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# **VALIDATION REPORT (rev.03)**

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**"Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM Project" in Korea**

**REPORT No. : CDM-10-008**

**KSA** KOREAN  
STANDARDS  
ASSOCIATION

Project No.	Date of first issue :	Revision No.	Revision Date
CDM-10-008	08 Sep 2010	03	25 Aug 2011
Project Title : Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project.			

## Executive Summary

Korean Standards Association (KSA) has performed a validation of "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project" in Korea. 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.

In summary, it is that KSA's opinion on the proposed CDM project activity, as described in the CDM PDD (version 07, 05 July 2011), meets all relevant UNFCCC requirements for the small-scale CDM and correctly applied the approved baseline and monitoring methodology AMS-I.F. Hence, KSA requests the registration of the "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project" in Korea as a CDM project activity.

<b>Project Participant:</b> Korea Land Housing Corporation (LH Corporation) Ecoeye Co., Ltd.		<b>Applied Methodology/Version :</b> AMS-I.F version 02
		<b>Scope(s) :</b> 1 <b>Technical Area(s) :</b> 1.2
<b>Team Leader</b> Kyoo-Il Sohn <b>Team Member</b> Chang-Woo Lee Sung-yong Park Chung-kook Lee	<b>Responsible Certification Body Member :</b> Young-Gi Kim	<b>First CDM PDD Version</b> Date of issuance: 07-May-2010 Version No. :01
		<b>Final CDM PDD Version</b> Date of issuance: 05-Jul-2011 Version No.: 07

<b>Table of Contents</b>	<b>PAGE</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 Objective .....	1
1.2 Scope .....	1
1.3 Validation Team .....	1
<b>2. METHODOLOGY</b> .....	<b>2</b>
2.1 Review of Documents .....	3
2.2 Follow-up Interviews .....	3
2.3 Resolution of Clarification and Corrective Action Request .....	4
2.4 Internal Quality Control .....	6
<b>3. VALIDATION FINDINGS</b> .....	<b>7</b>
3.1 Approval .....	7
3.2 Participation .....	7
3.3 Project Document .....	7
3.4 Project Description .....	7
3.5 Baseline and Monitoring Methodology .....	10
3.6 Additionality of a Project Activity .....	17
3.7 Monitoring Plan .....	19
3.8 Sustainable Development .....	20
3.9 Comments by Local Stakeholders .....	20
3.10 Environmental Impacts .....	20
<b>4. COMMENTS BY PARTIES, STAKEHOLDERS AND NOGs</b> .....	<b>21</b>
<b>5. VALIDATION OPINION</b> .....	<b>22</b>
<b>6. REFERENCES</b> .....	<b>23</b>

Appendix A Validation Protocol

Appendix B Certificates of Competence

## Abbreviations

<b>BM</b>	Build Margin
<b>CAR</b>	Corrective Action Request
<b>CDM</b>	Clean Development Mechanism
<b>CEF</b>	Carbon Emission Factor
<b>CER</b>	Certified Emission Reduction(s)
<b>CL</b>	Clarification Request
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2e</sub></b>	Carbon dioxide equivalent
<b>DNA</b>	Designated National Authority
<b>GHG</b>	Greenhouse gas(es)
<b>GWP</b>	Global Warming Potential
<b>KEPCO</b>	Korea Electric Power Corporation
<b>KPX</b>	Korea Power Exchange
<b>KSA</b>	Korean Standards Association
<b>FAR</b>	Forward Action Request
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MKE</b>	Ministry of Knowledge and Economy
<b>MP</b>	Monitoring Plan
<b>MoV</b>	Means of Verification
<b>NGO</b>	Non-Governmental Organization
<b>ODA</b>	Official Development Organization
<b>OM</b>	Operation Margin
<b>PDD</b>	Project Design Document
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change

## 1. INTRODUCTION

Korea Land & Housing Corporation (hereafter, LH Corporation), the representative of project participant, has contracted Korean Standards Association (hereafter, KSA) to carry out a validation of the proposed project "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project" in Korea (hereafter, the project). This report summarizes 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 stakeholders 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.F. version 02. 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 not 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 Validation Team

The validation team consists of the following personnel:

<i><b>Role/Qualification</b></i>	<i><b>Name</b></i>	<i><b>Document Review</b></i>	<i><b>Site Visit</b></i>	<i><b>Follow-up Actions</b></i>	<i><b>Reporting</b></i>	<i><b>Technical Review</b></i>
Team Leader CDM Validator	Mr. Kyoo-II Sohn	✓	✓	✓	✓	
Team Member CDM Validator	Mr. Chang-Woo Lee	✓	✓			
Team Member CDM Validator	Mr. Sung-yong Park	✓		✓		
Team Member Technical Expert	Mr. Chung-kook Lee	✓		✓		
Technical Reviewer CDM Validator	Mr. Chan-Sik Yoon					✓

## 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 check 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 stakeholders 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	Ref.	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 and the other supporting documents. The PDD version 01, dated 07 May 2010, was initially reviewed and KSA requested the project participant to present the supporting information and documents the related with the project design. 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 stakeholders and site visits were performed in the period of 01 July 2010 to 07 July and 08 Mar to 10 Mar 2011. The schedule on site visit and interviewed personnel were as follows;

01 July 2010 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Chuncheon Mancheon	824-1, Mancheon-ri, Dong-myeon, Chuncheon-si, Gangwon-do

02 July 2010 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Chungju Yeonsu (6)	259-4, Yeonsu-dong, Chungju-si, Chungcheongbuk-do
Jeocheon Gangjeo (A1)	Jeocheon Gangjeo National rental house A-1BL Gangjeo-dong, Jecheon-si, Chungcheongbuk-do

05 July 2010 visit the project site (CDM Validator : Mr. Chang-Woo Lee)

Site Name	Location (Address)
Icheon Galsan (2)	630-1, Galsan-dong, Icheon-si, Gyeonggi-do
Nonsan Daegyo	279-2, Daegyo-dong, Nonsan-si, Chungcheongnam-do

06 July 2010 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Gyeongsan Sadong (1)	696 Pyeongsan-dong, Gyeongsan-si, Gyeongsangbuk-do

06 July 2010 visit the project site (CDM Validator : Mr. Chang-Woo Lee)

Site Name	Location (Address)
Goseong Dongoe	572, Dongoe-ri, goseong-eup, Goseong-gun, Gyeongsangnam-do
Yeongam Yongang	190-4 Yongang-ri, Samho-eup, Yeongam-gun, Jeollanam-do

07 July 2010 visit the project site (CDM Validator : Mr. Chang-Woo Lee)

Site Name	Location (Address)
Gunsan Guam	417-1, Guam-dong, Gunsan-si, Jeollabuk-do

08 Mar 2011 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Pohang Jangryang	san 118-3 Pohang humansia, Yangdeok-dong, Buk-gu, Pohang-si, Gyeongsangbuk-do

09 Mar 2011 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Iksan Hamyeol	208-13, Wa-ri, Hamyeol-eup, Iksan-si, Jeollabuk-do



10 Mar 2011 visit the project site (CDM Validator : Mr. Kyoo-II Sohn)

Site Name	Location (Address)
Sacheon Yonghyun	Yonghyun Taekji 1BL, Deokgok-ri, Yonghyeon-myeon, Sacheon-si, Gyeongnam

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

Organization	Interview topics
the representative of the local resident (resident or local manager)	<ul style="list-style-type: none"><li>- Environmental impacts</li><li>- Stakeholders' comments</li></ul>
O&M service providers (Relevant APT O&M manager)	<ul style="list-style-type: none"><li>- Technology applied and operational lifetime</li><li>- Provisions for training, operation and maintenance</li><li>- Monitoring and reporting procedures</li></ul>
Project Participant: LH Corporation  Consulting Company : Ecoeye	<ul style="list-style-type: none"><li>- Clarification on technical details of the project.</li><li>- Confirmation on non-involvement of ODA.</li><li>- Monitoring and reporting procedures</li><li>- Additionality</li><li>- Baseline methodology.</li><li>- Estimated emission reduction and emission factors applied</li><li>- Stakeholder consultation process</li><li>- Environmental impacts</li><li>- Legal compliance.</li><li>- Resources, training needs and procedures for operation and maintenance.</li><li>- Benefits from CDM registration.</li><li>- Prior consideration of CDM</li></ul>

## 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"(EB 55 Annex 1) /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 eleven CARs and four 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 (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 the 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 Approval

The project participant are composed of "Korea Land and Housing Corporation (LH Corporation)" and "Ecoeye Co., Ltd". The Host Party - the Republic of Korea - meets all relevant participation requirements. The Republic of Korea has ratified the Kyoto Protocol on 08 Nov 2002 and established "the CDM Review Committee", "Prime Minister's Office" as its DNA. The DNA of Republic of Korea has approved on 11 November 2010 (Document No. 2010-19) /1-6/ (revised on 21 April 2011) confirming the voluntary participation of project participations and contributing to sustainable development in Korea. No Annex I Party has been identified yet. Parties to the Kyoto Protocol have been confirmed via Korea's DNA lists on the UNFCCC web sites.

KSA received Letters of approval from the project participant and confirmed them by calling DNA.

### 3.2 Participation

The project participant has been approved by the corresponding Party which is confirmed by the issued LoA /1-6/. Project participants listed in the PDD/1-1/ were cross-checked by the letter of approval /1-6/. Letter of approval states that the project participants are voluntary.

The project is owned by the "Korea Land and Housing Corporation (LH Corporation)" and "Ecoeye Co., Ltd" 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.

### 3.3 Project Document

PDD used is CDM-SSC-PDD ver. 03 which is the most recent PDD format and complies with relevant form and guidance as provided by UNFCCC EB. Completeness was assessed through the protocol included as Appendix A of this report.

### 3.4 Project Description

#### 3.4.1 General Information

The proposed project activity involves installation of 2.876MW (2,876.44kW) composing 36 small-scale solar photovoltaic power plants. The electricity generated from solar photovoltaic power plants will be supplied to the households displacing electricity supplied from KEPCO (Korea Electric Power Co., Ltd) grid which are produced by a thermal power plant which uses a

fossil fuel and result in reduced GHG emission.

The estimated emission reduction attributable to the project activity are 24,200 tCO<sub>2</sub>-eq per over the selected 10 year crediting period, with annual average reduction of 2,420 tCO<sub>2</sub>-eq. The technologies of the proposed project activity are as follows;

Module Max. Output	Manufacturer	No. of Module	Capacity (kW)	PV power plant	Remarks
200 W <sub>p</sub>	S-Energy	2,460	492.00	6 sites	
	CU Electron	1,488	297.60	4 sites	
	Canadian Solar	2,904	580.80	8 sites	
230W <sub>p</sub>	Kyung Won	2,372	545.56	5 sites	
	LG Electronics	4,176	960.48	13 sites	
Total			2,876.44	36 sites	

The technologies applied to the proposed project are deemed current good practice and are not expected to be replaced within the crediting period. The project have all inherent benefits of a renewable energy project. The starting date has been identified as the date of "Facility supply and installation contract"/1-7/. The earliest starting date is 24 April 2009 and the latest starting date is 04 November 2010 among 36 PV power plants.

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 registration date. The project activity will have all inherent benefits of a renewable energy. Moreover, the project activity will contribute to the local economic development and the sustainable development objectives of the Republic of Korea.

The information presented in the PDD on the technical design are consistent with the actual planning and implementation of the project activity as confirmed by;

- Review of data and information was checked at the desk review stage by following documents;
  - PDD /1-1/
  - Construction Completion Report on the PV Power Plant (for 36 plants) /1-8/
  - Guideline on the supporting, equipment installation & management of New and renewable energy (Dec 24, 2008; MKE 2008-232) /1-9/
  - Guideline on the Supporting renewable energy equipment (Dec 29, 2008, MKE 2008-332) /1-10/
  - Plan for Photovoltaic Supply Business /1-11/
  - Module Specification/ 1-12/
  - Utilization Status on the generating equipments of Renewable Energy for 2007~2008 by KPX (Korea Power Exchange; <http://www.kpx.or.kr>) /1-13/

- Accounting Regulation on the Electric Business /1-14/
- An on-site visit has been performed and relevant stakeholder and personnel related to operation and maintenance were interviewed. And also checked with design drawing including specification and capacity and number of module.

In the view of the above, KSA confirms that the project description as included in the PDD is sufficiently accurate and complete in order to comply with the requirements of the CDM

### 3.4.2 Eligibility as a Small Scale Project

The proposed project activity is displacing the KEPCO grid solar photovoltaic based on renewable power generation. The qualification of the project activity as a small-scale project activity is confirmed during the on-site visit as follows;

- Maximum output capacity.

The project qualifies as small-scale project activity as the maximum output capacity of 2.876MW<sub>e</sub> (2,876kW<sub>e</sub>) which is less than the 15 MW<sub>e</sub> capacity limit stipulated in paragraph 6 (c) of decision 17/CP.7. Therefore the description of project design justifies the applicability criteria of approval small scale methodology AMS- I.F. Renewable electricity generation for captive use and mini-grid (version 02) /2-7/

- Debundling

The definition of debundling for SSC project activities is stated in Annex 13 of EB 54 /2-4/, and it was confirmed during on-site visits that those items for followings related to debundling do not be applied to the proposed project activity.

- With the same project participants
- In the same project category and technology/measure
- Registered within the previous 2 years
- Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

### 3.4.3 Choice of the Crediting Period

The crediting period for this project activity is considered as fixed crediting period of 10 years starting on the 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/1-1/.

