VALIDATION REPORT (Rev.07)

"4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants Bundling Project" in Korea

REPORT No. : 2009-07

KSA KOREAN STANDARDS ASSOCIATION

Executive Summary

Korean Standards Association (KSA) has performed a validation of "4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants Bundling Project" which is a small scale CDM project activity. The proposed project is to build up a photovoltaic (PV) power system with 4.85 MW_e of installed capacity and the electricity generated by the PV system will be supplied to the KEPCO grid. And thus the generated electricity will displace electricity produced from thermal power plants which use fossil fuel and result in additional reduction of GHG emission.

The validation has been performed by document review based on the project design document, follow-up interviews with project stakeholder and resolution of outstanding issues and the issuance of the validation report.

The applied requirements for validation depend on *"the Article 12 of the Kyoto Protocol"*, *"the CDM modalities and procedures"*, *"the simplified modalities and procedures for small-scale CDM project activities"* and *"the subsequent decisions by the CDM Executive Board*". A risk based approach was taken to conduct the validation and corrective action request and clarifications were raised for relevant actions by the project participants.

The validation team has confirmed that the proposed project is a grid connected renewable energy project and properly applies the version 14 of AMS-I.D. The determination of the baseline is well elaborated, transparent and sufficiently supported with facts. The crediting period is 10-year option without renewal.

This project is composed of 6 PV power plants which are ① Yeongam 1st PV Power Plant, ② Yeongam 2nd PV Power Plant, ③ Jindo PV Power Plant, ④ Hadong PV Power Plant, ⑤ Hoengseong PV Power Plant and ⑥ Goesan PV Power Plant. The expected generation of electricity are 1,723 MWh per year, 1,736 MWh per year, 1,149 MWh per year, 221 MWh per year, 176 MWh per year and 820 MWh per year respectively and the resulting output assumes 5,826 MWh per year. Thus, the estimated emission reduction attributable to the project activity is 37,530 $tCO_{2\text{-}eq}$ per over selected 10-year-crediting- period.

The monitoring plan makes sufficient provision for monitoring relevant project and baseline emission indicators. Responsibilities and authorities for the project management, monitoring and reporting and QA/QC procedures have been addressed. A local stakeholder consultation process has been carried out by the project participants. The resulting of interview during on-site assessment, stakeholder including the local resident and local government were welcomed the photovoltaic power plant And also comments by Parties, stakeholder and UNFCCC accredited NGOs were invited through the CDM website. No comments were received.

In summary, it is that KSA's opinion on the project aictivity, as described in the project design

document version 05.3, 6 April 2010, meets all relevant UNFCCC requirements for the small-scale CDM and correctly applied the approved baseline and monitoring methodology AMS-Ⅰ.D. Hence, KSA requests the registration of the "4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants Bundling Project" in Korea as a CDM project activity.

Validation Performed by

Kyoo-Il Sohn (Team Leader, CDM Validator)
Chang-Woo Lee (Team member, CDM Validator)
Chan-Sik Yoon (Technical Verifier)

Confirmed by

Young-Gi Kim (Director, Int' Cert. Division)

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CL	Clarification Request
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
KEPCO	Korea Electric Power Co. Ltd.
KPX	Korea Power Exchange
KRC	Korea Rural Community Corporation
KSA	Korean Standards Association
FAR	Forward Action Request
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MoV	Means of Verification
NGO	Non-Governmental Organization
ODA	Official Development Organization
OM	Operation Margin
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change

1. INTRODUCTION

Korea Rural Community Corporation (hereafter, KRC), the project participant, has contracted Korean Standards Association (KSA) to carry out a validation of the proposed project "4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants Bundling Project" (hereafter, the project) in Korea. This report summaries the findings over the validation process that has been performed on the validation requirements of the Clean Development Mechanism (CDM).

1.1 Objective

The purpose of validation is to ensure a thorough, independent assessment of proposed project activities submitted for registration as a proposed CDM project activity against the applicable CDM requirements. In particular, the project's baseline, the monitoring plan and the project's compliance with relevant UNFCCC and host Party 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. The validation is seen as necessary to provide assurance to stakeholder of the quality of the project activity and its intended generation of certified emission reduction (CERs).

1.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document (PDD) and the relevant documents. The information in these documents is reviewed against the criteria stated in Article 12 of Kyoto Protocol (decision 17/CP.7), the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions of the COP/MOP and the CDM Executive Board including the approved baseline and monitoring methodology AMS-Ⅰ.D. version 14. The KSA validation team follows a risk-based approach in the validation focusing on the identification of significant risks for project implementation and generation of certified emission reductions (CERs). Validation is no meant to provide any consulting toward the project participants. However, the corrective action requests (CARs) and clarifications (CL) may have provided input for improvement of the project design.

1.3 Description of the Proposed CDM Project

The proposed project activity involves installation of a grid connected 4.85 MW_e the bundled solar photovoltaic power plant. The electricity generated from solar photovoltaic power plant will be exported to the KEPCO grid. And thus displace electricity produced from a thermal power plant which uses a fossil fuel and result in reduced GHG emission. The installed capacity of the project are composed of 1.4916 MW_e, 1.4916 MW_e, 0.9944 MW_e, 0.1936 MW_e, 0.154 MW_e and

0.522 MW_e, and the yearly generation is likely to be 5,826 MWh. The estimated emission reduction attributable to the project activity are 37,530 tCO_{2-eq} per over the selected 10 year crediting period, with annual average reduction of 3,753 tCO_{2-eq}. The technology of the proposed project activity is as follows;

Items		Technology Standard		
		Yeongam 1st PV plant	Yeongam 2nd PV plant	Jindo PV plant
Solar Cells	Module Type	YL-220pb-2 (poly)	STP200-18/Ub (poly)	YL-220pd-2(poly)
	Maximum output power	220 W_p	200 W_p	220 W_p
	Number of Module	6,780	7,458	4,520
	Efficiency	13.5%	13.6%	13.5%
	Capacity	1,491.6 KW_e	1,491.6 KW_e	994.4 KW_e
Inverter	Rated Voltage	DC 450~820, AC270V	DC 450~820, AC270V	DC 450~820, AC270V
	Output	500KW × 3units	500KW × 3units	500KW × 2units
	Control method	PWM	PWM	PWM
	Efficiency	97.7%	97.7%	97.7%

Items		Technology Standard		
		Hadong PV plant	Hoengseong PV plant	Goesan PV plant
Solar Cells	Module Type	YL-220pb-2(poly)	YL-220pb-2(poly)	SPR-300-WHT (single)
	Maximum output power	220 W_p	220 W_p	300 W_p
	Number of Module	880	700	1,740
	Efficiency	13.5%	13.5%	18.4%
	Capacity	193.6 KW_e	154 KW_e	522 KW_e
Inverter	Rated Voltage	DC 450~900, AC380V	DC 450~900, AC 380V	DC 450~800, AC 315V, AC 400V
	Output	100 KW × 2 units	100KW × 2 units	250KW × 1 unit 30KW × 1 unit
	Control method	MPPT	MPPT	MPPT
	Efficiency	96.7%	96.7%	97.5%

1.4 Validation Team

The validation has been performed by the following personnel;

Name	Role/Qualification	Remarks
Mr. Kyoo-Il Sohn	Team Leader, CDM Validator Sector Expert	Document Review, Site Visit, Follow-up Action & Report
Mr. Chang-Woo Lee	Team Member, CDM Validator	Document Review & Site Visit

2. METHODOLOGY

To assess the correctness of the information provided by the project participants, the validation consists of the following three phases;

Ⅰ. Review of Documents, including;

- Review of data and information to verify the correctness, credibility and interpretation of presented information;
- Cross checks between information provided in the PDD and information from sources other than that used, if available, and if necessary independent background investigations.

Ⅱ. Follow-up actions, including;

- Interview with relevant stakeholder in the host country, personnel with knowledge of the project design and implementation;
- Cross-check of information provided by interviewed personnel to ensure that no relevant information has been omitted the validation

Ⅲ. The resolution of outstanding issues and the issuance of the final validation report and opinion.

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 noncompliance 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)	Comments	Draft and/or Final Conclusion
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.	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 noncompliance 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			
Description of Corrective Action Requests and Clarification	Ref. to checklist table 2	Comments/Responses from project proponent	Final 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 summarized 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”".

2.1 Review of Documents

The validation is performed by KSA primarily based on the review of the PDD /1-1/ and the other supporting documents. The PDD version 01, dated 04 September 2009, was initially reviewed and KSA requested the project participant to present the supporting information and documents the related with the project design and such additional information and documents were also reviewed by KSA. Through the validation process, the PDD and the relevant documents were evaluated to confirm the actions taken by the project participants to the CARs and CLs issued by KSA.

