the project activity" History of the project activity was as follows: - 11 August 2005 ~ 10 September 2005: Feasibility study for this project activity - 05 October 2005: Based on the result of feasibility study, this project activity decided to proceed as CDM project in KDHC's management review - 13 December 2005 : Approval of electricity generation business from Sinanjeungdo PV (photovoltaic) Power Plant Project by local government, JollaNamdo of the Republic of Korea. - 22 February. 2006: Approval of electricity generation business from Daegu PV (photovoltaic) Power Plant Project by Daegu city of the Republic of Korea and so on. Validation team also reviewed whether KDHC considered the incentive from CDM in the decision to proceed with the project activity. This is reviewed including selling CERs in KDHC's management review in October 2005. However, identified and reviewed information about the starting date of	**CL2**	

			project activity and consideration of CDM in the decision to proceed with the project activity by validation team were not fully described in the PDD.		
B.4 Calculation of GHG Emission Reductions – Project emissions *It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.4.1 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	PDD B.6	DR	The project is the PV power generation project and no project emission is expected.	**OK**	**OK**
B.4.2 Have conservative assumptions been used when calculating the project emissions?	PDD B.6	DR	N/A	**OK**	**OK**
B.4.3 Are uncertainties in the project emission estimates properly addressed?	PDD B.6	DR	N/A	**OK**	**OK**
B.5 Calculation of GHG Emission Reductions – Baseline emissions *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	PDD B.6	DR	Yes. The calculation was documented according to the approved methodology by AMS I.D. And the calculation for baseline emissions is provided in section B.6.3 in the PDD in a complete and transparent manner.	**OK**	**OK**
B.5.2 Have conservative assumptions been used when calculating the baseline emissions?	PDD B.6	DR	Refer to B.2.	**CAR2 CAR3**	**OK**
B.5.3 Are uncertainties in the baseline emission estimates properly addressed?	PDD B.6	DR	Yes. The uncertainty in baseline emission is addressed in section B.6.2 in PDD	**OK**	**OK**
B.6 Calculation of GHG Emission Reductions – Leakage *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					

B.6.1 Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	PDD B.6	DR	For the PV power project, no leakage need be considered.	**OK**	**OK**
B.6.2 Have conservative assumptions been used when calculating the leakage emissions?	PDD B.6	DR	Refer to B.6.1	**OK**	**OK**
B.6.3 Are uncertainties in the leakage emission estimates properly addressed?	PDD B.6	DR	Refer to B.6.1	**OK**	**OK**
B.7 Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.1 Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	PDD B.6	DR	Yes, By displacing fossil-fuel based generated electricity, the project is expected to reduce 827t CO2e per year for the crediting period.	**OK**	**OK**
B.8 Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.8.1 Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	PDD B.7	DR	Yes. the project is applied approved methodology AMS-I.D version 12, indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories	**OK**	**OK**
B.8.2 Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	PDD B.7	DR, I	Data will be kept for two years after the last issuance of the CERs and all collected information will be stored electronically.	**OK**	**OK**
B.9 Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
B.9.1 Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	PDD B.7	DR	Generation by PV plant does not emit GHGs and hence there will be no project emission. The electricity consumed in the plant is excluded in measuring the amount of electricity supplied to the grid.	**OK**	**OK**

B.9.2 Are the choices of project GHG indicators reasonable and conservative?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.3 Is the measurement *method* clearly stated for each GHG value to be monitored and deemed appropriate?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.4 Is the measurement *equipment* described and deemed appropriate?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.5 Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.6 Is the measurement *interval* identified and deemed appropriate?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.7 Is the *registration, monitoring, measurement* and *reporting* procedure defined?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.8 Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.9.9 Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	PDD B.7	DR	Yes. Refer to B.9.1	**OK**	**OK**
B.10 Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					