## 3.5 Baseline and Monitoring Methodology

### 3.5.1 Applicability of the Selected Methodology to the Project Activity

According to Appendix B of the 'Simplified modalities and procedures for small-scale CDM project activities' /2-2/, the selected baseline methodology refers to project type I (Renewable Energy Projects) and project category F(*Renewable electricity generation for captive use and mini-grid* ).

The project activity has applied baseline as mentioned in the approved methodology AMS-I.F. version 02 /2-7/. The project activity generates renewable electricity from solar photovoltaic and the generated electricity will be supplied to the households displacing KEPCO grid which are generated by fossil fuel.

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

The proposed project activity is confirmed at desk review and on-site visit as follows;

- generates about 2.876MW<sub>e</sub> (2,876kW<sub>e</sub>) of electricity by solar energy, one of renewable energies.
- The electricity generated by PV power plant is supplied to the households displacing KEPCO grid system.

Thus, the selected methodology to the proposed project activity is applicable.

### 3.5.2 Project Boundary

The project boundary encompasses the physical geographical site of the renewable energy generation source. The power generated by the proposed project activity will be supplied to the households displacing KEPCO grid system. The project boundary description is clear in accordance to the project category of the approved methodology.

### 3.5.3 Baseline Identification

According to "the 5th Basic plan of long-term electricity demand and supply (BPE)" /1-30/ by MKE (Ministry of Knowledge and Economy, <http://www.mke.go.kr>), electricity energy situation in Korea are as follows;

- Electricity consumption growth rate has gradually decreased.

Years	1991~1995	1996-2000	2001-2004	2005-2009
electricity consumption growth rate	11.6%	8.0%	6.8%	5.7%

\* 11.6% in ' → 8.0% in '96~'00 → 6.8% in '01~'04 → 5.7% in '05~'09

- Electricity consumption for the 3 year period 2007~9 was higher than forecasted (the average forecast of former BPE) by 3.3 ~ 5%.
- Measures such as the rationalization of the electric rate system and energy efficiency

improvement are taken and pursued in order to achieve the target demand.

- Measures Related to Long-term Demand and Supply Management (DSM)
  - Making the most use of DSM resources taking into consideration the status of supply and demand.
  - Improving DSM results by promoting effective DSM projects.
  - Reflect energy saving amount by promoting efficiency improvement projects such as high efficiency apparatus.
- The prospects for power consumption ('10~'24)

Unit: GWh

Years	2010	2015	2020	2024	Average growth rates (%)
Power consumption	423,784	496,590	535,779	551,606	1.9

- Generating Capacities Expansion
  - Generation capacities expansion plan, (the 5th BPE, '10-'24)

Unit: MW

Nuclear	Coal	LNG	Renewables	Pumped storage	Total
18,200	12,090	12,236	8,346	800	51,672

- Generator retirement (2010~2024): total of 3,983MW (19 units).
- SMP (System Margin Price) (source: <http://epsis.kpx.or.kr> /1-34/) trend has gradually increased

Unit: Won (₩)/kWh

Years	2006	2007	2008	2009	Remarks
SMP	79.07	83.7	122.63	105.4	

- Renewable energy situation
  - Current Status of renewable facilities as of December 2009.

Unit: MW

Hydro		Wind power	Solar	Bio	Waste incineration	LFG	Fuel Cell	Total
large	small							
1,529.9	84.6	345.9	414.7	86.2	36.8	230.3	22.5	2,750.9
55.6%	3.1%	12.6%	15.1%	3.1%	1.3%	8.4%	0.8%	100%

- Outlook for renewable facilities expansion : total of 8,346MW new renewable facilities are expected to be constructed during the period 2010 ~ 2024
  - \* Ocean energy (tide energy) facilities will be expected to amount to 3,037MW (36%)

Emissions reductions are determined by the AMS-I.F version 02 /2-7/ methodology mentioned in the PDD /1-1/. This project activity is to generate electricity using solar energy and supplies electricity to the households displacing the KEPCO grid that would have been supplied by at least one fossil fuel-fired generating unit. Thus, the baseline emission are the product of amount electricity displaced with the electricity produced by the PV power plant and an emission factor.

The information presented in the PDD/1-1/ have been validated by the first desk review of all the data, further confirmation based on the on-site visit and a final step by cross-checking the information with the FSR /1-27/ & /1-28/. The sources referenced in the PDD/1-1/ have been correctly quoted. The information was cross-checked based on verifiable and credible source, such as;

1) Documents are provided by PPs

- PDD /1-1/
- Facility Supply and Installation Contract. /1-7/
- Construction Completion Report on the PV Power Plant (for 36 plants) /1-8/
- Plan for Photovoltaic Supply Business /1-11/
- Module Specification /1-12/
- Utilization Status on the generating equipments of Renewable Energy for 2007~2008 by KPX (Korea Power Exchange; <http://www.kpx.or.kr>)/1-13/

2) Documents for cross checking by KSA

- Guideline on the supporting, equipment installation & management of New and renewable energy (Dec 24, 2008; MKE 2008-232)/1-9/
- Guideline on the Supporting renewable energy equipment (Dec 29, 2008, MKE 2008-332) /1-10/
- Feasibility Study Report - Supporting System in Feed-in Tariffs of Electricity generation from New and Renewable Energy Source by MKE (Ministry of Knowledge and Economy) of Korea (<http://www.mke.go.kr>) /1-27/
- Study on feed-in tariff of PV power plant in Korea by KERI (Korea Electrotechnology Research Institute) /1-28/
- Act on operation of electricity market by KPX (Korea Power Exchange) /1-20/
- The 5th Basic plan of long-term electricity demand and supply by MKE /1-30/
- Act on the promotion of the development, use and diffusion of new and renewable energy/1-25/
- The status report of generation facility for 2008 by KPX /1-32/
- The Energy Act /1-22/
- Framework Act on Low Carbon Green Growth/1-33/



- Korea Power Exchange (<http://www.kpx.or.kr>) /1-34/
- Korea Electric Power Corporation (<http://www.kepco.co.kr>) /1-37/

Based on the validated assumptions on calculations, KSA considered the identified baseline scenario is reasonable. KSA confirms that all related CDM requirements, including relevant and/or sectoral policies and circumstances, have been correctly identified taken into account in the definition of the baseline scenario. A verifiable description of the baseline scenario has been included in the PDD/1-1/, KSA confirms that;

- All the assumptions and data used by the project participants are listed in the PDD /1-1/, including their references and sources;
- All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD /1-1/;
- Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
- Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD /1-1/;
- The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

### 3.5.4 Algorithms and/or formulae used to determine emission reductions

KSA assessed the calculation of the baseline emission, project emissions and leakage and emission reductions. The corresponding calculations, parameters and equations are presented in B.6.3 of the PDD /1-1/. The parameters and equations presented in the PDD/1-1/ and further documentation have been compared with the information and requirements presented in the methodology and respective tools.

The assumptions and data used to determine the emission reduction are listed in the PDD /1-1/ and all sources have been checked and confirmed. Based on the information reviewed it can be confirmed that the sources used are correctly quoted and interpreted in the PDD /1-1/.

The value presented in the PDD /1-1/ are considered reasonable based on the documentation reviewed, further references and the results of the interviews. The baseline methodology has been correctly applied following requirements. The estimated baseline emissions can be confirmed as the same have been replicated by the audit team using the information provided. Detailed information on the verification of the parameters used in the equation can be found in the appendix A. The algorithms for the determination of the baseline, project and leakage are discussed in the following sections.

## 1) Baseline Emissions

Emissions reductions were calculated according to the methodology, AMS-I.F. version 02 /2-7/ and emission factor was also calculated based on the approved methodology of "Tool to calculate the emission factor for an electricity system (version 2.2)" /2-8/

The information presented in the PDD/1-1/ has been validated by the first desk review of all the data, further confirmation based on the website (<http://www.kepco.co.kr>)/1-34/ and a final step by cross-checking the information with similar PV power projects which are registered as CDM project.

The documents and information used to confirm baseline emission factor are as follows;

① Documents are provided by PPs

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

② Documents for cross checking by KSA

- For 5 years (2004 ~ 2008), "Statistics of Electric Power in Korea" /1-31/.

Those are available on the website (<http://www.kepco.co.kr>)

- The Energy Act in Korea./1-22/
- IPCC guideline on national greenhouse gas inventories /2-5/
- The status report of generation facility for 2008 by KPX (Korea Power Exchange) /1-32/

Since the project activity is the installation of a new renewable power plant, the baseline scenario is correctly identified as an electricity delivered to the households displacing the KEPCO grid by the project activity multiplied by the combined margin (CM) calculation described in the "Tool to calculate the emission factor for an electricity system" /2-8/, namely "the net electricity amount by the project activity" \* "CM factor". For this purpose it has been validated by KSA validation team that the project participant applied all the 7 steps as per the approved baseline methodology.

Since the Korean electricity system is not constituted of layered dispatch system, the KEPCO grid is considered for the determination of a baseline grid electricity emission coefficient ( $EF_{CO_2}$ ).

## Step 1: Identify the relevant electric power system

The electricity by the proposed project activity is connected physically to KEPCO grid which is the only one in Korea. And the power plant in islands except Jeju Island are not connected to the national grid, so they are not considered. Thus, the relevant electric power system is KEPCO grid.

## Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

"Option I . Only grid power plants are included in the calculation" was chosen.

## Step 3: Select an Operation Margin (OM) Method.

During the most recent 5 years (2004 ~ 2008), low-cost/must run resources constitute 40.40% of total grid generation which is less than 50%. So Simple OM method was chosen.

Step 4: Calculate the operating margin emission factor according to the selected method.

According to the selected method, simple OM is calculated as the generation-weighted average emission per electricity unit of all generating power plant within KEPCO grid, not including low-operating cost and must run power plants for three years (2006 ~ 2008).

Subsequently choosing Option A, the simple OM emission factor is determined as per formular 1 of tool as  $OM = 0.6816$

Step 5: Identify the cohort of power units to be included in the build margin.

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 20.378% of the total generation have been considered during build margin calculations.

The approximate operating margin is calculated as average of data available for 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.

Step 6: Calculate the build margin (BM) emission factor.

BM is calculated as the generation-weighted average emission factor of all generating power plant within KEPCO grid during the most recent year y for which power generation data is available. BM emission factor is determined as per formular 13 of tool as  $BM = 0.5221$ .

Step 7: Calculate the combined emission factor.

According to "Tool to calculate the emission factor for an electricity system /2-8/", the weighting factor is set to be respectively  $W_{OM} = 75\%$  and  $W_{BM} = 25\%$  during the crediting period.

The combined margin (CM) of the project activity is calculated as 0.6417 tCO<sub>2-eq</sub>/MWh. The baseline emission factor determined ex-ante will be used for calculation of emission reductions.

OM	BM	CM
0.6816	0.5221	0.6417

With the expected generation of 3,771 MWh per year to the households displacing KEPCO grid by the proposed project activity, the annual baseline emission will be 2,420 tCO<sub>2-eq</sub>.

All steps and formula mentioned in the 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.

The power sector data used for the calculation has been cross checked as follows;

- Each power plant of the electric generation amount : "Statistics of Electric Power in Korea" /1-31/ and "The status report of generation facility for 2008 by KPX /1-32/.

- Each Fuel of CGVs and NCVs : "The Energy Act" /1-22/ and IPCC guideline on national greenhouse gas inventories /2-5/

As above, KSA confirmed that all data used for the calculation are not excessive and appropriate.

All the equations involved along with the KEPCO grid power sector data used for calculation were found by the validation team to be in line with the "Tool to calculate the emission factor for an electricity system, version 2.2" /2-8/. 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 0.6417 tCO<sub>2e</sub>/MWh, the same value has properly been used in the emission reduction calculation as per the requirement of AMS-I.F version 02 /2-7/.

## 2) Project Emissions

Thus as per the requirement of AMS-I.F. version 2.0 calculation of project is not applicable for the proposed project activity which is renewable energy project activity under consideration,  $PE_y = 0$ .

## 3) Leakage

Thus as per the requirement of AMS-I.F. version 2.0 calculation of leakage emission is not applicable for the project activity as the energy generating equipment is not transferred from another activity,  $LE_y = 0$ .

## 4) Emission Reductions

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<sub>2e</sub>/y)

$BE_y$  : Baseline emissions in year y (tCO<sub>2e</sub>/y)

$PE_y$  : Project emissions in year y (tCO<sub>2e</sub>/y)

$LE_y$  : Leakage emissions in year y (tCO<sub>2e</sub>/y)

Baseline emission is the annual electricity generated by the renewable energy unit times an emission factor ( $EF_{CO_2}$  in tCO<sub>2eq</sub>/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/1-1/, the proposed project activity is yet to be commissioned and the start of 10 years crediting period without a renewal has been stated as the 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 Additionality of a Project Activity**

### **3.6.1 Prior consideration of the Clean Development Mechanism**

#### **1) Starting date of CDM project activity**

According to Glossary of CDM terms (version 05), 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 "Facility supply and installation contract"/1-7/ are identified as a starting date of the project activity. The earliest date of "Facility supply and installation contract" in the 36 PV power plant is 24 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 the date of "Facility Supply and Installation Contract" is the earliest date at which either the implementation or construction or real action of a project activity begins and the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. Thus, the most reasonable start date of project activity is the date on which contracts have been signed for "Facility supply and installation contract"/1-7/.