2.2 Follow-up Interviews

Follow-up interviews with the stakeholder and site visit were performed in the period of 22 October 2009 to 04 November 2009. The schedule on site visit and interviewed personnel were as follows;

22 October 2009 visits Hoengseong PV plant (CDM Validatior : Mr. Kyoo-Il Sohn)

Address : Beopju-Ri, Ucheon-myeon, Hoengseong-gun, Gangwond-do

Interview with the representing of local residents

Interview with the operation and maintenance (O&M) service providers

23 October 2009 visits Goesan PV plant (CDM Validatior : Mr. Kyoo-Il Sohn)

Address : Banggok-Ri, Jangyeon-myeon, Goesan-gun, Chungcheongbuk-do

Interview with the representing of local residents

Interview with the operation and maintenance (O&M) service providers

26 October 2009 visits Yeongam 1st PV plant, Yeongam 2nd PV plant and Jindo PV plant (CDM Validatior : Mr. Chang-Woo Lee)

Address Yeongam 1st PV: Sanho-ri, Samho-eup, Yeongam-gun, Jeollanam-do

Yeongam 2nd PV: Sanho-ri, Samho-eup, Yeongam-gun, Jeollanam-do

Jindo PV: Sopo-ri, Jisan-myeon, Jindo-gun, Jeollanam-do

Interview with the operation and maintenance (O&M) service providers

27 October 2009 visits Hadong PV plant (CDM Validatior : Mr. Chang-Woo Lee)

Address : Pyeongchon-ri, Cheongam-myeon, Hadong-gun, Gyeongsangnam-do

Interview with the operation and maintenance (O&M) service providers

04 November 2009 Meeting with the project participants (KRC) and the Consultant (Ecosense Co. Ltd) (CDM Validatior : Mr. Kyoo-Il Sohn and Mr. Chang-Woo Lee)

The list of person interviewed is included in the reference. The main topics of the interviews are summarized as belows;

Organization	Interview topics
the representing of the local residents	- Environmental impacts - stakeholder' comments
O&M service providers	- Technology applied and operational lifetime - Provisions for training, operation and maintenance - Monitoring and reporting procedures
Korea Rural Community Corporation (KRC) (Project Proponent) and Ecosense Co., Ltd. (Consultant)	- Clarification on technical details of the project. - Confirmation on non-involvement of ODA. - Monitoring and reporting procedures - Additionality - Baseline methodology. - Estimated emission reduction and emission factors applied - Stakeholder consultation process - Environmental impacts - Legal compliance. - Resources, training needs and procedures for operation and maintenance. - Benefits from CDM registration. - Prior to the CDM consideration.

2.3 Resolution of clarification and corrective action requests

As an outcomes of the validation process, the validation team can raise Corrective Action Requests (CAR) and Clarifications (CLs) in order to confirm that the proposed project activity meets the CDM requirements and can achieve credible emission reductions. CARs and CLs require the project participants to modify the project design, to rectify the PDD or to provide adequate additional explanations or evidence. Criteria for CARs and CLs are as follows and are based on the "Clean Development Mechanism Validation and Verification Manual"(EB44 Annex 3) /2-1/.

- Corrective Action Request (CAR) shall be raised if one of the followings occurs;

a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

b) The CDM requirements have not been met;

c) There is a risk that emission reduction cannot be monitored or calculated.

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

The validation by KSA identified ten CARs and five CLs. The resolution of CARs and CLs raised by KSA is to be reflected in the revised PDD and submitted to KSA for validation conclusion.

2.4 Internal Quality Control

The final validation report including the validation findings were reviewed by a technical verifier (Mr. Chan-sik Yoon) prior to the submission of the validation report to the project participants and prior to requesting registration of the project activity. Also a technical verifier is qualified by KSA's qualification scheme for CDM validation and verification.

3 Validation Findings

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

3.1 Participation Requirements

The only project participants is Korea Rural Community Corporation (KRC). The Host Party, the Republic of Korea meets all relevant participation requirements in the CDM. The Republic of Korea has ratified the Kyoto Protocol on 08 Nov 2002 and established “CDM Review Committee", prime minister's office as its DNA. The DNA of Korea has approved and issued the LoA (Reg. No. 2010-03) /1-20/ for the proposed project on 12 Feb 2010. No Annex I Party has been identified yet. The project is owned by KRC and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding toward Korea.

3.2 Project Design

The proposed project activity consists of bundling of 6 small-scale photovoltaic power plants, namely Yeongam 1st, Yeongam 2nd, Jindo, Hadong, Hoengseon and Goesan, located in the Republic of Korea.

The Yeongam 1st small-scale photovoltaic power plant consists of 6,780 pieces of 220 W_p solar

cells which the capacity is 1,496 KW_e and 500 KW × 3 units of inverters. The Yeongam 2nd small-scale photovoltaic power plant consists of 7,458 pieces of 200 W_p solar cells which the capacity is 1,496 KW_e and 500 KW × 3 units of inverters. The Jindo small-scale photovoltaic power plants consists of 4,520 pieces of 220 W_p solar cells which the capacity is 994.4 KW_e and 500 KW × 2 units of inverters. The Hadong small-scale photovoltaic power plants consists of 880 pieces of 220 W_p solar cells which the capacity is 193.6 KW_e and 100 KW × 2 units of inverters. The Hoengseong small-scale photovoltaic power plants consists of 700 pieces of 220 W_p solar cells which the capacity is 154 KW_e and 100 KW × 2 units of inverters. Goesan small-scale photovoltaic power plants consists of 1,740 pieces of 300 W_p solar cells which the capacity is 522 KW_e and 250 KW × 1 unit and 30 KW × 1 unit of inverters.

The technology applied is deemed current good practice and is not expected to be replaced within the crediting period. The project will have all inherent benefits of a renewable energy project. The starting date has been identified as the date on which the contract of the construction of the proposed project signs. The starting date is 25 June 2008 for the Yeongam 1st PV power plant, Yeongam 2nd PV power plant, Jindo PV power plant, Hadong PV power plant and Hoengseong PV plant and 30 April 2009 for the Goesan PV plant. respectively.

The operational lifetime of the proposed project is estimated to be around 20 years and the crediting period without renewable of 10 years starting on 01 June 2010 or registration date which comes later. The project meets the sustainable development objectives of the Republic of Korea.

3.3 Eligibility as a Small Scale Project

The proposed project activity is a grid connected solar photovoltaic based on renewable power generation. The project qualifies as small-scale CDM project activity as the combined total maximum output capacity of 4.85 MW_e which is less than the 15 MW_e capacity limit stipulated in paragraph 6 (c) of decision 17/CP.7. Therefore the project design description justifies the applicability criteria of approval small scale methodology AMS-Ⅰ.D. grid connected renewable electricity generation version 14.

3.4 Baseline Determination and Additionality

The project activity has been applied baseline as mentioned in the approved methodology AMS-I.D. version 14. The project activity is generating renewable electricity from solar photovoltaic and the generated electricity will support to the KEPCO grid replacing fossil fuel generated electricity.

The baseline selected for the project activity is the continuation of generation at current level of emission from the KEPCO grid system.

The project boundary encompasses the physical geographical site of the renewable energy generation source. The power generated by the proposed project activity will be exported to the KEPCO grid system, therefore the KEPCO grid has been cooperated in the project boundary. The project boundary description is clear and in accordance to the project category of the approved methodology AMS-I.D. version 14.

Since the Korean electricity system is not constituted of layered dispatch system, the Korean national grid is considered for the determination of a baseline grid electricity emission coefficient (EF_{CO2}). The project activity used the average of the approximate operating margin ($EF_{OMgrid,y}$) and build margin ($EF_{BMgrid,y}$) for determination of the baseline emission factor($EF_{CMgrid,y}$).

In the calculation of the approximate of operating margin, the generation from hydro, nuclear, low cost biomass, geothermal power plant and domestic coal have been excluded. In the calculation of build margin, capacity additions of the most recent plants contributing to 20% of the total generation are used. Since 20% falls on part capacity plants contributing to 20.96% of the total generation have been considered during build margin calculations.

The approximate operating margin is calculated as an average of data available for the three years 2006, 2007 and 2008, which is the most recent statistics available at the time of initial PDD preparation. The build margin is calculated using data of 2008.

The OM and BM emission factor have been calculated using the data from "Statistic of Electric Power in Korea"/1-14/ by KEPCO (http://www.kepco.co.kr), "the installation capacity of power generation in Korea 2009/" /1-15 by KPX (Korea Power Exchange) (http://www.kpx.co.kr) and 2006 IPCC guideline on National GHG inventories /2-5/ (Carbon oxidation factor of each fuel and carbon emission factor).

The combined margin (CM) of the project activity is calculated as 0.6441t$CO_{2\text{-eq}}$/MWh. With the expected generation of 5,826MWh per year to the KEPCO grid, the annual baseline emission will be 3,753t$CO_{2\text{-eq}}$. The baseline emission factor determined ex-ante will be used for calculation of the emission reductions.

KSA validation team confirmed that the application and determination of the selected baseline methodology are transparent and reasonable and baseline for this project activity is reasonable by validating the assumption, calculation and rationales used in the PDD by cross-checking the documents and sources referred to in the PDD.

Starting date of CDM Project Activity

The starting date of CDM project activity is the earliest date at which either the implementation of consideration or real action of a project activity begins. The dates of construction contract for PV power plant are identified as a starting date of this project activity which are that Yeongam 1st PV Power plant, Yeongam 2nd PV power plant, Jindo PV power plant, Hadong PV power plant

and Hoengseong PV plant are 25 June 2008 and Goesan PV power plant is 30 April 2009. There are other date which could be considered as a starting date of this project activity such as a permission date of electricity business by local government and date of the commencement for construction works. However KSA regarded "date of construction contract" /1-5/ as an official consent to the project activity and accepted it as the starting date because the project proponent was committed to expenditures related to the implementation or construction of the project activity

Prior Consideration of the CDM

KRC board meeting with consideration of CDM has been performed prior to the project starting date. They discussed with the expected emission reduction, CDM CERs benefits, CDM principle and the process and how to register the CDM at the KRC board meeting on 31 May 2007.

KSA validation team checked it by reviewing the meeting results of the 88th KRC board meeting titled "In-house renewable energy development plan" /1-11/ which was submitted by KRC dated on 31 May 2007 for Yeongam 1st PV, Yeongam 2nd PV, Jindo PV, Hadong PV and Hoengseong PV.

And the starting date of Goesan PV was on 30 April 2009 which dated after 02 August 2008.

The KRC informed the DNA of Korea in the writing of the commencement of the project activity and of their intention to seek CDM status dated on 08 June 2009 /1-13/, including a brief description of the project activity and the precise geographical location. Also, KSA validation team verified it with the DNA of the Korea. Validation team certified that this project activity is proceeded in terms of KRC's social responsibility and to create domestic demand of new & renewable energy.

Additionality

The investment barrier was used to assess the additionality of the proposed project activity. The investment barrier of the project has been demonstrated by a NPV as well as IRR /1-3/.