B.10.1 Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	PDD B.7.1	DR	The monitoring plan contains only one parameter for monitoring which is the 'net electricity exported (EGy)' to the Korean grid. The collection and archiving of EGy is properly accounted in the monitoring plan. Through the section B.7.1 in the PDD gives the description of monitoring.	**OK**	**OK**
B.10.2 Are the choices of baseline GHG indicators reasonable and conservative?	PDD B.7.1	DR	According to the monitoring methodology, only electricity supplied by the project activity to the grid as EFy. OM and BM are not to be monitored as these factors are chosen using ex-ante method based on most recent information available on the plant already built at the time of PDD submissions.	**OK**	**OK**
B.10.3 Is the measurement *method* clearly stated for each baseline indicator to be monitored and also deemed appropriate?	PDD B.7.1	DR	The measurement method clearly stated for baseline indicator to be monitored and also deemed appropriate in the section B.7.1 of the PDD.	**OK**	**OK**
B.10.4 Is the measurement *equipment* described and deemed appropriate?	PDD B.7.1	DR,I	The measurement equipment (total electricity exported to grid by this project activity) is described and deemed appropriate in the section B.7.1 of the PDD.	**OK**	**OK**
B.10.5 Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	PDD B.7.1	DR,I	The allowable error of the data is within ±0.5% according to the Electricity Enterprises Act.The procedure for calibration and maintenance of monitoring equipment is in place.	**OK**	**OK**
B.10.6 Is the measurement *interval* for baseline data identified and deemed appropriate?	PDD B.7.1	DR,I	The measurement interval for baseline data identified and deemed appropriately described in the PDD. Electricity exported to grid by KDHC Daegu & SinanJeungdo PV Power Plant is measured automatically by established meter hourly and sent to KEPCO.	**OK**	**OK**
B.10.7 Is the *registration, monitoring, measurement* and *reporting* procedure defined?	PDD B.7.1	DR,I	Role and responsibility for registration, monitoring, measurement and reporting are defined in the PDD.	**OK**	**OK**
B.10.8 Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	PDD B.7.1	DR,I	Procedures identified for maintenance of monitoring equipment and installations. The total electricity exported to grid by this project activity will be calibrated every 2 year according to KEPCO's procedure.	**OK**	**OK**
B.10.9 Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation) Does PP must crosscheck the electricity supplied to	PDD B.7.1	DR	The monitored data is saved on PV management system more than 10 years. The amount of electricity supplied to the grid is measured automatically and conformed monthly by KEPCO's meter. As per the methodology, the electricity supplied to the grid will be	**OK**	**OK**

the grid against the sale?			crosschecked against the sales		
B.11 Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
B.11.1 Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	PDD B.6.3	DR	Leakage is not applicable according to AMS- I.D.	**OK**	**OK**
B.11.2 Are the choices of project leakage indicators reasonable and conservative?	PDD B.6.3	DR	Refer to B.11.1	**OK**	**OK**
B.11.3 Is the measurement *method* clearly stated for each leakage value to be monitored and deemed appropriate?	PDD B.6.3	DR	Refer to B.11.1	**OK**	**OK**
B.12 Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1 Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	PDD D.1	DR	Not applicable to this project.	**OK**	**OK**
B.12.2 Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	PDD D.1	DR	Refer to B.12.1	**OK**	**OK**
B.12.3 Are the sustainable development indicators in line with stated national priorities in the Host Country?	PDD D.1	DR	Refer to B.12.1	**OK**	**OK**
B.13 Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					

B.13.1 Is the authority and responsibility of overall project management clearly described?	PDD B.7.2	DR,I	Private Entity KDHC has the authorities and responsibilities of overall project activities management.	**OK**	**OK**
B.13.2 Are procedures identified for training of monitoring personnel?	PDD B.7.2	DR,I	The procedures for training of monitoring personnel is identified during the on site assessment. The monitoring personnel are well qualified and they are having their periodic training monitoring personnel.	**OK**	**OK**
B.13.3 Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	PDD B.7.2	DR,I	In case Generating electricity through the PV, any emergencies can't be caused unintended emissions.	**OK**	**OK**
B.13.4 Are procedures identified for review of reported results/data?	PDD B.7.2	DR,I	The procedures for review of reported results/data are in place (ex: Internal review procedure).	**OK**	**OK**
B.13.5 Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	PDD B.7.2	DR,I	Procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting is placed on- site and validation team has been reviewed it during on-site assessment.	**OK**	**OK**
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1 Are the project's starting date and operational lifetime clearly defined and evidenced?	PDD C.1	DR	Refer to B.3.4 for starting date of project activity. Operational lifetime is clearly defined as 20 years in section C of the PDD.	**CL 2**	**OK**
C.2 Is the start of the crediting period clearly defined and reasonable?	PDD C.2	DR	Yes, the start of the crediting period, 1 August 2008 is clearly and reasonably defined. This project applies a crediting period of 10 years in section C.2.2.2 of the PDD.	**OK**	**OK**
D. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					