KSA regarded this "Facility supply and installation contract" /1-7/ as an official consent to the project activity and accepted it as the starting date.

#### **2) Prior Consideration of the CDM**

The starting date of the project activity is 24 April 2009, the earliest date of "Facility supply and installation contract"/1-7/ in the 36 PV power plant. Through the document check, the validation team hereby confirms that this is the earliest date on which the real action has taken place. Moreover this is the date on which PP has financially committed towards the expenses of the project activity and is in compliance with the latest "Glossary of CDM terms (version 5.0)"

The start date of the project activity is prior to the date when the project was published for global stakeholder comments (04 June 2010).

The project start date is after 02 Aug 2008, thus this is a new project activity according to the categorization in "Guideline on the demonstration and assessment of prior consideration of the CDM", 49th Report Annex 22 (version 03)/2-9/ which was available at the time of project decision making. The project participants have informed both host country DNA /1-4/ and the UNFCCC /1-5/ regarding the consideration of the project on 12 Oct 2009 within 6 months of the project start date (24 April 2009). Thus, it can be concluded that CDM was seriously for the project activity and it meets the required criteria of prior consideration of CDM.

Moreover, the description of key event timeline regarding CDM application and project

implementation is included in the section B.5 of PDD.

And validation team confirmed that this project activity is to proceed in terms of LH Corporation's social responsibility and to create domestic demand of new & renewable energy

Also the validation contract was made between PP and KSA on 28 May 2010 and PP made a request for Korea DNA approval /1-6/ and received the approval on 11 November 2010 (revised on 21 April 2011).

### **3.6.2 Additionality**

#### **1) Investment Analysis**

In case of no considering subsidy, IRRs and NPVs are negative which means 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.

But in case of considering subsidy, IRRs show that the returns from the project are slightly higher than the applied discount rate. The purpose of subsidy for PV power plant is to compensate high installation cost for the renewable energy power generation projects. Also the proposed project activity is applied this subsidy rule. Thus, the returns from the project in the absence of the benefits from CDM can be some attractive for the project proponent to go forward with the project.

The validation team has verified all sources of the IRR and NPV 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.

#### **2) Additionality of microscale project activities /2-11/**

The project activity is the PV power plant, one of the renewable energy and also capacity of the project activity is 2.876MW which is below 5MW. Thus, the project activity can be assessed the additionality of the project activity by "Guidelines for demonstrating additionality of microscale project activities" (version 2.0, EB 60 Report Annex 25) /2-11/.

The project activity satisfied the paragraph 2 (c) and (d) requirements of EB 60 Annex 25 which are required to assess the additionality of the project activity as follows;

- The total capacity of the project activity is 2.876MW
- The project activity is designed for distributed energy generation (not connected to the KEPCO grid) with both conditions (i) and (ii) satisfied;
  - (i) Each of the independent subsystem/measures in the project activity is smaller than 1,500kW electrical installed capacity.
  - (ii) End users of the subsystem or measures are households.

- The photovoltaic power is one of the renewable energy which are encouraged and recommended by the Korean Government. /1-25/
- the total installed capacity of photovoltaic power generation contributes only 0.67% to KEPCO grid at 2009 year /1-28/

The installed capacity of the independent subsystem in the project activity are described in B.5 of PDD. And all of the individual capacity in the project activity are smaller than 1,500kW.

As see above, KSA validation team concluded that the project activity is additional.

Validation team have verified additionality by both conducting investment analysis method and "Guidelines for demonstrating additionality of microscale project activities"/2-11/. As per the results of investment analysis, the additionality of the proposed project activity can be not demonstrated considering subsidy. But the additionality of the proposed project activity is demonstrated by "Guidelines for demonstrating additionality of microscale project activities"/2-11/.

Thus it has been established that the project activity would not have occurred in the absence of CDM and is hence additional.

## 3.7 Monitoring Plan

### 3.7.1 Collecting data and reporting

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 applied methodology, AMS-I.F, in context of the parameters to be monitored.

In this project activity, the only parameter to be monitored to calculate emission reduction is the net electricity ( $EG_y$ ) supplied to the households using KEPCO grid. The electricity( $EG_y$ ) supplied to the households will be monitored by the watt meter (the measuring devices in inverter) and the quantity of transmitted electricity will be electronically archived. The auxiliary electricity consumption (connector bands, inverters and so on) will be excluded from the supplied electricity to households on the base of conservative methods.

All data will be archived electronically for a period of two years after the crediting period.

The choice of project GHG indicators is found reasonable and in conformance with the requirements set by the applied methodology, AMS-I.F.

### 3.7.2 Monitoring System

As per the "Measures Act"/1-24/ in Republic of Korea, electricity meter for low-capacity such as this project activity should be re-calibrated within 7 years, but the watt meter in the project activity will be re-calibrated at least once in 3 years according to *"General guideline to SSC CDM methodologies (version 17 EB 61 Annex 21) /2-3/*.

The monitoring plan in the PDD properly described the quality control and quality assurance to

ensure delivery of the high quality data. And the selected data/parameters will meets reliable QA/QC procedure as QMS, and periodic calibration of the monitoring equipments will be carried out by competent body. The overall responsibility and authority for daily monitoring, reporting and maintenance is established.

### **3.8 Sustainable Development**

The LoA /1-6/ of the Host country, the Republic of Korea, clearly presents a statement that this project activity contribute to the sustainable development in Korea.

### **3.9 Comments by Local Stakeholders**

Stakeholders have been directly asked to comment on the project activity through an open meeting among the relevant local stakeholders and project participant held at the project site and conference room from 1st Apr to 18 Sep 2009 (1st stage) and from 5th Apr to 23 Apr 2010 (2nd stage). Approvals required by law have been issued from the local government and the process of these approvals included collecting comments from stakeholders before issuance. The relevant comments including any objection for the this project activity has not received from the local stakeholders. During on-site interview with the representative of local residents, there are no objections or arguments to the relevant of project activity.

A summary of the comments received and a note on how due account was taken of the concerns raised in the above public consultation are included in section E of PDD. After review of the available information and discussions with the local stakeholders during the site visit, validation team is confirmed the project participant has conducted the local stakeholders consultation adequately.

### **3.10 Environmental Impacts**

As per Korean legislation, EIA (Environmental Impacts Assessment) is not required for this kind of project activities and the same is sufficiently described in the PDD.

Social and environmental aspects for the project activity have been sufficiently addressed. No adverse environmental impacts as well as trans-boundary impacts have been expected from this project activity.



## **4. COMMENTS BY PARTIES, STAKEHOLDERS AND NGOs**

The Project Design Document for this project was made available on the UNFCCC website and was open for comments from Parties, stakeholders and NGOs from 04-06-2010 to 03-07-2010. No comments were received.

## 5. VALIDATION OPINION

Korean Standards Association (KSA) has carried out validation of the "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project" in the Republic of Korea. The validation has performed on the basis of UNFCCC criteria for the Clean Development Mechanism and the host country criteria.

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

Total emission reductions from the project are estimated to be on the 2,420 tCO<sub>2</sub>-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 activity meets all relevant UNFCCC requirements for CDM, is eligible as category I.F small-scale CDM project activity, and correctly applies the approved simplified baseline and monitoring methodology AMS-I.F. (version 2.0). Hence, KSA requests the registration of the project "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project" as a CDM project activity.

**August 25th, 2011**



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Young-Gi Kim

**Director  
International Certification Division  
Korean Standards Association**



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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 Land & Housing Corporation (LH Corporation) (Webhosted PDD of the project is version 01 dated 07 May 2010 and the final version of the PDD of the project is version 07 dated 05 July 2011 )
- /1-2/ Excel Spreadsheets for calculation of the operating margin and build margin emission coefficient.
- /1-3/ Excel Spreadsheets for IRRs and NPVs calculation. (version 06)
- /1-4/ Notification to the DNA of Korea (by the official letter from LH Corporation)
- /1-5/ Notification to the UNFCCC secretariat (by the website)
- /1-6/ Approval of CDM - DNA of Republic of Korea (English and Korean)
- /1-7/ Facility Supply and Installation Contract.
- /1-8/ Construction Completion Report on the PV Power Plant (for 36 plants)
  - (1) Completion Inspection Report
  - (2) Construction Records including installed capacity.
  - (3) Inspection certificate prior to operation for each of PV power plant by Korea Electrical Safety Corporation (<http://www.kese.or.kr>)
  - (4) Serial Number of PV module for each of PV power plant
  - (5) Certificate of Renewable Energy module for each of PV power plant
  - (6) Test Report for Module for each of PV power plant
  - (7) Serial Number of the installed inverter for each PV power plant
  - (8) Test Report for the Installed inverter for each PV power plant
- /1-9/ Guideline on the supporting, equipment installation & management of New and renewable energy (Dec 24, 2008; MKE 2008-232)
- /1-10/ Guideline on the Supporting renewable energy equipment (Dec 29, 2008, MKE 2008-332)
  - including Installation Criteria for Monitoring equipment  
(Inverter : CT  $\pm 3\%$ , Watt meter : 1.0S (1.0%))
  - including maintenance guarantee period for PV poer plant
- /1-11/ Plan for Photovoltaic Supply Business
- /1-12/ Module Specification

- CU electronics (<http://www.cuec.co.kr>) : PV Module 200W (Multi crystalline PV module)
- S-Energy (<http://www.s-energy.co.kr>) : 200W PV Module (Polycrystalline PV)
- Canadian solar (<http://www.canadian-solar.com>) : CS6P-200
- LG electronics (<http://www.lge.co.kr>) : LG230M1W-E1
- Kyung Won Co., Ltd (<http://www.kwsolar.co.kr>) : KW230-M60A
- /1-13/ Utilization Status on the generating equipments of Renewable Energy for 2007~2008 by KPX (Korea Power Exchange; <http://www.kpx.or.kr>)
- /1-14/ Accounting Regulation on the Electric Business
- /1-15/ Statement of Accounts for PV power plant (36 PV Power plant)
- /1-16/ GPS Information (36 PV power plant)
- /1-17/ KEPCO in Brief for 2006/2007/2008/
- /1-18/ Accounting Resolution - Subsidy
- /1-19/ Standard Price on the Installation for Renewable Energy Sources for 2009 and 2010
- /1-19/ Electricity Business Act
- /1-20/ Act on operation of electricity market by KPX
- /1-21/ The Act on Assessment of Impacts of Works on Environmental, Traffic and Disaster
- /1-22/ The Energy Act
- /1-23/ Framework Act on Environmental Policy of Korea
- /1-24/ Measures Act
- /1-25/ Act on the promotion of the development, use and diffusion of new and renewable energy. in Korea
- /1-26/ Guideline on standard price of electricity generated using alternative energy
- /1-27/ Supporting System in Feed-in Tariffs of Electricity Generation from New & Renewable Energy Sources by MKE (Ministry of Knowledge and Economy)
- /1-28/ Study on feed-in tariff of PV power plant in Korea by KERI (<http://www.keri.re.kr>),
- /1-29/ A five year national strategy for green growth in Korea by the committee of Green Growth Korea
- /1-30/ The 5th Basic plan of long-term electricity demand and supply by MKE
- /1-31/ Statistic of Electric Power in Korea by KEPCO
- /1-32/ The Status Report of generation facility for 2008 by KPX.
- /1-33/ Framework Act on Low Carbon Green Growth
- /1-34/ Korea Power Exchange (<http://www.kpx.or.kr>)
- /1-35/ Ministry of Knowledge Economy (<http://www.mke.go.kr>)
- /1-36/ Ministry of Environment (<http://www.me.go.kr>)

- /1-37/ Electric rate for households - Korea Electric Power Corporation (<http://www.kepco.co.kr>)
- /1-38/ Bank of Korea (<http://ecos.bok.or.kr>)
- /1-39/ Korea Statical information Service (<http://www.kosis.kr>)
- /1-40/ Corporation Tax Act
- /1-41/ Korea Exchange Bank (<http://www.keb.co.kr>)
- /1-42/ Report on the result of local stakeholders consultation for 2009/2010
- /1-43/ The 1st Master Plan on the National Energy by Council on National Energy  
(<http://www.naenc.go.kr>)
- /1-44/ Coefficient of utilization on the renewable energy in Korea during 2007 to 2008 by KPX  
(Korea Power exchange)
- /1-45/ The auxiliary electricity consumption
  - electric consumption by standby power of Inverter - dated 25 Aug 2011 by Dastech Co., Ltd.
  - electric consumption by standby power of Inverter - dated 25 Aug 2011 by Teldaseobo
  - product guarantee test of inverter - dated 12 May 2011 by Willings
  - electric consumption by standby power of connector bands - dated 26 Aug 2011 by Mirae E&I Co., Ltd
  - electric consumption by standby power of connector bands - dated 31 Aug 2011 by Mobitron

## 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 01.2 EB 55 Annex 1)*
- /2-2/ Appendix B of the simplified modalities and procedures for small-scale CDM project activities;*
- /2-3/ General guidelines to SSC methodologies. (version 17 EB 61 Annex 21)*
- /2-4/ Guidelines on assessment of de-bundling for SSC project activities.(version 03, EB 54 Annex 13)*
- /2-5/ IPCC guideline on national greenhouse gas inventories (1996 & 2006)*
- /2-6/ Tool for the demonstration and assessment of additionality (Version 05.2)*
- /2-7/ AMS-I.F Renewable electricity generation for captive use and mini-grid (version 02)*
- /2-8/ Tool to calculate the emission factor for an electricity system (Version 02.2)*
- /2-9/ Guidelines on the demonstration and assessment prior consideration of the CDM. (version 3.0, EB 49 Annex 22)*
- /2-10/ Guidelines on the Assessment of Investment Analysis (version 4, EB 61 Annex 13)*
- /2-11/ Guideline for demonstrating additionality of microscale project activities (version 02, EB 60 Annex 25)*
- /2-12/ Glossary of CDM terms (version 05)*