Information and data applied to additionality are summarized at <Table 3-1 > "Input Data for additionality"

<Table 3-1> Input Data for additionality

Items	Calculated based	Remarks
Expected electricity generation amount (MWh/yr)	▪ Annual electricity generation = Installed capacity * Capacity Factor * Annual hours (8,760hrs/yr) ▪ Total expected electricity generation amount 5,826 MWh/yr	See <Table 3-2>

Sales price per KWh	122.63 Won/yr An average of SMP in 2008	KPX (http://epis.kpx.or.kr)
Investment Costs	▪ 5 PV sites : ₩31,715million (Yeongam 1st PV, Yeongam 2nd PV, Jindo PV, Haddong PV and Hoengseong PV) ▪ Goesan PV : ₩3,845 million ▪ Total investment costs ₩35,560 million	Construction Contract/1-5/ and breakdown of costs.
Operation and Maintenance costs (including taxes)	▪ ₩213,360,00/yr ※ O&M Costs are calculated by Investments Costs * 0.6%	Relevant Report /1-18/
Period of assessment	20 years	Relevant Report /1-19/
Exchange rate and CERs Price	▪ Exchange rate is an annual average in 2008 : ₩1,610.08/€ ▪ CERs price is the highest in 2008: € 23.38/ton	http://www.keb.co.kr http://www.pointcarbon.com

▪ Annual Electricity Generation : 5,826 MWh/yr

The electricity generation was calculated as follows;

Annual electricity generation = Installed capacity * Capacity Factor * Annual hours

※ Capacity factor was calculated by solar cell efficiency * inverter efficiency.

Annual electricity generations of each site are summarized at <table 3-2> "Annual Electricity Generation of each site". Solar cell efficiency and inverter efficiency were provided by manufacturer. Validation team cross-checked capacity factor with other similar PV power plants which is registered as CDM project and it shows that range is 13.5% ~ 17.5% and found that the selected capacity factors, 13.05% ~ 13.29%, are slightly low and 17.94% is slightly high. But referring to manufacture's explanation, the results of monitoring for other similar PV project and local circumstance, KSA validation team concluded that these capacity factor is valid and applicable at the time of investment decision.

<Table 3-2> Annual Electricity Generation of each site

Items	Capacity (kW)	Module Efficiency (%)	Inverter Efficiency(%)	Electricity (MWh/yr)
Yeongam 1st	1,491.6	13.5	97.7	1,723
Yeongam 2nd	1,491.6	13.6	97.7	1,736
Jindo	994.4	13.5	97.7	1,149
Hadong	193.6	13.5	96.7	221
Hoengseong	154.0	13.5	96.7	176
Goesan	522.0	18.4	97.5	820
Total	4,847.2	-		5,826

- Investment Costs : ₩35,560 million (KRW)

KSA validation team checked investment cost based on construction contract /1-5/ (including design costs, material costs and construction costs) and breakdown of cost. Unit costs of this PV project are calculated as ₩7,000,000/kW ~ ₩9,900,000/kW. <Table 3-2> shows analysis of investment for each PV power plant.

<Table 3-3> Analysis of Investment Cost for each PV plant

Site name	Investment costs	Installed Capacity (kW_e)	Unit Cost per kW	Remarks
Yeongam	20,889,000,000	2983.2	7,002,212	1st and 2nd
Jindo	7,542,000,000	994.4	7,584,473	
Hadong	1,754,000,000	193.6	9,059,917	
Heonngseong	1,530,000,000	154	9,935,065	
Goesan	3,845,000,000	522	7,365,900	
Total	35,560,000,000	4,847		

And validation team examined investment cost with other similar PV power plant in Korea which is registered as a CDM project and it shows that range is ₩6,500,000/kW ~ ₩9,300,000/kW.

Referring to a regional circumstantiates, civil and architecture construction and the results of internet search, Validation team concluded that investment cost of this project is not overestimated and valid at the time of investment decision.

- O&M Cost : 0.6% of investment cost

According to feasibility study report, "Supporting System in Feed-in Tariffs of Electricity Generation

from New & Renewable Energy Sources"/1-18/ by MKE, O&M cost (including labor cost, operating cost, repair cost and insurance cost) is 2.8% of investment cost in Korea at 2006 year and it will be down until 1% of investment cost when PV power plant has been widespread throughout the country. For this project activity, O&M cost was applied 0.6% of investment cost, as a conservative view. Validation team concluded that O&M cost in this project is valid and applicable at the time of investment decision.

- Electricity Tariffs : ₩122.63/KWh

Electricity Tariffs in this project is ₩136.86/KWh which is the average value in 2008. Also validation team examined this value with statistical value by KPX (http://epis.kpx.or.kr) to check it applicability. KSA validation team confirmed that ₩122.63/KWh is valid and applicable at time of investment decision.

- Operation lifetime of the project activity : 20 years

According to "Study on feed-in tariff of PV power plant in Korea /1-19/" by KERI (Korea Electrotechnology Research Institute, http://www.keri.re.kr), operation lifetime of PV power plant is assessed as 20 ~ 25 years. And validation team concluded that 20 years of operation lifetime for this project activity is valid to refer other similar project's operational lifetime, a technological level and technical expertise.

- Discount rate : 5.5%

As per "the agricultural economy survey and analysis criteria of KRC" /1-17/, discount rate of 5.5% is applied to NPV analysis for this project activity. In referring with other similar project (4 ~ 7%), FSR /1-18/ in PV power (7%) and Korea's economic circumstance, it deemed to be reasonable and appropriate for its project activity. And this is available to use at time of decision.

Validation team verified all sources of the IRR and NPV (the net present value) calculation/ 1-3/ as presented in B.5 of PDD /1-1/ and the calculation spreadsheet for confirming correctness of calculation and the consistency of the applied data. Validation team verified the additionality by conducting financial analysis method for each site of project, and NPVs of each site are musch lower than zero and IRR is minus (#NUM!) which was much less than benchmark 5.5% as see Table 3-4.

Table <3-4> The result of NPVs and IRRs for each PV plant

unit: million won (KRW)

PV plant sites	Without CERs		With CERs (23.38 EURO/ton)	
	IRR	NPV	IRR	NPV
Yeongam 1st and 2nd	#NUM!	-₩16,414	#NUM!	-₩15,876
Jindo	#NUM!	-₩6,065	#NUM!	-₩5,886
Hadong	#NUM!	-₩1,475	#NUM!	-₩1,440
Hoengseong	#NUM!	-₩1,309	#NUM!	-₩1,282
Goesan	#NUM!	-₩2,840	#NUM!	-₩2,714

And also a sensitivity analysis has been conducted on the NPV for capacity factor parameters, namely total generation ±20%, investment costs ±10%, operation expenses ±10% and CERs price ±10%. As per the results of sensitivity analysis, NPVs of each site for this project becomes still much less than zero. As the Korea's economical structure and condition is relatively stable, above indicators do not fluctuate much widely, thus their fluctuations rise up generally within the range of ±10% ~ 20%. During the lates 5 years, the Korea's average of economic growth is 4.5% and that of the inflation rate the corresponding period is 3.4% (http://www.kosis.kr). KSA validation team concluded that above variation range for sensitivity analysis parameter is a conservative method.

It has been verified from the NPV calculation attached with the PDD that the returns from the project in the absence of the benefits from CDM are not attractive enough for the project proponent to go forward with the project. So, the proposed project activity is not financially attractive or feasible. Thus it has been established that the project activity would not have occurred in the absence of CDM and is hence additional.

3.5 Application of Baseline Methodology and Calculation of Emission Factors

The baseline emission calculation for the proposed project activity correctly followed AMS-I.D. version 14. The choice of methodology was appropriately described in the PDD. All steps and formula mentioned in methodology are properly applied in the PDD. There is no transfer of energy generating equipment from another activity or the transfer of exiting equipment to another activity. Thus as per the requirement of AMS-I.D. version 14 calculation of leakage emission is no applicable for the project activity under consideration. The emission reduction due to the project activity will be direct function of the net electricity fed to the KEPCO grid.

The grid emission factor value as CM (combined margin) 0.6441 $tCO_{2\text{-}e}$/MWh and the power sector data used for the calculation has been cross checked with the grid emission factor calculation Excel sheet /1-2/ and "Statistics of Electric Power in Korea"/1-14/ (http://www. kepco.co.kr) and found

satisfactory. The OM, BM and CM for calculation of the same were checked. All the equations involved along with the KEPCO grid power sector data used for calculation of the same were found by the validation team to be in line with the "Tool to calculate the emission factor for an electricity system, version 1.1" /2-6/. The ex-ante determined grid emission factor will be fixed for the selected crediting period.

The grid emission factor value (CM) has been validated as 0.6441t$CO_{2\text{-}e}$/MWh, the same value has been properly used in the emission reduction calculation as per the requirement of AMS-I.D version 14.

According to the approved methodology, emission reductions are calculated as follows;

$ER_y = BE_y - PE_y - LE_y$

where, ER_y : Emission reductions in year y (tCO_{2e}/y)

BE_y : Baseline emissions in year y (tCO_{2e}/y)

PE_y : Project emissions in year y (tCO_{2e}/y)

LE_y : Leakage emissions in year y (tCO_{2e}/y)

Baseline emission is calculated as net electricity supplied by the project activity to the Grid ($EG_{BL,y}$ in MWh) multiplied by an emissions factor(EF_{CO_2} in tCO_{2eq}/MWh). No project emissions need to be considered, as the proposed project activity is a renewable energy project. No leakage has to be considered for the proposed project activity.

According to the Section C of PDD, the proposed project activity is yet to be commissioned and the start of 10 years crediting period without renewal has been stated as registration date. The emission reduction seems to be in line with the envisioned time schedule for the project's implementation and the indicated crediting period.