D.1 Does host country legislation require an analysis of the environmental impacts of the project activity?	PDD D.1	DR	The project does not belong to the category of performing EIA. KFQ confirmed according to the Act on Assessment of Impacts of Works on Environment, Traffic, Disasters, etc., Korea government does not require an EIA (Environmental Impact Assessment) for this project activity.	**OK**	**OK**
D.2 Does the project comply with environmental legislation in the host country?	PDD D.1	DR	The project complies with environmental legislation in Republic of Korea.	**OK**	**OK**
D.3 Will the project create any adverse environmental effects?	PDD D.1	DR,I	No, this project activity is not expected to create any adverse environmental effect.	**OK**	**OK**
D.4 Have environmental impacts been identified and addressed in the PDD?	PDD D.1	DR,I	Yes. The KDHC already conducted a study to mitigate environmental impacts before the project construction and the environmental impacts of this project is sufficiently described in section D of PDD.	**OK**	**OK**
E. Stakeholder Comments *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1 Have relevant stakeholders been consulted?	PDD E.1	DR,I	To receive stakeholder' comments related with this project, PP held a project presentations to the stakeholders and reported in the newspaper. For Daegu projecy, it was reported on the newspaper such as Gas Industry Newspaper (27 February 2007), Korea Energy (3 March 2006) and Dongailbo(28 February 2006). As a result of these media announcement, the project participants have received favorable comments for the project And for SinanJeungdo project, KDHC explained the purpose, background, present condition and construction schedule of this project to the stakeholders and received comments on 23 February 2007. In this public hearing, local stakeholders had a positive attitude toward this project but raised concerns about the possibility of affecting the fishery by the construction's noise. KDHC had communicated and compensated about this matter by mutual agreement with stakeholders. Validation team has looked through the public hearing minutes and interviewed local stakeholder to verify project proponent used appropriate media to invite comments on proposed project activity and due accounts	**OK**	**OK**

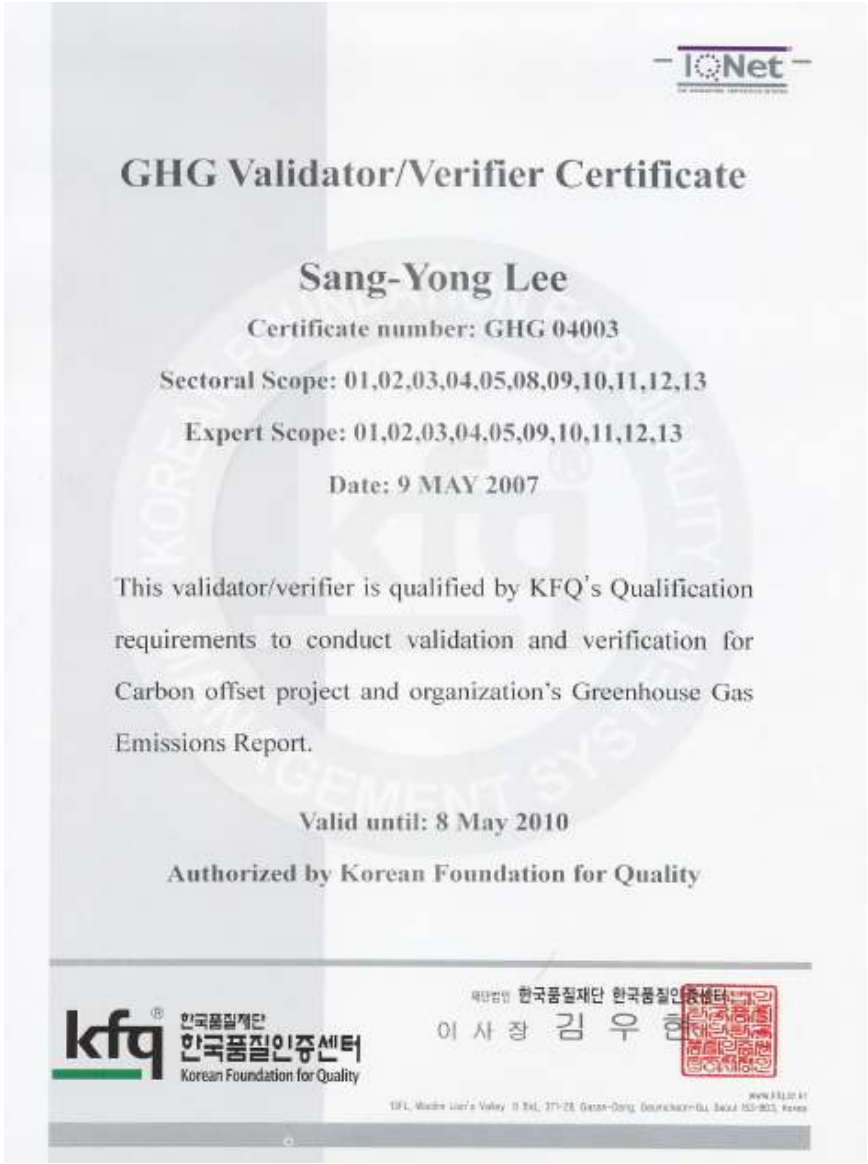
			was taken properly. Also validation team has found all participants in the public hearing were agreed and supported this project activity and, look for development of local economy.		
E.2 Have appropriate media been used to invite comments by local stakeholders	PDD E.1	DR,I	Refer to E.1., They used newspapers and direct communication to invite comments.	**OK**	**OK**
E.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	No stakeholder consultation process is required by the regulations/laws in Korea.	**OK**	**OK**
E.4 Is a summary of the stakeholder comments received provided?	PDD B.2	DR,I	Yes, The summary of the stakeholder comments received provided in section E2, E3 of the PDD.	**OK**	**OK**
E.5 Has due account been taken of any stakeholder comments received?	PDD E.3	DR,I	Yes, KFQ confirmed that the due account has been taken of any stakeholder comments received in section E3 of the PDD.	**OK**	**OK**