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

/1/ Interview from 01 July 2010 to 07 July 2010

Name	Organization	Position	Remarks
Mr. Young-Sun Choi	LH Corporation Future Strategy Office Green Growth Project Team	General Manager	
Mr. Young-Pil Kim	LH Corporation Future Strategy Office Green Growth Project Team	Manager	
Ms. Jae-Young Kim	Ecoeye Co., Ltd. Climate Business Development Division	Consulting Group Asst. Member	
Mr. Jeong-Hwan Lee	Ecoeye Co., Ltd. Climate Business Development Division	Consulting Group Asst. Member	
Mr. Yeong-Jae Jeong	Green vill Co., Ltd Chuncheon Mancheon	Apt Administration Manager	
Mr. Jong-Gi Kim	Chuncheon Mancheon	Resident	
Mr. Byeong-Gi Kim	Daecheong Development Co., Ltd Chungju Yeonsu (6)	Apt Administration Manager	
Mr. Jong-Gil Lee	Chungju Yeonsu (6)	Resident	
Mr. Wan-Gu Kim	Daecheong Development Co., Ltd Jecheon Gangjeon(A1)	Apt Administration Manager	
Ms. Su-Jin Im	Jecheon Gangjeon(A1)	Resident	
Mr. Hae-Sang Lee	Jeong Woo Industry Co., Ltd. Icheon Galsan(2)	Apt Administration Manager	
Mr. Dong-Pyo Jeon	Icheon Galsan(2)	Resident	
Mr. Hae-Bok Park	Housing Management Corporation Nonsan Daegyo	Apt Administration Manager	
Mr. Sun-Dong Jeong	Nonsan Daegyo	Resident	

Mr. Jeong-Gu Lee	Okmyeong Industry Co., Ltd Gyeongsan Sadong(1)	Apt Adminstration Manager	
Mr. Gye-Ung Son	Gyeongsan Sadong(1)	Resident	
Mr. Hyeon-Gu Sim	Nambu Construction Co., Ltd. Goseong Dongoe	Apt Adminstration Manager	
Mr. Su-Gap Lee	Goseong Dongoe	Resident	
Mr. Seong-Jin Kim	Housing Management Corporation Yeongam Yongang	Apt Adminstration Manager	
Ms. Chun-Ok Lee	Yeongam Yongang	Resident	
Ms. Go-Hui You	Housing Management Corporation Gunsan Guam	Apt Adminstration Manager	
Ms. Seong-Mi Na	Gunsan Guam	Resident	

/2/ Interview from 08 Mar 2011 to 10 Mar 2011

Name	Organization	Position	Remarks
Mr. Won Huh	LH Corporation Future Strategy Office Green Growth Project Team	Manager	
Mr. Seung-Chil Nam	LH Corporation Future Strategy Office Green Growth Project Team	Manager	
Mr. Jeong-Hwan Lee	Ecoeye Co., Ltd. Climate Business Development Division	Consulting Group Asst. Member	
Ms. Mee-Hee Jeong	Okmyeong Industry Co., Ltd Pohang Jangnyang	Apt Adminstration Manager	
Mr. Bok-Gyu Kim	Pohang Jangnyang	Resident	
Mr. Jung-Keun Choi	Keumkwang Housing Co., Ltd. Iksan Hamyeol	Apt Adminstration Manager	
Mr. Gyu-Jin Park	Iksan Hamyeol	Resident	



Name	Organization	Position	Remarks
Mr. Sang-Dong Doh	Nambu Construction Co., Ltd. Sacheon Yonghyeon	Apt Administration Manager	
Ms. Min-ha Kang	Sacheon Yonghyeon	Resident	

## APPENDIX A

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

**Table 2 Requirements Checklist**

**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 Decision 17/CP.7 CDM Modalities and Procedures §40a	OK	Table 2 Section A.2.3 and C.1 The copy of LoA by host Party, Republic of Korea was submitted at 21/04/2011.
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 A.3.1. ~ A.3.3 This project activity is a unilateral project. So, 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	OK (LoA not yet)	Table 2 Section A.2.1 ~ A.2.6 The project participant has submitted the written approvals of voluntary participation to KSA..
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.4
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.5
6. The project activity should lead to the transfer of environmental safe and sound technology and knowhow.	Decision 17/CP.7	OK	Table 2 Section E

Requirement	Reference	Conclusion	Cross Reference / Comment
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	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, §2(f)	OK	No public funding from Parties in Annex I involved. Table 2 Section A.6.4.
8. Parties participating in the CDM shall designate a national authority for the CDM.	Decision 17/CP.7, CDM Modalities and Procedures § 29	OK	The CDM Review Committee of Prime Minister's Office is DNA in Korea for CDM. Table 2 Section A.2.3
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	Republic of Korea is ratified the Kyoto Protocol on 08 Nov 2002. Annex I Party has not been identified yet. Table 2 Section A.2.3
10. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b,c,d	Not applicable	Annex I Party has not been identified yet. Table 2 Section A.3
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	Annex I Party has not been identified yet. Table 2 Section A.3
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 A.6.2.2 and section B.1.8
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. Table 2 Section A.4

Requirement	Reference	Conclusion	Cross Reference / Comment
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 A.6.2 and B.1
15. Comments by local stakeholders are invited, and a summary of these has been provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2 Section D
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 E
17. Parties, stakeholders 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 4 Jun 2010 until 3 Jul 2010 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 activity shall be adjusted for leakage.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §30	OK	Table 2 Section B.6
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 Section B.2

**Table 2 Requirements Checklist**

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A. General Description of Project Activity</b>					
<b>A.1. Title of the Project Activity</b>					
A.1.1. Does the project title enable to identify the unique CDM project activity ?	/EB 41/ Annex 12	DR	The project title is "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant bundling CDM project". The project title was reflected the organization' name and energy source of the project activity. Thus, it was clearly identified.	OK	OK
A.1.2. Are there any identification concerning the revision number and the date of the revision ?	/EB 41/ Annex 12	DR	Yes, properly mentioned in section A.1 of PDD The first version is version 01 on 07 May 2010. The current version is version 07 on 05 July 2011	OK	OK
<b>A.2. Approval</b>					
A.2.1. Have all parties involved approved the project activity ?	/VVM/ 44	DR, I	The host Party, Republic of Korea, has approved the project activity on 21 April 2011. (Document No. 2010-19) This proposed project activity is developed as unilateral. Thus, there is no Annex I Party.	OK Pending	OK
A.2.2. Has the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PDD provided a written letter of approval ?	/VVM/ 45	DR	The copy of LoA /1-6/ by host Party, Republic of Korea was submitted by PPs 21/04/2011.	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A.2.3. Does each letter confirms that ; a) The party is a party to the Kyoto Protocol. b) Participation is voluntary.  c) In the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country. d) It refers to the precise proposed CDM project activity title in the PDD being submitted for registration.	/VVM/ 45  /M&P 40(a)	DR	LoA confirms the followings; - The government of Republic of Korea has ratified the Kyoto Protocol in November 2002 - This is approval of voluntary participation in the proposed CDM project activity. - This project contributes to sustainable development in Korea LoA refers to the precise proposed CDM project activity title in the PDD. - Project title : "Korea Land & Housing Corporation (LH Corporation)'s National Rental House PV power plant Bundling CDM project"	OK Pending	OK
A.2.4 Is the letter(s) of approval unconditional with respect to (a) to (d) above A.1.3 ?	/VVM/ 46	DR	Yes, LoA is unconditional with respect to (a) to (d) above A.2.3.	OK Pending	OK
A.2.5 Has the letter(s) of approval been issued by the respective Party's DNA ?	/VVM/ 47	DR	Yes, refer to A.2.1	OK Pending	OK
A.2.6 Has the letter(s) of approval been issued by the respective Party's DNA ? If in doubt, verify with the DNA that letter(s) of approval are valid for the proposed projects activity, project participants and authentic.	/VVM/ 48, 49	DR	KSA checked the detailed information of the LoA /1-6/ from Republic of Korea for followings; - Logo - Project title - Project participant's name - Address - Signature - etc		OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<p>CAR 05</p> <p>As per LoA issued by the Host Party, Republic of Korea, project participants in the LoA are not consistent with the PDD.</p> <p>KSA confirmed that all information in the LoA are consistent with the PDD.</p> <p>KSA called the manager of DNA for confirming the authenticity of LoA.</p>	<p>OK</p> <p><del>CAR-05</del></p>	



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.3 Participation</b>					
A.3.1 Is the information the project participants listed in section A.3 and Annex 1 of the PDD internally consistent to each other and exactly the same as in the LoA from each Party involved.	/VVM/ 52	DR	<p>Yes, the information the project participants is listed in the table under section A.3 and Annex 1 of the PDD and is in consistency throughout the PDD.</p> <p>Project participants</p> <ul style="list-style-type: none"> <li>- Host Party : Republic of Korea <ul style="list-style-type: none"> <li>▫ Korea Land &amp; Housing Corporation (LH Corporation)</li> <li>▫ Ecoeye Co., Ltd.</li> </ul> </li> <li>- Annex I Party has not been identified yet.</li> </ul> <p>CL 01 Project participant's address in Annex I of PDD is not consistent with that of LoA.</p>	OK <del>CL-01</del>	OK
A.3.2. Has the participation of each project participants has been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation ?	/VVM/ 51, 52	DR	Refer to above A.2.1. and A.2.3	OK Pending	OK
A.3.3 Are there no entities other than those approved as project participants included in these sections of the PDD.	/VVM/ 51, 53	DR	<p>There are no entities other than those approved as project participants.</p> <p>The entities involved in the project activity are listed at the section A.3 of the PDD.</p> <ul style="list-style-type: none"> <li>- Host Party : Republic of Korea</li> <li>- Project participants : <ul style="list-style-type: none"> <li>▫ Korea Land &amp; Housing Corporation (LH Corporation)</li> <li>▫ Ecoeye Co., Ltd.</li> </ul> </li> </ul>	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.4. Project Design Document</b>					
A.4.1. Was the PDD prepared in accordance with the latest template from the EB ?	.VVM/ 55	DR	Yes, the webhosted PDD applies the latest template available on the UNFCCC web site. It was checked before webhosting the PDD.	OK	OK
A.4.2. Is the PDD in accordance with the applicable CDM requirements for completing PDD's and is the PDD duly completed ?	.VVM/ 55	DR	Yes, all the latest guidelines are applied in the project activity. Validation team have checked this during the desk review.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.5. Project Description</b>					
A.5.1 Does the information in section A.2 and A.4 of the PDD provides the reader with a clear understanding of the precise nature of the project activity ?	/VVM/ 58, 59	DR, I	<p>Yes, the information provides the reader with a clear understanding of the proposed CDM project activity. The proposed project is composed of 36 PV power plants in Korea.</p> <ul style="list-style-type: none"> <li>- The total installed capacity of the project is 2.876MW (2,876.44kW) which are composed 36 small scale PV power plants.</li> <li>- The project activity generate the electricity utilizing PV power and the generated electricity by the project will be supplied to the households which are displacing the electricity supplied from KEPCO grids.</li> <li>- The project activity is expected an average annual power generation of 3,771 MWh</li> <li>- The expected emission reductions are 2,420 tCO<sub>2e</sub> per year for over 10 years.</li> </ul> <p>CAR 08 Some information in table of section 4.2 of PDD are not match with the actual situation on the project site. For example) module capacity, no. of module and etc</p> <p>CL 04 Some of PV power plant address in section A.5 of PDD are mistyped. PPs required to correct the PV power plant's address.</p>	<p>OK CAR-08</p> <p>OK CL-04</p>	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<p>CAR 11</p> <p>There are discordance between the PV construction documents and inspection certificate prior to operation in the installed capacity.</p> <p>Please clarify discordance in the installed capacity and reflect the actual installed capacity on the PDD.</p> <p>Example sites: Chuncheon Mancheon Gyeongsan Sadong(1)</p> <p>Findings during the on-site visit were corrected and reflected on the PDD.</p> <p>KSA confirmed that the project activity is the same as described in the PDD.</p>	OK GAR-11	OK
A.5.2 Does the information in section A.2 and A.4 of the PDD provides the reader with a clear understanding of the technical aspects of its implementation ?	/VVM/ 58	DR, I	<p>Yes,</p> <p>The proposed project activity can diversity source of energy.</p> <p>The PDD clearly describes the project technology, i.e. the technical specification of the PV power plant are stated in section A.4.2 of PDD.</p> <p>The same was checked with the relevant document such as completion report /1-8/ and confirmed during site visit.</p>	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.																
A.5.3 Is the proposed project activities in existing or utilizing existing equipments ?  If so, does the description in the PDD reflect the project activity for the followings types of CDM project activities unless other means are specified in the methodology. (a) Large scale projects (b) Non-bundled small scale projects (c) Bundled small scale projects	/VVM/ 60	DR, I	No,  The project activity is a newly built photovoltaic power project.  The validation team confirmed that the proposed project is a small scale project applied AMS-I.F version 02 and the project is bundled small scale project activity.   The validation team confirmed it through the reviewing documents as well as physical site inspection.	OK Pending	OK																
A.5.4 In case a site inspection has been concluded, does the description in PDD reflect the proposed CDM project activity ?	/VVM/ 60	DR, I	Yes,  Validation team has conducted a site visit to check whether the design reflects the description provided in the PDD and confirms that the project description provided in the PDD reflects the actual implementation.  Site visit was conducted from 01 July to 07 July 2010 and from 08 Mar to 10 Mar 2011.  Site visit size was selected by sampling method as followings; <div>▫ Confidence Level</div> <table><tr><td>Confidence level</td><td>80%</td><td>90%</td><td>95%</td></tr><tr><td>value of z</td><td>1.282</td><td>1.645</td><td>1.96</td></tr><tr><td>CV</td><td>0.1</td><td>0.1</td><td>0.1</td></tr><tr><td>Sampling Error</td><td>3%</td><td>5%</td><td>10%</td></tr></table>	Confidence level	80%	90%	95%	value of z	1.282	1.645	1.96	CV	0.1	0.1	0.1	Sampling Error	3%	5%	10%	OK Pending	OK
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Sampling Error	3%	5%	10%																		