3.6 Application of Monitoring Methodology and Monitoring Plan

The monitoring methodology correctly applies the choice of both options for monitoring plan and baseline emissions. The monitoring plan of the proposed project activity has followed the approved methodology AMS-I.D. version 14 in context of the parameters to be monitored. In this project activity, the only parameter to be monitored for emission reduction calculation is the net electricity exported to the KEPCO grid. The choice of project GHG indicators are found reasonable and in conformance with the requirements set by the applied methodology. The monitoring plan consists of metering the electricity export to the KEPCO grid, and the quantity of transmitted electricity will be electronically measured and transferred to Korea Power Exchange (KPX) and project proponent, so it is cross checked by both entities. And also the data of transmitted electricity is collected hourly and archived electronically. All data will be archived

electronically for a period of two years after the crediting period.

As per the KPX(Korea Power Exchange) regulation "Act on operation of electricity market" /1-21/, electricity meter of this project activity will be re-calibrate within 3 and a half years, but the watt meter will be re-calibrated at least once in 3 years according to *"indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories(EB 41th Report Annex 20)" /2-2/.*

The monitoring plan of the PDD properly described the quality control and quality assurance to ensure delivery of the high quality data. And the selected data/parameters will be meeting the reliable QA/QC procedure as QMS and periodic calibration of the monitoring equipments will be carried out by competent. The overall responsibility and authority for daily monitoring, reporting and maintenance were established

3.7 Choice of the Crediting Period

The crediting period for this project activity is considered as fixed crediting period of 10 years without renewal starting on registration date. The expected operational lifetime for solar photovoltaic modules is estimated to be 20 years. Selection of the fixed crediting period of 10 years is also found acceptable in respect to the expected operation time of 20 years for the project activity, as mentioned in Section C of the PDD

3.8 Environmental Impacts

According to "the Act on Assessment of Impacts of Works on Environmental, Traffic and Disasters", the project proponent has to perform the environmental impact assessment if the capacity of the photovoltaic power plant is more than 100MW_e. Since the individual capacity of this project activity is less than 100MW_e, this project is excluded from the environmental impact assessment obligation. But the PERS (Prior Environmental Review System) is required in case of developing scope of the project over 10,000㎡ (Yeongam 1st, Yeongam 2nd and Jindo PV) and covers 6 sectors namely air, water, natural ecosystem, life environment and social & economical environment including appropriateness of plan and Feasibility for location.

The conclusion of the each site report showed that there are no any significant environmental impact for small scale solar photovoltaic power plant.

3.9 Comments by Local stakeholder

The identified local stakeholder for the this project activity, as mentioned in the Section E of the PDD, are the residents of the village if applicable and the local government in those area. During on-site interview with the representative of villager and the local official (township official), there is

no objections or arguments to the relevant of project activity.

4. COMMENTS BY PARTIES, stakeholder AND AND NGOs

The Project Design Document for this proejct was made available on the UNFCCC website and was open for comments from Parties, stakeholder and NGOs from 08 Sep. 2009 until 07 Oct. 2009. No comments were received.

5. VALIDATION OPINION

Korean Standards Association (KSA) has carried out validation of the "4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants bundling Project" in the Republic of Korea. The validation has performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria.

The validation has been performed by document review based on the project design document, follow-up interviews with project stakeholder and resolution of outstanding issues and the issuance of the validation report.

Total emission reductions from the project are estimated to be on the 3,753 $tCO_{2\text{-}eq}$ per a year over the selected 10 year crediting period without renewal. The emission reduction forecast has been checked and is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Validation team also confirmed that monitoring and maintenance plans are clearly defined and adequate.

In KSA's opinion, the project meets all relevant UNFCCC requirements for CDM, is eligible as category I.D small-scale CDM project activity, and correctly applies the approved simplified baseline and monitoring methodology AMS-I.D. (version 14). Hence, KSA requests the registration of the project "4.85 MW_e Korea Rural Community Corporation (KRC) PV Power Plants bundling Project" as a CDM project.

April 22, 2010

Young-Gi Kim

Director
International Certification Division
Korean Standards Association

Kyoo-Il Sohn

Validation Team Leader

6. REFERENCES

Category 1 Documents:

Documents provided by the Client that relate directly to the project.

/1-1/ Project Design Document (PDD) for Small-Scale CDM Activity - Korea Rural Community Corporation (KRC)

/1-2/ Excel Spreadsheets for calculation of the operating margin and build margin emission coefficient

/1-3/ Excel Spreadsheets for NPV Analysis for six (6) PV power plant

/1-4/ Permit for electricity business for six (6) PV power plant

- Yeongam 1st PV and Yeongam 2nd PV (License No. : Jeonnam 425) dated on 17 Dec 2007 and the relevant documents
- Jindo PV (License No. : Jeonnam 369) dated on 06 Nov 2007 and the relevant documents
- Hadong PV (License No. : Kyeongnam 2007-6480000-81-0075) dated on 28 Nov 2007 and the relevant documents
- Hoengseong PV (License No. : Kyeongnam 2007-6420000-81-0026) dated on 21 Nov 2007 and the relevant documents
- Goesan PV (License No. : Chungbuk 2008-41) dated on 21 April 2008 and the relevant documents

/1-5/ Construction Contract for the individual PV power plant

- Construction Contract for the Yeongam 1st & 2nd, Jindo, Hadong and Hoengseong PV power plants dated on 25 June 2008
- Construction Contract for the Goesan PV power plant dated on 30 April 2009

/1-6/ Commencement plan for construction for the individual PV power plant

- Commencement plan for construction for Yeongam 1st PV power plant dated on 15 July 2008
- Commencement plan for construction for Yeongam 1st PV power plant dated on 01 May 2009
- Commencement plan for construction for Jindo PV power plant dated on 15 July 2008
- Commencement plan for construction for Hadong PV power plant dated on 15 July 2008
- Commencement plan for construction for Hoengseong PV power plant dated on 15 July 2008
- Commencement plan for construction for Goesan PV power plant dated on 06 May 2009

/1-7/ Republic of Korean Law - "Act on Assessment of Impacts of Works on Environment, Traffic,

Disaster etc.

/1-8/ Republic of Korean Law - "Framework Act on Environmental Policy"

/1-9/ Prior environmental review system (PERS) for three (3) PV power plant

- Yeongam 1st and 2nd PV power plant

- Jindo PV Power plant

/1-10/ Local Resident Presentation Meeting

Pictures and list of attendant for local resident presentation meeting for Hoengseong PV Power plant dated on 08 Nov 2007.

A written approval for Goesan PV power plant by the local resident dated on 02 December 2009

/1-11/ The 88th board meeting titled "In-house Renewable Energy Development Plan" dated on 31 May 2007 by Korea Rural Community Corporation (KRC)

/1-12/ The 105th board meeting titled "The plant for promoting 2nd PV power plants" dated on 25 Sep 2008 by Korea Rural Community Corporation (KRC)

/1-13/ The official letter for promoting CDM project to DNA dated on 08 June 2009 by by Korea Rural Community Corporation (KRC)

/1-14/ "Statistics of Electric Power in Korea 2008" by KEPCO (http://www.kepco.co.kr)

"Statistics of Electric Power in Korea 2007" by KEPCO

"Statistics of Electric Power in Korea 2006" by KEPCO

/1-15/ The installation capacity of power generation in Korea 2009 by KPX

/1-16/ The Contract of Procurement for Yeongam 1st PV, Yeongam 2nd PV, Jindo PV, Hadong PV and Heongseong PV dated on 25 June 2008

The Contract of Procurement for Yeongam 1st PV, Yeongam 2nd PV, Jindo PV, Hadong PV and Heongseong PV dated on 01 May 2009

/1-17/ The agricultural economy survey and analysis criteria of KRC

/1-18/ Supporting System in Feed-in Tariffs of Electricity Generation from New & Renewable Energy Sources by MKE (Ministry of Knowledge and Economy)

/1-19/ Study on feed-in tariff of PV power plant in Korea by KERI (http://www.keri.re.kr),

(Korea Electrotechnology Research Institute; KERI)

/1-20/ Approval of CDM Project - DNA of Republic of Korea dated on 12 Feb 2010

/1-21/ Act on operation of electricity market by KPX

/1-22/ http://epis.kpx.or.kr (Korea Exchange Co., Ltd.)

/1-23/ http://www.suntech-power.com (A solar cell module manufacturing company)

/1-24/ http://www.yinglisolar.com (A solar cell module manufacturing company)

/1-25/ http://www.sunpowercorp.com (A solar cell module manufacturing company)

/1-26/ http://www.moleg.go.kr (Ministry of Government Legislation)

/1-27/ http://www.me.go.kr (Ministry of Environment)

/1-28/ http://www.mke.go.kr (Ministry of Knowledge Economy)

/1-29/ http://www.pointcarbon.com

/1-30/ http://www.keb.co.kr (Korea Exchange Bank)

Category 2 Documents:

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

/2-1/ Clean Development Mechanism Validation and Verification Manual (version 01); EB 44th Report Annex 3

/2-2/ Appendix B of the simplified modalities and procedures for small-scale CDM project activities; Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. (version 12, 02 August 2008)

/2-3/ Appendix C of the *simplified modalities and procedures for small-scale CDM project activities; Determining the occurrence of debundling.*

/2-4/ Revised 1996 IPCC guidelines for national greenhouse gas inventories - Reference Manuel

/2-5/ 2006 IPCC guidelines for national greenhouse gas inventories - Reference Manuel

/2-6/ Tool for the demonstration and assessment of additionality (Version 05.2)

/2-7/ Grid connected renewable electricity generation --- (version 14)

/2-8/ Tool to calculate the emission factor for an electricity system (Version 01.1)

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above.