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	Validation team conclusion
CAR 1 : A letter of approval from the DNA of Republic Korea has not been submitted.	A.3.2	The letter of approval from the DNA of Republic of Korea was submitted on 20 June 2008	CAR 1 is closed.
CAR 2 : For the baseline emission calculation, the CM (combined margin) is not correctly calculated as well as OM (operating margin) & BM (build margin).	B.2.3/B.2.6	The Electricity Emissions Factor is re-calculated by KDHC based on the KEPCO' statistics of Electric Power in 2004, 2005, 2006. The detail of emission factor calculation is well described in the PDD and spreadsheet of it was submitted to the DOE.	CAR 2 is closed.
CAR 3 : In case of the SinanJeungdo project, utilization rate of PV generation is not explained sufficiently how to get the utilization data of 15.0% for fixed type), 17.6% for tracking both axis type and 19.5% for tracking one axis type.	B.2.4/B.3.2	Utilization rate of PV generation for SinanJeungdo project was confirmed based on the recent research report (31 March 2006), 'Improvement of Alternative Energy Development Promotion Act and scheme connected with RPS system', published by Ministry of Commerce, Industry and Energy (MOCIE). Validation team review this evidence and concluded that utilization rate is reasonable decided it in conservative manner. Refer to additional information, appendix 3(2004-N-PS04-P-04).	CAR 3 is closed.
CAR 4: Table 8 of B.6.4 in the PDD form is not filled completely.	A.2.6	Table 8 of B.6.4 in the PDD form is filled completely.	CAR4 is closed.

CL 1: Full detail of the location of the project activity to identify geographical boundaries is not clearly described in the PDD.	A.2.1	In the updated PDD, the project's spatial (geographical) boundaries are clearly defined and described.	CL 1 is closed.
CL 2: Identified and reviewed information about the starting date of project activity and consideration of CDM in the decision to proceed with the project activity by validation team were not fully described in the PDD.	B.3.4	KDHC described "the information regarding incentive from CDM was seriously considered in the decision to proceed with the project activity" in PDD.	CL 2 is closed.

Appendix B
Qualification of Validation Team



IQNet

GHG Validator/Verifier Certificate

Sang-Yong Lee

Certificate number: GHG 04003

Sectoral Scope: 01,02,03,04,05,08,09,10,11,12,13

Expert Scope: 01,02,03,04,05,09,10,11,12,13

Date: 9 MAY 2007

This validator/verifier is qualified by KFQ's Qualification requirements to conduct validation and verification for Carbon offset project and organization's Greenhouse Gas Emissions Report.