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<div><div><div><div><div><div>Numberof Sampling</div><div>Sampling Error</div></div><div><div>confidence level</div><div><div>80%</div><div>90%</div><div>95%</div></div></div></div><div><div>infinite population</div><div><div>3%</div><div>5%</div><div>10%</div></div><div><div>19</div><div>7</div><div>2</div></div><div><div>31</div><div>11</div><div>3</div></div><div><div>43</div><div>16</div><div>4</div></div></div></div></div><div><div>Sampling Size <math>(n) = \frac{(z\ value \times CV)^2}{\delta^2}</math></div><div>where : <math>n</math> : Sampling size in infinite population</div><div><math>CV</math> : Coefficient of Variability</div><div><math>\delta</math> : Sampling error</div></div><div><div><div><div><div>Numberof Sampling</div><div>Sampling Error</div></div><div><div>confidence level</div><div><div>80%</div><div>90%</div><div>95%</div></div></div></div><div><div>finite population</div><div><div>3%</div><div>5%</div><div>10%</div></div><div><div>13</div><div>6</div><div>2</div></div><div><div>17</div><div>9</div><div>3</div></div><div><div>20</div><div>12</div><div>4</div></div></div></div></div><div><div>Sampling Size <math>(n^*) = \frac{N \times n}{N + n}</math></div><div>where : <math>n^*</math> : Sampling size in finite population</div><div><math>N</math> : Number of Population</div><div><math>n</math> : Sampling size in infinite population</div></div></div> <div><div>OK</div><div>Pending</div></div> <div><div>OK</div></div>		

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.																																																				
			<p>As per above calculations equations, 9 PV power site for sampling was chosen so as to achieve a 90% confidence level with 5% sampling error (precision)</p> <p>But in considering the module, installed capacity and starting date, site-visits were selected 12 PV power sites more than calculated site as follows;</p> <table><tr><th>No.</th><th>Site Name</th><th>Installed Capacity</th><th>Remarks</th></tr><tr><td>1</td><td>Chuncheon Mancheon</td><td>86.4 kW</td><td>CU-Electron</td></tr><tr><td>2</td><td>Chungju Yeonsu (6)</td><td>60.0 kW</td><td>CU-Electron</td></tr><tr><td>3</td><td>Jeochon Gangjeon (A1)</td><td>88.8 kW</td><td>Canadian Solar</td></tr><tr><td>4</td><td>Icheon Galsan (2)</td><td>76.8 kW</td><td>S-Energy</td></tr><tr><td>5</td><td>Nonsan Daegyo</td><td>91.2 kW</td><td>Canadian Solar</td></tr><tr><td>6</td><td>Gyeongsan Sadong(1)</td><td>158.4kW</td><td>S-Energy</td></tr><tr><td>7</td><td>Goseong Dongoe</td><td>72.0kW</td><td>Canadian Solar</td></tr><tr><td>8</td><td>Yeongam Yongang</td><td>81.6kW</td><td>Canadian Solar</td></tr><tr><td>9</td><td>Gunsan Guam</td><td>45.6kW</td><td>S-Energy</td></tr><tr><td>10</td><td>Pohang Jangryang</td><td>151.34kW</td><td>Kyungwon</td></tr><tr><td>11</td><td>Iksan Hamyeol</td><td>74.75kW</td><td>LG electronics</td></tr><tr><td>12</td><td>Sacheon Yonghyun</td><td>96.14kW</td><td>Kyungwon</td></tr></table>	No.	Site Name	Installed Capacity	Remarks	1	Chuncheon Mancheon	86.4 kW	CU-Electron	2	Chungju Yeonsu (6)	60.0 kW	CU-Electron	3	Jeochon Gangjeon (A1)	88.8 kW	Canadian Solar	4	Icheon Galsan (2)	76.8 kW	S-Energy	5	Nonsan Daegyo	91.2 kW	Canadian Solar	6	Gyeongsan Sadong(1)	158.4kW	S-Energy	7	Goseong Dongoe	72.0kW	Canadian Solar	8	Yeongam Yongang	81.6kW	Canadian Solar	9	Gunsan Guam	45.6kW	S-Energy	10	Pohang Jangryang	151.34kW	Kyungwon	11	Iksan Hamyeol	74.75kW	LG electronics	12	Sacheon Yonghyun	96.14kW	Kyungwon	OK Pending	OK
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Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<p>For other PV power plants, validation team checked through following documents /1-8/ ;</p> <ul style="list-style-type: none"> <li>- Completion Inspection Report</li> <li>- Construction Records including installed capacity.</li> <li>- Inspection certificate prior to operation for each of PV power plant by Korea Electrical Safety Corporation (<a href="http://www.kese.or.kr">http://www.kese.or.kr</a>)</li> <li>- Serial number of PV module for each of PV power plant</li> </ul>	OK Pending	OK
A.5.5 Were designs, feasibility study reports (FSR) or comparisons to equivalent projects available for review ? Is the project description consistent with them ?			<p>Yes. The project is a small scale PV power which involves the installation of 2.876 MW using solar energy.</p> <p>The following documents /1-8/ including PDD are reviewed ;</p> <ul style="list-style-type: none"> <li>▪ Construction completion report on the PV power plants /1-8/ <ul style="list-style-type: none"> <li>(1) Completion Inspection Report</li> <li>(2) Construction Records including installed capacity</li> <li>(3) Serial Number of PV module for each of PV power plant</li> <li>(4) Certificate of Renewable Energy module for each of PV power plant</li> </ul> </li> </ul>		



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	/VVM/ 62	DR, I	<p>(5) Inspection certificate prior to operation for each of PV power plant by KESEC (<a href="http://www.kese.or.kr">http://www.kese.or.kr</a>)</p> <p>(6) Test Report for Module for each of PV power plant</p> <p>(7) Serial Number of the installed inverter for each PV power plant</p> <p>(8) Test Report for the Installed inverter for each PV power plant</p> <ul style="list-style-type: none"> <li>▪ Plan for Photovoltaic Supply Business /1-11/</li> <li>▪ Installation Criteria for Monitoring equipment by Guideline for Supporting renewable energy equipment /1-10/</li> <li>▪ Maintenance guarantee period for PV Power plant by Guideline for Supporting renewable energy equipment /1-9/</li> <li>▪ Feasibility Study Report - Supporting System in Feed-in Tariffs of Electricity generation from New and Renewable Energy Source by MKE (Ministry of Knowledge and Economy) of Korea (<a href="http://www.mke.go.kr">http://www.mke.go.kr</a>) /1-27/</li> <li>▪ Study on feed-in tariff of PV power plant in Korea by KERI (Korea Electrotechnology Research Institute) /1-28/</li> </ul>	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> <li>Act on operation of electricity market by KPX (Korea Power Exchange) /1-20/</li> <li>The 5th Basic plan of long-term electricity demand and supply by MKE /1-30/</li> <li>Act on the promotion of the development, use and diffusion of new and renewable energy./1-25/</li> <li>The status report of generation facility for 2008 by KPX /1-32/</li> <li>The Energy Act /1-22/</li> <li>Framework Act on Low Carbon, Green Growth/1-33/</li> </ul>	OK Pending	OK
A.5.6 In case no physical site inspection was undertaken, how the project description was assessed for appropriateness and what is the outcome ?	/VVM/ 62	DR	N/A Refer A.5.4 of this checklist.	OK	OK
A.5.7 Does the project activity involve the alternation of an existing installation or process ? If so, does the project description clearly state the difference resulting from the activity compared to the pre-project situation ?	/VVM/ 63	DR, I	No, the project activity is newly built PV power plant.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.6. Technical Description of the Small-scale Project Activity.</b>					
<b>A.6.1 Location of the Small-scale Project Activity.</b>					
A.6.1.1 Does the information on the location of the project activity allow for a clear identification of the site ?	EB 41 Annex 12	DR, I	<p>Yes, The information on the location of the project are clearly described at the section A.4.1.4 of the PDD.</p> <p>The details of physical location with GPS coordinates have been provided in the PDD section A.4.1.4</p> <p>CL 02 The geographical coordinates in the section A.4.1.4 of PDD are in minutes and seconds format. Please revised with the decimal system.</p> <p>It is confirmed during on-site assessment and checked by Google Earth..</p>	OK <del>CL-02</del>	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.6.2 Type and category and technology/measure of of the Small-scale Project Activity.</b>					
A.6.2.1 Is the category correctly identified and indicated ?	EB 41 Annex 12	DR, I	<p>The project activity generates the electricity utilizing renewable energy (solar energy) and the generated electricity by solar sources is supplied to the households which are displacing KEPCO grid.</p> <p>The total capacity of the project is 2,876 kW (2.876MW). So, the project activity is belongs to Sectoral scope 1 for renewable energy.</p> <p>Thus, the project activity meets the following type and category.</p> <p>Type : I - Renewable Energy Projects</p> <p>Category: I.F. - Renewable electricity generation for captive use and mini-grid</p>	OK Pending	OK
A.6.2.2 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	<p>Yes, the project is a photovoltaic power plants with the total installed output capacity of 2.876 MW which is less than the 15MW capacity limit specified for type I.F small-scale CDM project activities.</p>	OK	OK
A.6.2.3 Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	PDD A.4	DR	<p>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 displacing to the KEPCO grid are selected as the electricity system boundary.</p>	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>A.6.3 Estimated amount of emission reduction over the chosen crediting period.</b>					
A.6.3.1.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 2,420 tones of CO <sub>2</sub> eq per year throughout the crediting period.	OK	OK
<b>A.6.4 Public Funding of the small-scale project activity.</b>					
A.6.4.1 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 Korea Land & Housing Corporation (LH Corporation) Investment Plan - Plan for Photovoltaic Supply Business /1-11/.	OK Pending	OK
<b>A.6.5 Debundling</b>					
A.6.5.1 Is the small-scale project activity a debundled component of a large scale project activity ?	/VVM/ 136 (c)	DR, I	No. 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.	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B. Baseline and monitoring methodology</b>					
<b>B.1 Applicability of selected methodology to the project activity.</b>					
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 ?	/VVM/ 70	DR	<p>Yes,</p> <ul style="list-style-type: none"> <li>▫ Methodology : AMS.I.F Renewable electricity generation for captive use and mini-grid (version 02)</li> <li>▫ Reference : Appendix B of the simplified modalities and procedures for small-scale CDM project activities.</li> <li>▫ Tool: Tool to calculate the emission factor for an electricity system (version 2.2)</li> </ul> <p>CAR 06 Methodological tool used to calculate the emission factor is not applied the latest version</p>	OK GAR-06	OK
B.1.2 Does the project activity meet the applicability criteria conditions of the approved methodology or any other tool or other methodology component referred to therein ?	/VVM/ 71	DR	<p>CAR 09 Each of the applicability condition for AMS-I.D. "Grid connected renewable electricity generation" are not mentioned in the PDD with justifications.</p> <p>The selected baseline methodology refers to project type I (Renewable Energy Projects) and project category F (Renewable electricity generation for captive use and mini-grid. According to Appendix B of the 'Simplified modalities and procedures for small-scale CDM project activities' /2-2/.</p>	OK GAR-09	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<p>The proposed project activity is as follows :</p> <ul style="list-style-type: none"> <li>- generates about 2.876 MW of electricity by solar energy, one of renewable energies.</li> <li>- supplies to the households displacing the electricity supplied from KEPCO grid.</li> </ul> <p>Thus, the methodology of AMS-I.F is applicable to the proposed project.</p>		
B.1.3 Is comparable information available from other sources and cross check with the PDD in order to assess the applicability ?	/VVM/ 71	DR, I	As this project activity is new small scale solar power plant which is less than 15MW, it is quite clear that it meets the applicability conditions as above. The PP has submitted the technical specifications.	OK	OK
B.1.4 Is the project activity expected to result in emission other than those allowed by the methodology ?	/VVM/ 71	DR, I	<p>No.</p> <p>The project will not expected to result in emission other than those allowed by the methodology.</p>	OK	OK
B.1.5 Is the project activity a small scale project activity ? (If yes, assess the specific small-scale activity)		DR	<p>Yes.</p> <p>The project activity is the installation of 2.876MW which is less than 15MW.</p> <p>Refer section B.1.2 - B.1.4</p>	OK	OK
B.1.6 Does the project activity qualify within the thresholds of the three possible types of small scale project activities ?	/VVM/ 136 a)	DR, I	Yes. As discussed in section B.1.2, the capacity of the project activity is 2.876MW which is less than the threshold limit 15MW. It included only one component.	OK	OK
B.1.7 Does the project activity conforms to one of the approved small-scale categories and applies the relevant tool or methodology ?	/VVM/ 136 (b)	DR	Refer section B.1.2 - B.1.4	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.1.8 Is the project activity not a debundled component of a large-scale project, in accordance with the rules defined in appendix C of the simplified modalities and procedures for small scale CDM project activities ?	/VVM/ 135 (c)	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.	OK Pending	OK
B.1.9 Is an assessment of the environmental impacts of the proposed CDM project activity required by the Host Party ?	/VVM/ 135 (d)	DR	No., Validation team have checked the local regulation and as per the local regulation, the size of the project does not required any EIA. The reviewed local regulation - "Framework Act on Environmental Policy" in Korea /1-23/ - "The Act on Assessment of Impacts of Works on Environmental, Traffic and Disaster" in Korea /1-21/	OK	OK