/1/ Interview on 22 October 2009

Name	Organization	Position
Bu-Dong Kim	Korea Rural Community Corporation, Hongcheon-Chuncheon Branch O & M Team	General Manager The operation & Maintenance (O&M) Service Provider
Jeong-Dai Ko	Korea Rural Community Corporation. Hongcheon-Chuncheon Branch O & M Team	Assistant Manager The operation & Maintenance (O&M) Service Provider
Byeong-Jun Kang	A local resident (Beopju-ri, Ucheon-myeon)	A representative of local resident
Chang-Soo Byeon	A local resident (Beopju-ri, Ucheon-myeon)	A representative of local resident
Tai-Jin Jeong	A local resident (Uhang-ri, Ucheon-myeon)	A representative of local resident

/2/ Interview on 23 October 2009

Name	Organization	Position
Yeong-hak Yoo	Korea Rural Community Corporation. Goesan Branch, O & M Team	Manager of PV Power Plant
Dong-Jun Suh	A local resident (Banggok-ri, Jangyeon-myeon)	A representative of local resident
Jeong-Kwan Yoon	A local resident (Banggok-ri, Jangyeon-myeon)	A representative of local resident

/3/ Interview on 26 October 2009 : Yeongam 1st PV and 2nd PV

Name	Organization	Position
Ho-Jong Park	Korea Rural Community Corporation. Yeongam Branch, Local Development Team	Team leader
Ho-Kwang Park	Korea Rural Community Corporation. Yeongam Branch, O & M Team	Team Leader
Jin-Hyun Kim	Korea Rural Community Corporation. Branch, O & M Team	Manager
Young-Hee Lim	Korea Rural Community Corporation. Yeongam Branch, O & M Team	Assistant Manager

/4/ Interview on 26 October 2009 : Jindo PV

Name	Organization	Position
Jong-Seok Kim	Korea Rural Community Corporation. Jindo Branch, Local Development Team	Manager
Jeong-Seob Park	Korea Rural Community Corporation. Jindo Branch, Local Development Team	Assistant Manager
Moon-Won Cho	Korea Rural Community Corporation. Jindo Branch, Local Development Team	Assistant Manager

/5/ Interview on 27 October 2009 : Hadong PV

Name	Organization	Position
Woi-Jo Park	Korea Rural Community Corporation. Hadong-Namhae Branch, Local Development Team	Team leader
Young-Ho Lee	Korea Rural Community Corporation. Hadong-Namhae Branch, O & M Team	Assistant Manager

/6/ Interview on 04 November 2009 : Project participant and Consultant

Name	Organization	Position
Jeom-Hyeong Lee	Korea Rural Community Corporation. Head Office, Clean Energy Team	Team leader
Min-Hee Cho	Korea Rural Community Corporation. Head Office, Clean Energy Team	Assistant Manager
Hyun-Kyu Park	Ecosense Co., Ltd Climate Change Strategy Team	Consultant

APPENDIX A

VALIDATION PROTOCOL FOR SMALL-SCALE CDM PROJECT ACTIVITIES

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

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention	Kyoto Protocol Art. 12.2	OK	Table 2 Section A.2.4 to A.2.7
2. The project shall assist Parties included in Annex I in achieving compliance with part of their quantified emission reduction commitment under Art. 3 of Kyoto Protocol.	Kyoto Protocol Art. 12.2,	OK	Table 2 Section 3.1 - A.3.3 Host Party, Republic of Korea : KRC (Korea Rural Community Corporation) Annex Ⅰ Party has not been identified yet.
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved, including confirmation by the Host Parties that the project activities assists its in achieving sustainable development.	Kyoto Protocol Art.12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	~~Pending (LoA not yet)~~ OK	Table 2 Section A.3.3 The letter of approval from the DNA of the Republic of Korea has submitted on 12 Feb 2010.
4. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art.12.5b	OK	Table 2 Section B.6
5. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity., i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art.12.5c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	OK	Table 2 Section B.3

Requirement	Reference	Conclusion	Cross Reference / Comment
6. The project activity should lead to the transfer of environmental safe and sound technology and knowhow		N/A	Table 2 Section A.4.5 SSCDM is not required for this requirement.
7. 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	Marrakech Accords (Decision 17/CP.7,) CDM Modalities and Procedures Appendix B, §2f	OK	Table 2 Section A.5. No public funding from Parties in Annex Ⅰ involved.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures § 29	OK	Table 2 Section A.3 Republic of Korea : CDM Review Committee" Prime minister's office.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities and Procedures § 30, 31b	OK	Table 2 Section A.3.3 Republic of Korea is ratified the Kyoto Protocol on 08 Nov 2002. Annex Ⅰ Party has not been identified yet.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	Not applicable	Table 2 Section A.3.3 Annex Ⅰ Party has not been identified yet.
11. 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 Modalities and Procedures §31b	Not applicable	Table 2 Section A.3.3 Annex Ⅰ Party has not been identified yet.

Requirement	Reference	Conclusion	Cross Reference / Comment
12. 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.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2 Section A4.2
13. The project design document shall conform with the Small Scale CDM Project Design Document format.	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	The most recent PDD format version 3 is correctly applied.
14. The proposed project activity shall confirm 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 A4.2 and B.1.2
15. Comments by local stakeholder are invited, and a summary of these provided.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2 Section E
16. 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

Requirement	Reference	Conclusion	Cross Reference / Comment
17. Parties, stakeholder and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	The PDD has been made publicly available from 08 Sep. to 07 Oct 2009 and comments were invited through the UNFCCC website. No comments received during above mentioned period.
18. The proposed activity conforms to all other requirements for CDM project activity in the CDM modalities and procedures that are not replaced by these simplified modalities and procedures.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22 f	OK	
19. The emission reduction attributable to the proposed project shall be adjusted for leakage.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §30	OK	No Leakage
20. The proposed project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the CDM	Simplified Modalities and Procedures for Small Scale CDM Project Activities §31	OK	