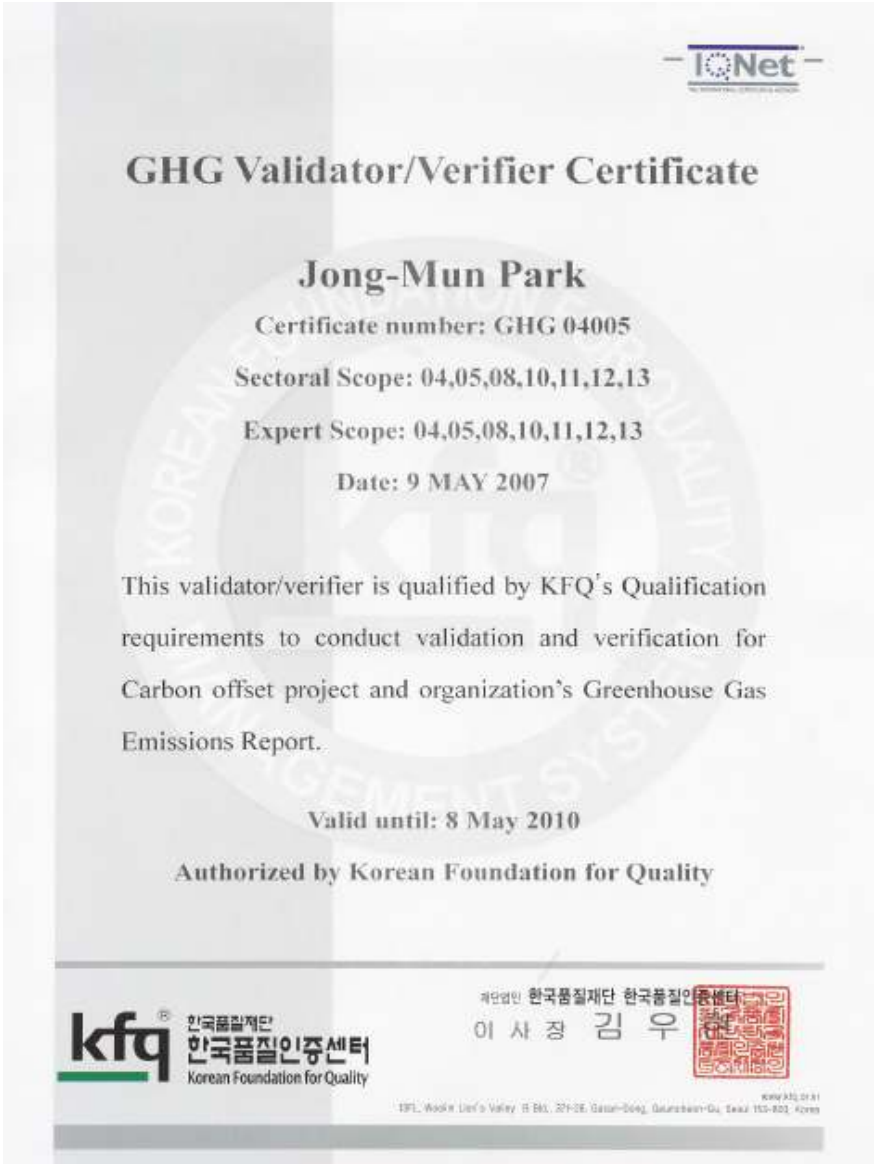
Valid until: 8 May 2010

Authorized by Korean Foundation for Quality

kfq 한국품질재단 한국품질인증센터 Korean Foundation for Quality

재단법인 한국품질재단 한국품질인증센터

이 사 장 김 우 현



IQNet

GHG Validator/Verifier Certificate

Jong-Mun Park

Certificate number: GHG 04005

Sectoral Scope: 04,05,08,10,11,12,13

Expert Scope: 04,05,08,10,11,12,13

Date: 9 MAY 2007

This validator/verifier is qualified by KFQ's Qualification requirements to conduct validation and verification for Carbon offset project and organization's Greenhouse Gas Emissions Report.

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kfq 한국품질재단 한국품질인증센터 Korean Foundation for Quality

재단법인 한국품질재단 한국품질인증센터

이 사 장 김 우