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.2 Project Boundary</b>					
B.2.1 Is the delineation of the project boundary in the PDD correct and does it meet the requirements of the selected baseline methodology ?	/VVM/ 79	DR, I	Yes. As per the methodology para 12 of AMS I.F, (ver 02) "The physical, geographical site of the renewable generation source delineates the project boundary".	OK Pending	OK
B.2.2 Have all sources and GHG's required by the methodology been included within the project boundary ?	/VVM/ 79	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.	OK Pending	OK
B.2.3 Does the methodology allow PP's to choose whether a source or gas is to be included within the project boundary ?	/VVM/ 79	DR, I	No, the applied methodology does not allow the PP to choose a source or gas to be included in the project boundary. Refer B2.1 - B.2.2	OK	OK

KSA-GF-618-1(Rev1,'09.01.05)

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.3.2 Has any procedure contained in the methodology to identify the most reasonable baseline scenario been correctly applied?	/VVM/ 82 & 87(d)	DR, I	Yes, Applied methodology : AMS-I.F. Renewable electricity generation for captive use and mini-grid (version 02)/2-7/ As the methodology, AMS-I.F, prescribes the baseline and no further analysis is required, so there is no need to take steps to identify the baseline scenarios.  Refer to checklist B.3.1 above.	OK	OK
B.3.3 Does the selected methodology require use of tools to establish the baseline scenario?	/VVM/ 82	DR, I	Yes., Baseline emission for the project activity are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor ( $tCO_{2e}/MWh$ ) calculated in a transparent and conservative manner as a CM (combined margin) consist of OM(operating margin) and BM(build margin) according to the procedures prescribed in the tool reference in AMS-I.D (version 17) "Tool to calculate the emission factor for an electricity system"(version 2.2)  $BE_y = EG_{BL-y} * EF_{CO_2}$ where, $BE_y$ = Baseline Emissions in year y; $tCO_2$ $EG_{BL-y}$ = Energy baseline in year y; MWh $EF_{CO_2}$ = $CO_2$ Emission Factor in year; $tCO_{2e}/MWh$	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.3.4 Does the methodology require several alternative scenarios to be considered in the identification of the most reasonable baseline scenario?	/VVM/ 83	DR, I	No, refer to checklist B.3.2 and B.3.3 above.	OK	OK
B.3.5 If yes, are all scenarios that are considered by the project participants and are supplementary to those required by the methodology reasonable in the context of the proposed project activity ?	/VVM/ 83	DR, I	Not applicable No, refer to checklist No.B3.4 above.	OK	OK
B.3.6 Does PDD provide all the assumptions and data including reference and sources ?	/VVM/ 84 & 87(a)	DR, I	Yes. All the assumptions and data used by the PP including reference and sources are provided in the PDD.	OK	OK
B.3.7 Are all the documentation used for establishing the baseline scenario correctly quoted and interpreted in the PDD ?	/VVM/ 84 & 87(b)		Yes, all the documentation is used for establishing the baseline scenario and correctly quoted and interpreted in the PDD.	OK	OK
B.3.8 Are the information provided in the PDD cross-checked with other credible sources, such as local expert opinion, if available ?	/VVM/ 84	DR, I	Yes. cross-checked with national regulations and sectoral information that publically available as follows; - Statics of Electric Power in Korea (Chapter 1, Section 5 Power generating results by plants) (2006 to 2008)/1-31/ - Framework Act on Low Carbon Green Growth/1-33/ - Supporting system in feed-in tariffs of electric generation from new & renewable energy sources by MKE ( <a href="http://www.mke.go.kr">http://www.mke.go.kr</a> )/1-27/ - A five year National Strategy for Green Growth in Korea by the Committee of Green Growth Korea /1-29/	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.3.9 Are all the assumptions and data used by the project participants justified appropriately and supported by evidence ?. Are those deemed reasonable?	/VVM/ 87(c)	DR, I	Yes. The assumptions and data used by the PP are checked by KSA. It is justified appropriately and supported by evidence. And it is deemed reasonable.	OK	OK
B.3.10 Have all applicable CDM requirements been taken into account in the identification of the baseline scenario for the proposed CDM project activity?	VVM 85	DR, I	Yes, it is confirmed.	OK	OK
B.3.11 Have all relevant policies and circumstances been identified and correctly considered in the PDD, in accordance with the guidance by the CDM EB?	VVM 85 & 87(d)		Yes, it is confirmed.	OK	OK
B.3.12.Does the PDD provide a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	/VVM/ 86		Yes. It is defined at the PDD B.4. The baseline of the proposed project activity is the renewable energy to the grid system. There is no GHG emission in the solar power plant. Thus the emission reductions are equal to the baseline emissions.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.4 Algorithms and/or formulae used to determine emission reductions</b>					
B.4.1 Have the equations and parameters in th PDD been correctly applied as required by the selected approved methodology ?	/VVM/ 90	DR	<p>As per Para 14 of the applied methodology AMS-I.F./2-7/, Baseline emission for the project activity are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor (<math>tCO_{2e}/MWh</math>)</p> $BE_y = EG_{BL,y} * EF_{CO_2,y}$ <p>Where</p> <p><math>BE_y</math> : Baseline Emission in year y (<math>tCO_2</math>)</p> <p><math>EG_{BL,y}</math> : Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)</p> <p><math>EF_{CO_2,y}</math> : Emission factor (<math>tCO_2/MWh</math>)</p> <p>Yes, all the ex-ante parameters are included in section B.6.2 of the PDD.</p>	OK	OK
B.4.2 In case the methodology provides the selection of different options for equations or parameters, has an adequate justification been provided and were the correct equations and parameter used in accordance with the methodology ?	/VVM/ 90	DR	<p>The applied methodology AMS.I.F (version 02)/2-7/ refers to "tool to calculate the emission factor for an electricity system"(version 2.2) /2-8/. This tool provides option to calculate the operating margin and build margin values.</p> <p>Refer Section B.3.3</p>	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.4.3 Is the choice of data and parameters used in the equations appropriate ?	/VVM/ 91	DR	Yes, refer to checklist B.3.3 above.	OK	OK
B.4.4 In case of ex-ante data and parameters, are all data sources and assumptions appropriate ? And Are calculations correct, applicable to the proposed project activity ?	/VVM/ 91	DR, I	Yes, refer to checklist B.3.3 above.	OK	OK
B.4.5 In case of ex-post data and parameters, are the estimates provided in the PDD for these data and parameters reasonable ?	/VVM/ 91	DR, I	Yes, refer to checklist B.3.3 above.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5 Additionality of a project activity</b>					
B.5.0.1 Describe how the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by the project participant to support the demonstration of additionality is assessed and validated using local knowledge, sectoral and financial expertise and considering other sources of information for cross checks.	/VVM/ 95		<p>According to 'Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activity'/2-2/, 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;</p> <ul style="list-style-type: none"> <li>- investment analysis</li> <li>- technological barrier</li> <li>- barrier due, to prevailing practice</li> <li>- other barrier</li> </ul> <p>The project developer applied with investment barrier to assess the additionality as followings data;.</p> <ul style="list-style-type: none"> <li>- electric rate for households : <a href="http://www.kepco.co.kr">http://www.kepco.co.kr</a> (<a href="http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp">http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp</a>)/1-37/</li> <li>- discount rate was applied corporate bond yield rate 5.96% (3-year, AA-) which is the yearly average value in 2006 - 2008 from Economic Statistics System provided by Korea Bank. (<a href="http://ecos.bok.kr">http://ecos.bok.kr</a>)/1-38/</li> <li>- O&amp;M cost : 1.0% based on the FSR/1-27/</li> <li>- corporation tax : 10%, 20%(exceed ₩200mil) based on the article 55 of "Corporation tax Act"/1-40/</li> <li>- Exchange rate at <a href="http://www.keb.co.kr">http://www.keb.co.kr</a>/1-41/</li> </ul>	OK Pending	OK



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.												
			<p>- Secondary CERs price at <a href="http://www.pointcarbon.com">http://www.pointcarbon.com</a></p> <p>- Investment Costs are based on the Completion Report on the PV power plant construction /1-8/ and Facility supply and installation contract /1-7/</p> <p>Without subsidy, the project activity is negative, but with subsidy the project activity is positive results, i.e. economically attractive.</p> <p>The results of financial analysis to assess additionality are as below table;</p> <p style="text-align: center;">Result of Financial Analysis Unit: Million Won</p> <table border="1"> <tr> <td></td> <td>Without Subsidy</td> <td>With Subsidy</td> <td>Remarks</td> </tr> <tr> <td>IRR</td> <td>#NUM!</td> <td>7.07%</td> <td></td> </tr> <tr> <td>NPV</td> <td>△₩9,746</td> <td>₩509</td> <td></td> </tr> </table> <p>As see above table, in case of no considering subsidy, IRRs and NPVs are negative. But in case of considering subsidy, IRRs show that the returns from the project are slightly higher than the applied discount rate (Bench mark rate)</p> <p>Thus in case of considering subsidy, the return from the project in the absence of the benefits from CDM are attractive enough for the project proponent to go forward with the project.</p>		Without Subsidy	With Subsidy	Remarks	IRR	#NUM!	7.07%		NPV	△₩9,746	₩509		OK Pending	OK
	Without Subsidy	With Subsidy	Remarks														
IRR	#NUM!	7.07%															
NPV	△₩9,746	₩509															