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
***A. General* Description of Project Activity**					
A.1. Title of Small-Scale Project Activity					
A.1.1. Does the used project title clearly enable to identify the unique CDM Activity ?	PDD A.1	DR, I	Yes. Project title: 4.85MW_e Korea Rural Community Corporation (KRC) PV Power Plants Bundling Project. The project title reflected the capacity, bundling and energy source of the project. So that, it was clearly identified.	~~PENDING~~	OK
A.1.2. Are there any indication concerning the revision number and the date of the revision ?	PDD A.1	DR	Yes, properly mentioned in A.1 The current revision is version 05.3 on 6 April 2010.	~~PENDING~~	OK
A.1.3. Is this in consistency with the time line of the project's history ?	PDD	DR	Yes, it is.	OK	OK
A.2. Description of the Small-Scale Project Activity.					
A.2.1. Is the purpose of the project activity clearly described ?	PDD A.2	DR	Yes, the information on the purpose of the project activity, type of technology has been described in PDD section A.2	OK	OK
A.2.2. Is all information provided in compliance with actual situation or planning ?	PDD A.4.2	DR, I	To be confirmed during on-site assessment. CAR 01 : The KSA validation team verified the installed capacity and found that those were differently described in the PDD ex) Hoengseong PV : 0.175KW_e → 0.154KW_e Goesan PV: 0.520KW_e → 0.522KW_e	~~CAR 01~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			PP Response : There is a little difference between the planned installed capacity and the actual installed capacity. We revised the installed capacity following the actual installed capacity in the PDD.		
A.2.3. Is all information provided consistent with details provided in further chapters of the PDD ?	PDD	DR	The information given in the PDD is all consistent in the further chapter.	OK	OK
A.2.4. Is there other environmental or social benefits excluding GHG emission reduction in the project ?	PDD A.2	DR	Yes, the project will have all inherent benefits of a renewable energy project. The proposed project will contribute to revitalization of local energy industry under the corporation of a local government.	OK	OK
A.2.5. Is there any adverse environmental or social effects in the project ?	PDD A.2	DR, I	To be confirmed during on-site visit. No, the project aims to generate electricity from the photovoltaic power and feed it into the grid. Thus, there is no adverse environmental or social effects.	~~PENDING~~	OK
A.2.6. Is the project in compliance with relevant legislation in the host country ?	PDD A.2	DR, I	To be confirmed during on-site visit. The license for electricity generation and a written permission related the proposed project are confirmed during on-site assessment. Written permissions for electricity business of each PV plant are as belows; - Yeongam 1st PV : 07 Dec 2007. - Yeongam 2nd PV : 07 Dec 2007 - Jindo PV : 06 Nov 2007 - Hadong PV : 28 Nov 2007 - Hoengseong PV : 21 Nov 2007 - Goesan PV : 21 April 2008	~~PENDING~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A.2.7. Does the project contribute to sustainable development of the host country from environmental, social and economic perspectives ?	PDD A.2	DR	Yes, the project is expected to bring the host country and local areas social and environmental benefits including diversification of energy sources, reduction of GHG emissions. CL 02 Please address the contribution to sustainable development of Korea from the social, the environmental and the economic perspectives. PP Response : We added at Section A.2, of the PDD.	~~CL 02~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A3. Project Participants					
A.3.1. Is the table required for the indication of project participants correctly applied ?	PDD A.3	DR	Yes, the table under section A.3 is correctly applied. - Host Party, Republic of Korea : Korea Rural Community Corporation (KRC). - Annex Ⅰ Party has not been identified yet	OK	OK
A.3.2. Is all information provided in consistency with details provided by further chapters of the PDD (in particular Annex Ⅰ)	PDD	DR	Yes, the information is in consistency throughout the PDD	OK	OK
A.3.3. Have the project received the written approval of voluntary participation from the designated national authorities of each Party involved, including confirmation by the host party that the project activity assists it in achieving sustainable development ?		DR	~~The project participant has not submitted the written approvals of voluntary participation~~ The copy of LoA by host Party, the Republic of Korea has been submitted on 12 Feb 2010.	~~Pending~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A4. Technical description of the small-scale project activity					
A.4.1. Are the project's geographical boundaries clearly described ?	PDD A.4.1.4	DR, I	Yes, details of physical location with GPS coordinates have been provided in the PDD section A.4.1.4 Yeongam 1 : 34°43'29"N, 126°28'34"E Yeongam 2 : 34°44'50"N, 126°28'52"E Jindo : 34°29'18"N, 126°11'33"E Hadong : 35°09'14"N, 127°47'34"E Hoengseong : 37°27'06"N, 128°02'60"E Goesan : 36°51'15"N, 176°55'13"E It is confirmed during on-site assessment and by Google Earth. CL 04 KSA validation team verified the Hongcheon (Hoengseong) and the Bangkok (Goesan) PV Power plant and found that the name of site in PDD has differently described with the actual site's name. PP Response We matched the name of PV plant to Hoengseong. and Goesan.	~~CL 04~~	OK
A.4.2. Does the project qualify as a small-scale CDM project activity as described in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM ?	PDD A.4	DR	Yes, the project is a photovoltaic power plants with a maximum output capacity of 4.85 MW_e which is less than the 15MW_e capacity limit specified for type Ⅰ.D small-scale CDM project activities.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A.4.3. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	PDD A.4	DR	Yes, the components of each photovoltaic power plant include the photovoltaic module, inverter and transformer. For calculation of the baseline grid emission factor the power plants generating and exporting to the KEPCO grid are selected as the electricity system boundary.	OK	OK
A.4.4. Does the project design engineering reflect current good practices?	PDD A.4	DR, I	The proposed project activity can diversity source of energy. ▫ The solar cell module of Yeongam 1, Jindo, Hadong and Hoengseong used YL-220Pb-2 of Yingli Solar (http://www.yinglisolar.com) ▫ The solar cell module of Yeongam 2 used STP-200-18/ub of Sun-tech Power (http://www.suntech-power.com) ▫ The solar cell module of Goesan PV power plant is SPR-300WHT-1 by SunPower Corporation. (http://www.sunpowercorp.com) CL 03 KSA validation team verified the Hoengseong PV Power plant and found that the name of solar module in PDD has differently described with the actual module's name. YL220Wp (poly) → YL220Pb-2 PP Response We matched the name of the model for module from YL220Wp (poly) to YL220Pb-2.	~~CL 03~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A.4.5. Are the project environmental safe and sound technology and result in technology transfer to the host country?	PDD A.4	DR, I	To be confirmed during on-site assessment. Further the elaboration on the benefits and significance of the proposed project in respect to the transfer of technology. The project activity generates electricity with using countless insolation from sun, there are no severe impact of environment. Accordingly, the adopted technology to this project is environmentally safe and sound.	~~Pending~~	OK
A4.6 Are the GHGs emissions reductions additional to what would occur in the absence of the project ?	PDD	DR	The solar power energy is a renewable clean energy which is not emitting GHG. This project can displace the electricity which is generated by a fossil fuel power plant. So that, the GHG emission reduction are additional to what would occur in the absence of the project.	OK	OK
A.4.7. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?	PDD A.4	DR, I	To be confirmed during on-site assessment. The project does not require extensive training since the technology is not new, but training on the operation and maintenance is planed and implemented by PP	~~Pending~~	OK
A.4.8. Does the project design clearly and consistently indicate the chosen crediting period, the total estimation of emission reductions for the chosen crediting period ?	PDD A.4	DR	Yes, the length of the crediting period is 10 years without renewal and the total estimated reductions is 3,753tones of CO_2eq per year throughout the crediting period.	OK	OK
A.4.9. How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (ownership, licenses, contract etc) ?	PDD A.4	DR, I	This project activity is implemented by the project participants and can be demonstrated by business license. The license will be confirmed during on-site assessment. PP have been recognized both construction and electric business for PV power plant. KSA confirmed the electric business permit for PV power plant by the local government office.	~~Pending~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A.5. Public Funding					
A.5.1. Does the information on public funding provided conform to the actual situation or planning as presented by the project participants ?	PDD A.4.4	DR, I	No indication that any public funding is involved. But documented evidences representing that ODA from Annex Ⅰ Parties is not included in the project investment should be provided. It is confirmed through KRC Investment Plan.	~~Pending~~	OK
A.6. Debundling					
A.6.1. Is the small-scale project activity a debundled component of a large scale project activity ?	PDD A.4.5	DR, I	To be confirmed during on-site assessment. The proposed project is not a debundled component of a larger project activity. Because there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity within 1 km of the project boundary.	~~Pending~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B. Baseline and monitoring methodology					
B.1 Applicability of selected methodology to the project activity.					
B.1.1 Is the methodology correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology available on the UNFCCC CDM web site.	PDD B.1	DR	Yes, ▪ version 14 of "AMS.I.D" (Grid connected renewable electricity generation) ▪ Version 1.1 of "Tool to calculate the emission factor for an electricity system" ▪ Version 5.2 of "Tool for the assessment of investment analysis ▪ Version 2.0 of "Guidance on the Assessment of Investment Analysis.	OK	OK
B.1.2 Does a selected approved methodology applies to the project activity in which the applicability conditions of the methodology are met and the project activity is not expected to result in emissions other than those allowed by the methodology.	PDD B.2	DR	Yes, the selected baseline methodology refers to project type Ⅰ (Renewable Energy Projects) and project category D (Grid connected renewable electricity generation) according to Appendix B of Annex Ⅱ 'Simplified modalities and procedures for small-scale CDM project activities'. The proposed project activity is as follows : - Installed Capacity is 4.85 MW_e of electricity by solar energy, one of renewable energies. - supplies grid with the electricity produced. Thus, the methodology of AMS-I.D is applicable to the proposed project.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.1.3 Is the choice of methodology justified and the project participants have shown that the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein ?	PDD B.2	DR	Refer B.1.2. The choice of the approved methodology is justified to the proposed project activity.	OK	OK
B.1.4 Is the documentation referred to in the PDD and by verifying that its content correctly quoted and interpreted in the PDD.	PDD B.2	DR	Refer B.1.2.	OK	OK
B.1.5 If comparable information is available from sources other than that used in the PDD, cross check the PDD against the other sources to confirm that the project activity meets the applicability conditions of the methodology.	PDD B.2	DR	Refer B.1.2.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.2 Project boundary					
B.2.1 Does the project boundary include physical, geographical site of the industrial facility, processes or equipment that are affected by the project activity ?	PDD B.3	DR	The spatial extent of the proposed project boundary includes the project sites and all power plants connected physically to electricity system of KEPCO.	OK	OK
B.2.2 Based on documented evidence and corroborated by a site visit where required by section from Section A.2 above, is the delineation in the PDD of the project boundary correct and meets the requirements of the selected baseline methodology ?	PDD B.3	DR, I	To be confirmed during on-site visit Yes, it is.	~~Pending~~	OK
B.2.3 Have all sources and GHGs required by the methodology been included within the proposed project boundary.	PDD B.3	DR, I	To be confirmed during on-site visit According to baseline methodology, the project boundary encompasses the physical, geographical site of the renewable generation which covers PV generator and relevant accessory equipments.	~~Pending~~	OK
B.2.4 In case that the methodology allows project participants to choose whether a source or gas is to be included within the project boundary, have the project participants justified that choice ?	PDD B.3	DR, I	No, it does not emit GHG emission because the project is a photovoltaic power plant. GHG emission from the project boundary does not included emission during plant construction, leakage from electricity transfer and emission from transportation, mining, and pumping.	~~Pending~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.3 Baseline identification					
B.3.1 What is the baseline scenario ? Has the baseline scenario been determined according to the chosen methodology ?	PDD B.4	DR	Yes, the baseline scenario has been determined according to AMS-I.D (version 14) Baseline is determined according to AMS I.D. para 9. Baseline is the KWh produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO_2/yr) calculated in a transparent and conservative manner as a CM(combined margin) consist of OM(operating margin) and BM(build margin) according to 'Tool to calculate the emission factor for an electricity system' $BE_y = EG_{BL\_y} * EF_{CO_2}$ where BE_y = Baseline Emissions in year y; tCO_2 EG_{BL_y}= Energy baseline in year y; KWh EF_{CO_2}= CO_2Emission Factor in year; tCO_{2e}/KWh	OK	OK
B.3.2 Is the baseline scenario identified reasonable by validating the assumptions, calculations and rationales used, as described in the PDD ?	PDD B.4	DR, I	Yes, the baseline of the proposed project is the renewable energy to the grid system. There is no GHG emission in the photovoltaic power plant. Thus the emission reductions are equal to the baseline emission. And this project activity displaced the electricity which is generated by a fossil fuel power plant.	OK	OK
B.3.3 Are documents and sources referred to in the PDD correctly quoted and interpreted.	PDD B.4	DR	Yes, it is.		OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.3.4 Are the information provided in the PDD with other verifiable and credible sources cross checked, such as local expert opinion, if available ?	PDD B.4	DR	Yes, the power sector data used for calculation has been cross-checked with the information provided in PDD and "Statistics of Electric Power in Korea 2008" (http://www.kepco.co.kr) and found satisfactory. CAR 04 There are mis-calculation in the table B-5 including raw data and total amount. PP Response We revised table B.5 including raw data and total amount based on Electricity Generation Facilities, Dec 31, 2008 (KEPCO) (http://www.kepco.co.kr)	~~CAR 04~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.4 Additionality of a project activity					