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			<p>The purpose of subsidy for PV power plant is to compensate high installation cost for the renewable energy power generation project.</p> <p>The project are not demonstrated the additionality with investment analysis.</p> <p>But the project can be demonstrated the additionality by "Guidelines for demonstrating additionality of microscale project activities"/2-11/</p> <p>Refer this checklist section 5.6.1 to section 5.6.5</p>		
B.5.0.2 Are any tools and documents provided by the EB to demonstrate the additionality of the proposed CDM project activities relevant and have they been correctly considered and applied ?	/VVM/ 96		Refer Section B.5.0.1	OK	OK
B.5.0.3 Are any specific complementary or alternative requirements included in the approved CDM methodology and have they been correctly considered and applied ?	/VVM/ 96		No. Refer Section B.5.0.1	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.1 Prior Consideration of the clean development mechanism.</b>					
B.5.1.1 Is the start date of the project activity, reported in the PDD, in accordance with the latest version of the "Glossary of CDM terms" ?	/VVM/ 99	DR	According to "Glossary of CDM terms (version 5)"/2-12/, the date of "Facility supply and installation contract/1/7/" are identified as a starting date of the project activity. The earliest date of "Facility supply and installation contract"/1-7/ in the 36 PV power plants is 24 April 2009.  The starting dates of this project are clearly mentioned in section C.1.1 of the PDD.	OK	OK
B.5.1.2 Is the project activity, in accordance with the guidance from the EB, a new project activity (project activities with start date at or after 02 Aug 2008) or an existing project activity (project activities with starting date before 02 Aug 2008) ?	/VVM/ 100	DR	This project activity is a new project activity with start date after 02 Aug 2008.A	OK	OK
B.5.1.3 Is the proposed project appropriate for the prior consideration of the CDM	/VVM/ 102	DR	The project participants have informed both the host country /1-4/ and the UNFCCC /1-5/ regarding the consideration of the project on 12 Oct 2009 within 6 months of the project start date (24 April 2009). Thus, it can be concluded that CDM was seriously considered for the proposed project activity and it meets the required criteria of prior consideration of CDM.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.1.4 In case there is a new project activity (start date at or after 02 Aug 2008) and for which PDD has not been published for global stakeholder consultation or a new methodology is proposed to the EB before the project activity start date, please ensure by means of confirmation from the UNFCCC secretariat that the PP had informed the Host Pary DNA and the UNFCCC secretariat by submitting the standardized form F-CDM prior consideration within 6 months of project start date ?	/VVM/ 101 & EB 49 Annex 22	DR	N/A	OK	OK
B.5.1.5 If there is an existing project activity (project activities with start date before 02 Aug 2008) for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, please verify through documents review that PP's prior consideration ;	/VVM/ 102	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
(a) Evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, other project participant, to undertake the project as a proposed CDM project activity.	/VVM/ 102 (a)	DR	N/A	OK	OK
(b) Reliable evidence from project participants that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat.	/VVM/ 102 (b)	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.2 Identification of Alternation</b>					
B.5.2.1 Does the PDD identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the applied approved methodology prescribes the baseline scenario and no further analysis is required?	/VVM/ 105	DR	N/A	OK	OK
B.5.2 Does the list of alternatives given in the PDD ensures that:	/VVM/ 106	DR	N/A	OK	OK
(a) The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity?	/VVM/ 106 (a)	DR	N/A	OK	OK
(b) The list contains all plausible alternatives which can be considered to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity?	/VVM/ 106 (b)		N/A	OK	OK
(c) The alternatives comply with all applicable and enforced legislation?	/VVM/ 106 (c)		N/A There are no local law that enforce the installation of solar power plant in the host country. Validation team have reviewed the local regulations and confirms that same.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.3 Investment Analysis</b>					
B.5.3.1 Has the investment analysis been used to demonstrate the additionality of the proposed CDM project?	/VVM/ 108	DR	Yes, PP has applied investment analysis to demonstrate the additionality.	OK	OK
<p>B.5.3.2 Which approach is chosen for investment analysis of the proposed CDM project activity and is it appropriate?</p> <p>(a) The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income, and there is at least one alternative which is less costly than the proposed CDM project activity (simple cost analysis);</p> <p>(b) The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative (comparison analysis);</p> <p>(c) The financial returns of the proposed CDM project activity would be insufficient to justify the required investment (benchmark analysis).</p>	/VVM/ 109	DR	<p>PP has chosen benchmark analysis /2-5/ and additionality of microscale project activities /2-11/ to demonstrate the additionality which is appropriate to the project activity.</p> <p><b>CAR 01</b> As per section B.5 of PDD, economic feasibility is analyzed without subsidy by the results of the 22nd EB meeting. But as per para 6 of EB 22 Report Annex 3, national and sectoral policies are to be taken into account when establishing baseline scenarios. For the sake of transparency and completeness, the project participant is required to include relevant national and sectoral policies available for renewable project. Please refer EB 53 annex 32.</p> <p><b>CAR 02</b> Project participants are required to submit the objective evidence for discount rate that are applied at the investment analysis.</p>	<p>OK <del>CAR-01</del></p> <p>OK <del>CAR-02</del></p>	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
			CAR 03 Baseline emissions for the proposed project activity are the product of amount electricity displaced with the electricity produced by the renewable generating unit and emission factor. SMP (system margin price) is not appropriate to the proposed project activity.	OK CAR-03	
<p>B.5.3.3 Please describe how the accuracy of financial calculations carried out for any investment analysis is validated .</p> <p>(a) Conduct a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determine the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices.</p> <p>(b) Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices.</p> <p>(c) Review feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants.</p>			<p>PP has chosen the parameters based on the third-party and the objective evidence. This is clearly described in the PDD section B.5. and also mention this report section 3.6.2.</p> <p>The parameter used in calculating the investment analysis are cross-checked as follows;</p> <ul style="list-style-type: none"> <li>▫ Annual electricity generation was calculated by installed capacity * capacity factor * annual hours and is appropriate.</li> <li>※ capacity factor is based on the coefficient of utilization on the renewable energy in Korea during 2007 to 2008 by KPX /1-44/</li> <li>▫ Electric rate for households : <a href="http://www.kepco.co.kr">http://www.kepco.co.kr</a> (<a href="http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp">http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp</a>)/1-37/</li> <li>▫ Subsidy are based on the relevant laws /1-25/</li> <li>▫ Installation Cost are based on the "Completion Report on the PV power plant construction"/1-8/ and "Facility supply and installation contract"/1-7/</li> </ul>	OK Pending	



(d) Assess the correctness of computations carried out and documented by the project participants. (e) Assess the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions.	/VVM/ 111	DR	<ul style="list-style-type: none"> <li>▫ O&amp;M cost and operation lifetime of the project activity are based on the feasibility report. /1-27/ and /1-28/</li> <li>▫ discount rate was applied corporate bond yield rate 5.96% (3-year, AA-) which is the yearly average value in 2006 - 2008 from Economic Statistics System provided by Korea Bank. (<a href="http://ecos.bok.kr">http://ecos.bok.kr</a>) /1-38/ and are deemed to be reasonable and appropriate.</li> <li>▫ The range for sensitivity analysis are considered in comparison of the Korea's economical structure and condition.</li> </ul>	OK	OK
B.5.3.4 Is benchmark applied in the investment analysis suitable ?	/VVM/ 112	DR	PP has chosen the financial indicator as equity IRR and NPV. And also an excel sheet to calculate the benchmark is submitted to the validation team. It is calculated using all the public official sources. The formulae and the description to derive the benchmark is provided in the PDD.	OK	OK
(a) Is the type of benchmark applied suitable for the type of financial indicator presented ?	/VVM/ 112 (a)	DR	Yes, refer to checklist B.5.3.4 above and CAR 01	OK Pending	OK
(b) Does any risk premium applied in determining the benchmark reflect the risks associated with the project type or activity ?	/VVM/ 112 (b) EB 51 Annex 58 para 15	DR	refer to checklist B.5.3.4 above and CAR 01	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
(c) Is it reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants involved and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark ?	/VVM/ 112 (c)	DR	N/A	OK	OK
B.5.3.5 In case where the PP's rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed project activities, describe the means to validate the following requirements:	/VVM/ 113	DR	See the following items.	OK	OK
(a) Has the FSR been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed;	/VVM/ 113 (a)	DR	O&M cost and operation lifetime of the project activity are considered as th basis of the decision to proceed with the investment in the project activity based on the feasibility report. /1-27/ The period of time between the finalization of the FSR and the investment decision is about 2 year. But indicator in FSR was considered the stage of invigorating the PV power plant, KSA confirmed that O&M costs are considered as the most conservative value and the applied 20 years operation lifetime of the project activity is still available.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
(b) Are the values used in the PDD and associated annexes fully consistent with the FSR, and where inconsistencies occur the DOE should validate the appropriateness of the values;	/VVM/ 113 (b)	DR	Yes, KSA validation team confirmed that the values used in the PDD and associated annexes are consistent with the FSR /1-27/.	OK	OK
(c) On the basis of its specific local and sectoral expertise, is confirmation provided, by crosschecking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision.	/VVM/ 113 (c)	DR	Yes, refer to checklist B.5.3.5 (a) above.	OK	OK
B.5.3.6 If a fair value for the project assets in the end of the assessment period is included, assess whether it is calculated in accordance with the local accounting regulation where available or international best practice ?	EB 51 Annex 58 para 4	DR	CAR 04 Data and information used in investment analysis should be presented in the PDD and submitted to assess by DOE. For example - construction costs, capacity factor for utilization, fair value, remaining lifetime of equipment and so on	OK CAR-04	OK
B.5.3.7 Does the financial indicator calculation include adding back of the depreciation and other non-cash related items to taxable profits ?	EB 51 Annex 58 para 5	DR	Yes, the financial indicator, i.e. equity IRR is calculated adding back the depreciation and the other no-cash related items to taxable benefits.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.3.8 Are input values used in all investment analysis valid and applicable at the time of the investment decision taken by the project participant.	EB 51 Annex 58 para 6	DR	Yes, input values used in all investment analysis are valid and applicable at the time of the investment decision taken by the PP.	OK	OK
B.5.3.9 In case of the project activities for which implementation ceases after commencement and where implementation is recommenced due to consideration of the CDM, does the investment analysis reflect the economic decision making context at point of the decision to recommence the project ?	EB 51 Annex 58 para 7	DR	N/A	OK	OK
B.5.3.10 Does the project participant supply spreadsheet versions of all investment analysis ?	EB 51 Annex 58 para 8	DR	Yes,	OK	OK
B.5.3.11 If project IRR is chosen, are the costs of financing expenditures (loan repayment and interests) excluded from the calculation of the project IRR ?	EB 51 Annex 58 para 9	DR	N/A	OK	OK
B.5.3.12 If equity IRR is chosen, is the part of the investment costs which is financed by equity considered as net cash outflow ? Is the part of the investment costs which is financed by debt excluded in net cash outflow ?	EB 51 Annex 58 para 10	DR	Equity IRR is chosen as the financial indicator. The debt is excluded from the net cash outflow in the provided IRR sheet.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.3.13 If project IRR is chosen and a post-tax benchmark is applied, is the actual interest payable taken into account in the calculation of income tax, with an reasonable interest rate ?	EB 51 Annex 58 para 11	DR	N/A	OK	OK
B.5.3.14 In case a benchmark is used, is the applied benchmark appropriate to the type or IRR calculated ?	EB 51 Annex 58 para 12	DR	Yes, PP has applied the corporation bond rate( 3-year, AA-) which is the average value in 2006 ~ 2008 from Economic Statistics System provided by Korea Bank/1-39/.  Validation team confirmed that applied benchmark is deemed to reasonable and appropriate to the IRR calculated.	OK	OK
B.5.3.6 In case the project activity could also be developed by an entity other than the project participant, is the benchmark based on publicly available data sources which can be clearly validated ?	EB 51 Annex 58 para 13	DR	The project activity is developed by the project participant.	OK	OK
B.5.3.7 In cases that internal company benchmarks/ expected returns are applied, is it verified that there is only one possible project developer and, either the internal company benchmarks/expected returns have been used for similar project with similar risks developed by the same company or, if the company is brand new, have been used for similar projects in the same sector in the country/region ?	EB 51 Annex 58 para 14	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.3.16 Are the results of variation of variable that constitute more than 20% of either total project costs or total project revenues clearly presented in PDD and reproducible with spreadsheet ? Are the ranges of variation deemed appropriate in the context of the specific project circumstances ?	EB 51 Annex 58 para 17 & 18	DR	The chosen sensitivity parameter i.e. generation and the project cost constitute more than 20% of total project or total revenues from the project. This is in line with guidance on investment analysis.	OK	OK
B.5.3.17 Is the investment analysis in accordance with the latest version of the "Guidelines on the Assessment of Investment Analysis" as provided by the EB and other relevant guidance including the latest guidelines on plant load factors "guideline for the reporting and validation of plant load factor"?		DR	The investment analysis is in accordance with the latest version of the "Guidelines on the assessment of the investment analysis"(version 04, EB Report 61 Annex 13 /2-10/	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.4 Barrier Analysis</b>					
B.5.4.1 Has the barrier analysis been used to demonstrate the additionality of the proposed CDM project?	/VVM/ 115	DR	N/A PPs did not apply the barrier analysis to demonstrate the additionality.	OK	OK
B.5.4.2 What barriers are identified and described in PDD to demonstrate additionality?	/VVM/ 115	DR	N/A	OK	OK
B.5.4.3 Does any issue considered in the barrier analysis have a clear direct impact on the financial returns of the project activity and thus shall be assessed by investment analysis?	/VVM/ 116	DR	N/A	OK	OK
(a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance, or	/VVM/ 116 (a)	DR	N/A	OK	OK
(b) Barriers related to the unavailability of sources of finance for the project activity.)	/VVM/ 116 (b)	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.4.4 To assess the barrier analysis apply the following two-step process:	/VVM/ 117	DR	N/A	OK	OK
(a). Please assess whether the barriers are real: Please assess the available evidence and/or undertake interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. (Review that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics. If existence of a barrier is substantiated only by the opinions of the project participants, this shall not be considered to be adequately substantiated. To demonstrate that a barrier is real it has to be supported by sufficient evidence on the basis of sectoral or local expertise)	/VVM/ 117 (a)	DR	N/A	OK	OK