B.4.1 Are the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality, assessed and verified ? .	PDD B.5	DR, I	According to 'Attachment A to Appendix of the simplified modalities and procedures for small-scale CDM project activity', the determination of project scenario additionality shall be performed explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers; - investment analysis - technological barrier - barrier due to prevailing practice - other barrier The project developer applied with investment barrier to assess the additionality as followings data;. - Verified SMP (system margin price) at http://epsis.kpx.or.kr - Exchange rate at http://www.keb.co.kr - Secondary CERs price at http://www.pointcarbon.com CAR 10 NPV calculation shall be based on the objective evidences for determination of initial investment cost and discount rate. PP Response : NPV was calculated based on the objective evidences of KRC for determination of initial investment cost and discount rate. Please refer to excel file for 'Financial Analysis of KRC PV project (6sites)"	~~CAR 10~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			The results of financial analysis to assess additionality, NPVs and IRRs of each site were negative which mean each sites has no return rates. It has been verified from the IRR calculation attached with the PDD that the returns from the project in the absence of the benefits from CDM are attractive enough for the project proponent to go forward with the project. So, the proposed project activity is not financially attractive or feasible. Thus it has been established that the project activity would not have occurred in the absence of CDM and is hence additional CL 01 Please submit to the validation team excel sheets for NPV calculation including calculation formula. PP Response We submitted excel sheets for NPV calculation to the validation team.		
B.4.2 Are the presented evidence, using local knowledge and sectoral and financial expertise critically assessed ?	PDD B.5	DR	Refer to Section B.4.1 above.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.4.3 Are tools and documents provided by the CDM Executive Board to demonstrate the additionality of proposed CDM project activities, as well as specific complementary or alternative requirements included in approved CDM methodology, considered ?	PDD B.5	DR	Refer to Section B.4.1 above.	OK	OK
B.4.4 Are all assumptions stated in a transparent and conservative manner?	PDD B.5	DR	Refer to Section B.4.1 above.	OK	OK
B.4.5 It is appropriately explained that the proposed CDM activity faces the barriers that prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives.	PDD B.5	DR	Refer to Section B.4.1 above.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5 Prior consideration of the clean development mechanism					
B.5.1 Is the start date of the project activity, reported in the PDD, in accordance with the “Glossary of CDM terms”?	PDD B.5	DR, I	It will be confirmed during on-site assessment on the basis of 'Glossary of CDM terms (version 4)'. The starting dates of this project are identified as followings; Yeongam 1 PV plant: 25 June 2008 Yeongam 2 PV plant: 25 June 2008 Jindo PV plant: 25 June 2008 Hadong PV plant: 25 June 2008 Hoengseong PV plant: 25 June 2008 Goesan PV plant: 30 April 2009 The starting date of above plants were considered with the contract date of construction.	~~Pending~~	OK
B.5.2 Is the proposed project appropriate for the prior consideration of the CDM			KRC Board Meeting with consideration of CDM has been performed prior to the project start date as follows; • KSA validation team checked it by reviewing the result of the 88th KRC Board Meeting titled "In-house Renewable Energy Development Plan" dated on 31 May 2007. The meeting results contained Yeongam 1 PV and 2 PV, Jindo PV, Hadong PV, and Hoengseong PV) They discussed at this Board meeting for followings ; - the expected emission reduction :4,200 tCO_2/yr	~~Pending~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			- CDM CERs benefits 63,000,000 won/yr - CDM principles and CDM process - How to register the CDM • KSA validation team also checked it by reviewing the result of the 105th KRC Board Meeting titled "The plan for promoting 2nd PV power plant" dated on 25 Sep 2008. The meeting results contained Goesan PV plant. • The KRC informed to the DNA of Korea by the writing documents dated on 08 June 2009; - the commencement of the project activity and of their intention to seek CDM status - A brief description of the project activity - the geographical location. • Validation team confirmed it with the DNA of Korea So that Validation team concluded that the proposed project activity was seriously considered CDM at the stage of the PV planning.	~~PENDING~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.6 Emission reductions					
B.6.1 Have the equations and parameters in the PDD been correctly applied by comparing them to those in the selected approved methodology.	PDD B.6	DR	The calculation of the emission reduction is correctly applied the approved methodology, AMS Ⅰ.D. (version 14) CAR 06 Baseline emission reduction applied have a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PDD to DOE for validation, but the data for 2008 year have not applied in the baseline emission reduction calculation. PP Response : We recalculated 'baseline emission factor' by the data for 2008 year.	~~CAR 06~~	OK
B.6.2 Is the selection of options offered by the approved methodology correctly identified ?	PDD B.6	DR	N/A, there is no option offered by the approved methodology.	OK	OK
B.6.3 Are the formulae required for the calculation of the proposed project emission reduction presented correctly ?	PDD B.6	DR	Yes, the formulae to calculate the emission reduction are correctly described in the PDD.	OK	OK
B.6.4 Is the form/table required for the indication of projected emission reductions correctly applied ?	PDD B.6	DR	Yes, all data and parameters are listed in the chapter "B.6.2. Data and parameters that are available at validation" of PDD. CAR o2 Name and value of data/parameter need to revised for followings; • Total installed capacity of the project activity: 4.8472(?) • electricity generation → Net quantity of electricity..	~~CAR 02~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			• $F_{i,j,y} \rightarrow F_{i,m,y}$ • $NCV_{i,} \rightarrow NCV_{i,y}$ PP response : We revised the name and value of data/parameter. • Total installed capacity: 4.8472 MW_e => 4.85 MW_e • Electricity generation: => Net electricity generation • $F_{i,j,y}$ => $FC_{i,m,y}$ • NCV_i => $NCV_{i,y}$ • $EF_{CO2,i}$ => $EF_{CO2,i,y}$		
B.6.5 Is the choice of ex-ante or ex-post vintage of emission factors specified clearly in the PDD ?	PDD B.6	DR	The ex-ante option was applied as a vintage of emission factors in the PDD.	OK	OK
B.6.6 Are the formulae required for the determination of baseline emission correctly described ?	PDD B.6	DR	Yes, formulae to calculate the baseline emission of this project are correctly described in the PDD	OK	OK
B.6.7 Are the formulae required for the determination of leakage emission correctly described ?	PDD B.6	DR	It does not emit GHG as the project is a photovoltaic power plant. So, there are no formulae for calculation of direct emissions.	OK	OK
B.6.8 Will the project results in fewer GHG emissions than baseline scenario ?	PDD B.6	DR	Yes, estimation of emission reduction by this project activity is 3,753 $tCO_{2\text{-}eq}$/yr.	OK	OK
B.6.9 Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	PDD B.6	DR	Yes, it is.	OK	OK
B.6.10 Is the data provided in this section in consistency with data as described in other chapter of the PDD ?	PDD B.6	DR	Yes, the data are consistent.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.7 Application of the monitoring methodology and description of the monitoring plan					
B.7.1 Data and parameters monitored					
B.7.1.1 Is it identified the list of parameters required by the selected approved methodology ?	PDD B.7	DR	Yes, all data and parameters are listed in the section "B.7.1 Data and parameters monitored". Parameter monitored is electricity supplied to the grid by the project activity (EG_y)	OK	OK
B.7.1.2 Does the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the methodology ?	PDD B.7	DR, I	Description of measurement methods and procedures to be applied. (Monitoring, data type, archiving procedures, recording frequency and responsible person(s) / entity (ies) and etc) It was confirmed during on-site assessment.	~~Pending~~	OK
B.7.2 Description of the monitoring plan					
B.7.2.1 Are the monitoring arrangements described in the monitoring plan feasible within the project design ?	PDD B.7	DR	The monitoring and reporting of electricity generation wil be undertaken electronically and cross checked with electricity sales receipt. CAR 08 The monitoring plan does not address explicity auxiliary power consumption by PV system. PP Response The amount of electricity consumed in the plant and electricity transmission to a grid will be measured and deducted from the emission reduction of the proposed project according to the monitoring.	~~CAR 08~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.7.2.2 Does the monitoring methodology reflect good monitoring and reporting practices ?	PDD B.7	DR	Yes, it is. The sales receipts and agreements (parallel operation and power purchase agreements) between the project owner and the grid company are used for cross checking.	OK	OK
B.7.2.3 Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex-post and verified ?	PDD B.7	DR, I	Yes, the means of implementation of the monitoring plan is appropriately described in the section B.7.2 of the PDD as followings.. - The authority and responsible for operation, monitoring, archiving and reporting of the project activity is clearly described in the section B.7.2 of the PDD. - QA/QC procedures are including periodic calibration of monitoring equipments, relevant laws and standards of Korea, measuring method and frequency, and contingency plan. CAR 03 The KSA validation team verified QA/QC management for Hoengseong PV power plant and found that the site was not established QA/QC system including monitoring equipments. PP Response We added QA/QC management about all PV power plants (6 sites) at B7.2 and Annex 4 (Monitoring information) of the PDD.	~~CAR 03~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	PDD B.7	DR, I	CAR 07 *According to 'indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories(EB 41th Report Annex 20)'* the monitoring equipments shall be periodically re-calibrated PP Response: The monitoring equipments will be periodically re-calibrated (every 3 years). We added at B.7.1, of the PDD.	~~CAR 07~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)					
B.8.1 Is it indicated a date of when baseline and monitoring methodology is determined?	PDD B.8	DR	Yes, the first version of PDD was determined on 04 September 2009.	Pending	OK
B.8.2 Is information on the responsible person(s) / entity(ies) provided ?	PDD B.8	DR	Yes, the information on the responsible person is cleary indicated in the PDD	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
C. Duration of the Project/Crediting period					
C.1 Are the project's starting date and operational lifetime clearly defined and evidenced ?	PDD C.1	DR, I	- The starting date of the project activity are Yeongam 1 PV, Yeongam 2 PV, Jindo PV, Hadong PV and Hoengseong PV plant: 25 June 2008 Goesan PV plant: 30 April 2009 - The expected operational lifetime of the PV plant will be 20 years. - The commercial operation of each PV plant has been started as follows Yeongam 1 PV plant: 21 September 2008 Yeongam 2 PV plant: 28 May 2009 Jindo PV plant: 22 September 2008 Hadong PV plant: 24 September 2008 Hoengseong PV plant: 23 September 2008 Goesan PV plant: 26 June 2009	OK	OK
C.2 Is the assumed crediting time clearly defined (renewable crediting period of max 7 years with two possible renewable or fixed crediting period of max 10 years with no renewal)?	PDD C.1	DR	Yes, fixed crediting period of max 10 years without renewal is selected.	OK	OK
C.3 Is the start of the crediting period clearly defined ?	PDD C.1	DR	Yes, the starting date of the first crediting period will be 01/06/2010 or the date of registration of the project whichever comes later.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
D. Environmental Impacts.					
D.1 If an environmental impact assessment (EIA) is required by the host Party, have the project participants undertaken an analysis of environmental impacts ?	PDD D.1	DR	According to the Korean Environmental Law, the project participant has to perform the EIA only if the capacity of photovoltaic power plant is over 100MW_e. Because the capacity of the proposed project activity are only total 4.85 MW_e, this project activity does not apply to EIA. But Yeongam 1st, 2nd and Jindo PV are required the PERS (Pre Environmental Review System). The KSA validation team had reviewed the results of PERS for 3 PV plants and confirmed that the main council opinion were cleared. And also the validation team looked at the Hadong PV, Hoengseong PV and Goesan PV plant and found that there are no any significant environmental impact for those solar photovoltaic power plants CL 05 Please address each PV plant area at D.1 of the PDD and submit to validation team the PERS reports. PP Response The PV power plants area added at D.1 of the PDD and the PERS reports was submitted.	~~CL05~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
D.2 Has an analysis of the environmental impacts of the project activity been sufficiently described ?	PDD D.1	DR, I	Refer to Section D.1.	OK	OK
D.3 Will the project create any adverse environmental effects ?	PDD D.1	DR, I	No adverse environmental effects are not created.	OK	OK
D.4 Are transboundary environmental impacts considered in the analysis ?	PDD D.1	DR, I	There is no transboundary environmental impacts.	OK	OK
D.5 Have environmental impacts been identified and addressed in the PDD ?	PDD D.1	DR	Not applicable, since there are no adverse environmental effects related to the proposed project.	OK	OK
D.6 Does the project comply with environmental legislation or law in the host country ?	PDD D.1	DR	Yes, Refer to Seciton D.1	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
E. Stakeholder's Comments. Local stakeholder shall be invited by the PPs to comment on the proposed project activity.					
E.1 Have relevant stakeholder been consulted ?	PDD E.1	DR, I	Yeongam 1st, 2nd and Jindo PV power plants are located in the remote place. So, there are no local residents nearby the PV plant. There were a local presentation for only Heongseong PV and Goesan PV power plants. But also there are no objection or argument from the identified stakeholder except misunderstanding for PV power plants. The stakeholder for this project are identified with the Korea Power Exchange (KPX), KEPCO and the related government offices. CAR 09 During the on-site interview with local residents, they requested explanation whether the PV power plants injure the crops. But KRC (project proponent) did not explained it to the local residents. PP shall explain to the local resident for PV power plant and submit to the validation team the results of meeting for local residents.	~~CAR 09~~	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			PP Response Misunderstanding for PV power plants are resolved through details explanation. Please submit to the validation team the results of meeting for local residents.		
E.2 Have appropriate media been used to invite comments by local stakeholder ?	PDD E.1	DR	There are no any comments received from stakeholder.	OK	OK
E.3. If a stakeholder consultation process is required by regulation/law in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/law ?	PDD E.1	DR, I	There is no a stakeholder consulting process which is required by regulation or law in the host country, the Republic of Korea. CAR 05 There are not clearly described for stakeholder's consulting process in the PDD including stakeholder's requirement, comments and its resolutions. PP Response We added stakeholder's consulting process at E.1, E.2(comments for stakeholder's requirement), E.3(resolutions for comments of stakeholder) of the PDD.	~~CAR 05~~	OK
E.4. Is a summary of the stakeholder comments received provided?	PDD E.1	DR	Refer to E.2	OK	OK
E.5. Has due account been taken of any stakholder comments received ?	PDD E.1	DR	No adverse comments received.	OK	OK

Table 3 Resolution of Corrective Action and Clarification Requests

No. of CAR/CL	Description of the CAR/CL	Ref.	Comments/Response from project proponent	Conclusions
CAR 01	The KSA validation team verified the installed capacity and found that those were differently described in the PDD ex) Hoengseong PV : 0.175KW_p → 0.154KW_p Goesan PV: 0.520KW_p → 0.522KW_p	PDD A.2 Table 2 A.2.2	There is a little difference between the planned installed capacity and the actual installed capacity. We revised the installed capacity following the actual installed capacity in the PDD.	OK
CAR 02	Name and value of data/parameter need to revise for followings; - Total installed capacity of the project activity: 4.8472(?) - electricity generation → Net quantity of electricity.. - $F_{i,j,y}$ → $F_{i,m,y}$ - $NCV_{i,}$ → $NCV_{i,y}$ - etc	PDD B.6.2 Table 2 B.6.4	We revised the name and value of data/parameter. - Total installed capacity: 4.8472 MW_e => 4.85 MW_e - Electricity generation: electricity generation => Net electricity generation - $F_{i,j,y}$ => $FC_{i,m,y}$ - NCV_i => $NCV_{i,y}$ - $EF_{CO2,i}$ => $EF_{CO2,i,y}$	OK
CAR 03	The KSA validation team verified QA/QC management for Hoengseong PV power plant and found that the site was not established QA/QC system including monitoring equipments.	PDD B.7.2 Table B.7.2.3	We added QA/QC management about all PV power plants (6 sites) at B7.2 and Annex 4 (Monitoring information) of the PDD.	OK
CAR 04	There are mis-calculation in the table B-5 including raw data and total amount.	PDD B.6.1 Table 2 B.3.4	We revised table B.5 including raw data and total amount based on Electricity Generation Facilities, Dec 31, 2008 (KEPCO) (http://www.kepco.co.kr)	OK
CAR 05	There are not clearly described for stakeholder's consulting process in the PDD including stakeholder's requirement, comments and its resolutions.	PDD Section E (E.1, E.2, E.3) Table 2 E.3	We added stakeholder's consulting process at E.1, E.2(comments for stakeholder's requirement), E.3(resolutions for comments of stakeholder) of the PDD.	OK

No. of CAR/CL	Description of the CAR/CL	Ref.	Comments/Response from project proponent	Conclusions
CAR 06	Baseline emission reduction applied have a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PDD to DOE for validation, but the data for 2008 year have not applied in the baseline emission reduction calculation.	PDD B.6 Table 2	We recalculated 'baseline emission factor' by the data for 2009 year.	OK
CAR 07	*According to 'indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories(EB 41th Report Annex 20)'* the monitoring equipments shall be periodically re-calibrated	PDD B.7 Table 7.2.1	The monitoring equipments will be periodically re-calibrated (every 3 years). We added at B.7.1, of the PDD.	OK
CAR 08	The monitoring plan does not address explicity auxiliary power consumption by PV system.	PDD E.1 Table 2 B.7.2.1	The amount of electricity consumed in the plant and electricity transmission to a grid will be measured and deducted from the emission reduction of the proposed project according to the monitoring.	OK
CAR 09	During the on-site interview with local residents, they requested explanation whether the PV power plants injure the crops. But KRC (project proponent) did not explained it to the local residents. PP shall explain to the local resident for PV power plant and submit to the validation team the results of meeting for local residents.	PDD E.1 Table E.1	Misunderstanding for PV power plants are resolved through details explanation. KRC had a meeting with local residents.	OK

No. of CAR/CL	Description of the CAR/CL	Ref.	Comments/Response from project proponent	Conclusions
CAR 10	NPV calculation shall be based on the objective evidences for determination of initial investment cost and discount rate.	PDD B.5 Table 2 B.4.1	NPV was calculated based on the objective evidences of KRC for determination of initial investment cost and discount rate. Please refer to excel file for 'Financial Analysis of KRC PV project (6sites)"	OK

No. of CAR/CL	Description of the CAR/CL	Ref. to checklist table 2	Comments/Response from project proponent	Conclusions
CL 01	Please submit to the validation team excel sheets for NPV calculation including calculation formula.	PDD B.5 Table 2 B.4.1	We submitted excel sheets for NPV calculation to the validation team.	OK
CL 02	Please address the contribution to sustainable development of Korea from the social, the environmental and the economic perspectives.	PDD A.2 Table 2 A.2.7	We added at Section A.2, of the PDD.	OK
CL 03	KSA validation team verified the Hoengseong PV Power plant and found that the name of solar module in PDD has differently described with the actual module's name. YL220Wp (poly) → YL220Pb-2	PDD A.4.2. Table 2 A.4.4	We matched the name of the model for module from YL220Wp (poly) to YL220Pb-2.	OK
CL 04	KSA validation team verified the Hongcheon (Hoengseong) and the Bangkok (Goesan) PV Power plant and found that the name of site in PDD has differently described with the actual site's name.	PDD A.2 Table 2 A.4.1	We matched the name of PV plant to Hoengseong and Goesan.	OK
CL 05	Please address each PV plant area at D.1 of the PDD and submit to validation team the PERS reports.	PDD D.1 Table 2 D.1	The PV power plants area added at D.1 of the PDD and the PERS reports was submitted.	OK

APPENDIX B

CERTIFICATES OF COMPETENCE

KSA

GHG Validator/Verifier Certificate

Kyoo-Il Sohn

Certificate No. : CDM-001

Sectoral Scope : 01, 05

Expert Scope : 01

Korean Standards Association hereby certifies that the above person is qualified by KSA's Qualification requirements to conduct validation and verification for CDM and GHG project.

VALID FROM	VALID UNTIL
2008.4.22	2011.4.21

PRESIDENT OF KSA

Kaphong Choi

KOREAN STANDARDS ASSOCIATION

13F, Ace High-end Tower 3, 371-50, Gasan-dong, Gwumcheon-gu, Seoul, Korea

KSA

GHG Validator/Verifier Certificate

Chang-Woo Lee

Certificate No. : CDM-004

Sectoral Scope : 04, 05, 13

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