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
(b) Do the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives? <i>(Please note, that not all barriers present an insurmountable hurdle to a project activity being implemented. By applying local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario</i>	/VVM/ 117 (b)	DR	N/A	OK	OK
B.5.4.5 Is it sufficiently demonstrated that CDM alleviates the identified barriers that prevent the proposed project activity from occurring ?	/VVM/ 115	DR	N/A	OK	OK
B.5.4.5 Overall, is the barrier analysis in compliance with the latest version of "Guidelines for objective demonstration and assessment of barriers (EB50, Annex 13)"?	/VVM/ 115	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.5 Common Practice Analysis</b>					
B.5.5.1 Is common practice required by the methodology applied by the proposed project activity to demonstrate additionality?	/VVM/ 119	DR	N/A PPs did not apply the common practice analysis to demonstrate the additionality.	OK	OK
B.5.5.2 Is the proposed project activity first-of-its-kind? If so, please specify how this statement is substantiated	/VVM/ 119	DR	N/A	OK	OK
B.5.5.3 In case the project activity is not first of its kind, is the geographical scope (e.g. the defined region) of the common practice analysis appropriate for the assessment of common practise related to the project activity's technology or industry type? Please consider that for certain technologies the relevant region for assessment will be local and for others it may be transnational / global. If a region other than the entire host country is chosen, please assess the explanation why this region is more appropriate.	/VVM/ 120 (a)	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.5.4 Was an assessment concerning the existence of other similar projects undertaken? Does this include official sources and was local and industry expertise used to determine to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, exist in the defined region?	/VVM/ 120 (b)	DR	N/A	OK	OK
B.5.5.5 If similar and operational projects, other than CDM project activities, are already “widely observed and commonly carried out” in the defined region, what are essential distinctions between the proposed CDM project activity and the other similar activities?	/VVM/ 120 (c)	DR	N/A	OK	OK
B.5.5.6 Final Conclusion: Based on the assessment of questions B.5.5.1. to B.5.5.5 is the proposed project activity additional ?	/VVM/ 119	DR	N/A	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.5.6 Additionality of Microscale Project Activities (<math>\leq 5\text{MW}</math>)</b>					
B.5.6.1 Is the project size $\leq 5\text{MW}$ of installed capacity of renewable energy ?	EB 54 Report Annex 15	DR	Yes, the capacity of the project activity is 2.876MW (2,876kW) which is less than 5MW	OK	OK
B.5.6.2. Is the geographic location of the project in LDCs/ SIDs or a special underdeveloped zone of the host country identified by the Government before 28 May 2010 ?	EB 54 Report Annex 15 (a)	DR	No.	OK	OK
B.5.6.3 Is the project an off grid ( $<12$ hrs grid availability per 24 hrs day is also considered off grid for this assessment) project supplying to households/ communities ?	EB 54 Report Annex 15 (b)	DR	Yes, The electricity generated by the project activity is supplying to households which are displacing the KEPCO grid.	OK	
B.5.6.4 The project activity is designed for distributed energy generation (not connected to a national or regional grid). And are the following two conditions satisfied ? <ul style="list-style-type: none"> <li>Project is for distributed renewable energy generation with each of the independent subsystems/ measures in the project <math>\leq 1,500\text{kW}</math>.</li> <li>End users of the subsystems or measures are households/ communities/SMEs.</li> </ul>	EB 54 Report Annex 15 (c)	DR	Yes <ul style="list-style-type: none"> <li>The distributed renewable energy generation with each of the independent subsystem in the project activity are less than 1,500kW.</li> <li>The installed capacity of each PV power plant are clearly described at section B.5 of the PDD.</li> </ul>	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B.5.6.5 Specific renewable energy technologies recommended by the host country DNA and approved by the Board (Conditions apply ; the total installed capacity of technology/measure contributes less than or equal to 5% to national annual electricity generation)	EB 54 Report Annex 15 (d)	DR	<p>Yes, the project activity satisfied the followings;</p> <ul style="list-style-type: none"> <li>▫ The capacity of the project is 2.876MW.</li> <li>▫ The photovoltaic power is one of the renewable energy which are encouraged and recommended by the Korean Government.</li> <li>▫ Total installed capacity of PV power generation (414.7MW) in Korea contributes only 0.67% to KEPCO grid (61,740MW) at 2009 years./1-30/</li> </ul> <p>As see above B.5.6.3 to B.5.6.5, KSA validation team confirmed that the project activity is additional.</p>	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>B.6 Monitoring Plan</b>					
B.6.1 Does the PDD include a monitoring plan ?	/VVM/ 122	DR	Yes, the PDD includes the monitoring plan. The monitoring plan is defined at the Section B.7 of the PDD	OK	OK
B.6.2 Does the monitoring plan comply with the approved methodology ?	/VVM/ 123	DR, I	Yes, the monitoring plan in the PDD comply with the approved methodology, AMS-IF. version 02	OK	OK
(a) Does the list of parameters identify required by the selected approved methodology. ?	/VVM/ 123 (a) (i)	DR, I	Yes, all data and parameters are listed in the section "B.7.1 Data and parameters monitored" of the PDD.	OK	OK
Does the monitoring plan contain all necessary parameters ?	/VVM/ 123 (a) (ii)	DR, I	Refer section B.6.1.	OK Pending	OK
Does the means of monitoring described in the plan comply with the requirements of the methodology ?	/VVM/ 123 (a) (ii)	DR, I	Refer section B.6.1.	OK Pending	OK
(b) Are the monitoring arrangements described in the monitoring plan feasible within the project design ?	/VVM/ 123 (b) (i)	DR, I	Refer section B.6.1.	OK	OK
- Are the means of implementation of the monitoring plan, including the data arrangement and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by requesting from the proposed CDM project can be reported ex post and verified ?	/VVM/ 123 (b) (ii)	DR, I	Refer section B.6.1.	OK	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>C. Sustainable development</b>					
C.1 Does the letter approval by the DNA of the host Party confirms the contribution of the proposed CDM project activity to the sustainable development of the host Party ?	/VVM/ 126	DR	Yes, the LoA of the host country /1-6/, Republic of Korea, clearly presents a statement that this project activity contribute to the sustainable development in Korea.	OK Pending	OK

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>D. Local Stakeholder Consultation</b>					
D.1 Were relevant stakeholders invited by the PP's to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website?	/VVM/ 128 & 129 (a)	DR	PPs have conducted the local stakeholders consultation from 1st Apr to 18 Sep 2009 (1st Stage) and from 5th Apr to 23 Apr 2010 and the publication of the PDD on the UNFCCC website is 04 June 2010. Thus, it is evident that local stakeholders were invited before the publication of the PDD on the UNFCCC website. CL 03 PPs are required to submit the documents related to stakeholders consultation to the validation team.	OK	OK
D.2 If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/VVM/ 128	DR	There are no regulation in the Republic of Korea which requires stakeholder consultation for the installation of PV power plants. And 36 PV power plants are installed on the roof of the rental apartment.	OK	OK
D.3 Have appropriate media been used to invite comments by local stakeholders?	/VVM/ 128	DR, I	There are no any adverse comments received from stakeholders.	OK	OK
D.4 Is the summary of the received comments complete?	/VVM/ 128 (b)	DR	Refer Section D.2 and D.3 above.	OK	OK
D.5 Have the PP's taken due account of any comments received and have they described this process in the PDD?	/VVM/ 128 (c)	DR	No adverse comments received.	OK	OK



Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
<b>E. Environmental Impacts</b>					
E.1 Have the PP's submitted an analysis of environmental impacts of the project activity? If those impacts are considered significant by the project participants or the host Party is an Environmental Impact Assessment (EIA) generated?	/VVM/ 132	DR, I	No., As per the Republic of Korea's environmental regulations, PV power plants do not require the environmental impact assessment below 100MW. As the each PV power plant is below 1MW, this project activity does not apply to EIA.  The validation team checked the PV power sites during on-site-visit and found that there are no any significant environmental impact for both solar photovoltaic power plant.	OK	OK
E.2 Were transboundary environmental impacts identified in the analysis?		DR, I	No, there are no transboundary environmental impacts due to the project activity.	OK	OK
E.3 Will the project create any adverse environmental effects?		DR, I	No., The project activity will not create any adverse environmental effects.	OK	OK
E.4 Have the identified environmental impacts been addressed in the project design sufficiently?		DR, I	Refer section E.1 above	OK	OK
E.5 Does the project comply with environmental legislation in the host country?		DR, I	Refer section E.1 above	OK	OK

Table 3 Resolution of Corrective Action and Clarification Requests

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion
CAR 01	As per section B.5 of PDD, economic feasibility is analyzed without subsidy by the results of the 22nd EB meeting. But as per para 6 of EB 22 Report Annex 3, national and sectoral policies are to be taken into account when establishing baseline scenarios. For the sake of transparency and completeness, the project participant is required to include relevant national and sectoral policies available for renewable project. Please refer EB 53 Annex 32.	B.5.3.2	In this project, the policy name related to the subsidy is Standard for the support on the new & renewable energy equipments by Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy. The purpose of this policy is to compensate high installation cost for the renewable energy power generation project. Without subsidy, the project activity is negative, but with subsidy the project activity is positive results, i.e. economically attractive. But, as the installed capacity of this project is less than 5MW, the additionality is demonstrated by using "Guidelines for demonstrating additionality of microscale project activities(version 02)". Therefore, the demonstration of additionality for this project is reflected in the Section B.5 of the PDD.	Acceptable. PP has identified the relevant national and sectoral policies available for PV power project and reflected to the investment analysis. PP has conducted the investment analysis considering with subsidy to assess the additionality. And the results are calculated at the attached excel spreadsheets/1-2/ But as the results of investment analysis is higher than bench mark rate, the additionality is not demonstrated by the investment analysis. Then PP has demonstrated the additionality using microscale project activity /2-11/ It was reflected at section B.5 of PDD. Thus CAR 01 is checked and satisfied. CAR 01 is closed.

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion								
CAR 02	Project participants are required to submit the objective evidence for discount rate that are applied at the investment analysis.	B.5.3.2	<p>In determination of the discount rate, this value is most recently available at the point of the project start.</p> <p>Discount rate for the project is corporation bond rate 5.96%(3-year, AA-) which is the yearly average value in 2006 ~ 2008 from Economic Statistics System provided by Korea Bank.</p> <p>The annual rate is summarized as follows:</p> <table><tr><td></td><td>2006</td><td>2007</td><td>2008</td></tr><tr><td>%</td><td>5.17</td><td>5.70</td><td>7.02</td></tr></table> <p>Further information can be found at: <a href="http://ecos.bok.or.kr/">http://ecos.bok.or.kr/</a></p> <p>Then, NPV applied this parameter is slightly higher than 0.</p> <p>But, as the installed capacity of this project is less than 5MW, the additionality is demonstrated by using "Guidelines for demonstrating additionality of microscale project activities(version 02)".</p> <p>Therefore, the demonstration of additionality for this project is reflected in the Section B.5 of the PDD.</p>		2006	2007	2008	%	5.17	5.70	7.02	<p>Acceptable.</p> <p>PP have submitted to DOE the objective evidence for discount rate. PP has conducted the investment analysis considering with subsidy to assess the additionality.</p> <p>And the results are calculated at the attached excel spreadsheets/1-2/ But as the results of investment analysis is higher than bench mark rate, the additionality is not demonstrated by the investment analysis.</p> <p>Then PP has demonstrated the additionality using microscale project activity /2-11/</p> <p>It was reflected at section B.5 of PDD.</p> <p>Thus CAR 02 is checked and satisfied. CAR 02 is closed.</p>
	2006	2007	2008									
%	5.17	5.70	7.02									

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion																													
CAR 03	Baseline emissions for the proposed project activity are the product of amount electricity displaced with the electricity produced by the renewable generating unit and emission factor. SMP (system margin price) is not appropriate to the proposed project activity. PPs are required to consider the purchasing electricity price.	B.5.3.2	<p>As this project doesn't not sell the electricity generated by PV power plants to grid, instead of SMP, the purchasing electricity price by households is applied to the input value of investment analysis.</p> <p>As for the input value, the expected revenue through this project is based on the electricity rate per kWh supplied to households displacing electricity supplied from KEPCO(Korea Electric Power Corporation) grid. In Korea, the electricity rate is charged by progressive tax and summarized as follows:</p> <table><tr><th colspan="2">Energy charge(won/kWh)</th></tr><tr><td>1 ~ 100 kWh</td><td>57.30</td></tr><tr><td>101 ~ 200 kWh</td><td>118.40</td></tr><tr><td>201 ~ 300 kWh</td><td>175.00</td></tr><tr><td><b>301 ~ 400 kWh</b></td><td><b>258.70</b></td></tr><tr><td>401 ~ 500 kWh</td><td>381.50</td></tr><tr><td>501 kWh ~</td><td>670.60</td></tr></table> <p>During one year, the electricity usage per households is based on "Statistics of Electric Power in Korea" and the value is summarized as follows:</p> <table><tr><th>year</th><th>Number of households</th><th>electricity usage (unit : MWh)</th></tr><tr><td>2006</td><td>13,112,311</td><td>52,521,897</td></tr><tr><td>2007</td><td>13,268,224</td><td>54,173,987</td></tr><tr><td>2008</td><td>13,473,388</td><td>56,227,938</td></tr><tr><td><b>Avg.</b></td><td><b>13,284,641</b></td><td><b>54,307,941</b></td></tr></table>	Energy charge(won/kWh)		1 ~ 100 kWh	57.30	101 ~ 200 kWh	118.40	201 ~ 300 kWh	175.00	<b>301 ~ 400 kWh</b>	<b>258.70</b>	401 ~ 500 kWh	381.50	501 kWh ~	670.60	year	Number of households	electricity usage (unit : MWh)	2006	13,112,311	52,521,897	2007	13,268,224	54,173,987	2008	13,473,388	56,227,938	<b>Avg.</b>	<b>13,284,641</b>	<b>54,307,941</b>	<p>Acceptable</p> <p>PP has conducted the investment analysis using electric rates by KEPCO instead of SMP</p> <p>And the results are calculated at the attached excel spreadsheets/1-2/</p> <p>As the results of investment analysis is higher than bench mark rate, the additionality is not demonstrated by the investment analysis.</p> <p>Then PP has demonstrated the additionality using microscale project activity /2-11/</p> <p>It was reflected at section B.5 of PDD.</p> <p>Thus CAR 03 is checked and satisfied. CAR 03 is closed.</p>
Energy charge(won/kWh)																																	
1 ~ 100 kWh	57.30																																
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No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion
			<p>Based on the above description, the monthly electricity usage per households is 341 kWh. Therefore, the electricity rate applied in NPV calculation is conservatively 258.70 won/kWh and the evidence is submitted DOE.</p> <p>Further information can be found at:  <a href="http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp">http://cyber.kepco.co.kr/cyber/01_personal/01_payment/payment_table/payment_table.jsp</a>  <a href="http://www.kepco.co.kr/">http://www.kepco.co.kr/</a> </p> <p>Then, NPV applied this parameter is slightly higher than 0.</p> <p>But, as the installed capacity of this project is less than 5MW, the additionality is demonstrated by using "Guidelines for demonstrating additionality of microscale project activities(version 02)".</p> <p>Therefore, the demonstration of additionality for this project is reflected in the Section B.5 of the PDD.</p>	

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion								
CAR 04	<p>Data and information used in investment analysis should be presented in the PDD and submitted to assess by DOE.</p> <ul style="list-style-type: none"><li>- construction costs</li><li>- capacity factor for utilization.</li><li>- residual value.</li><li>- remaining lifetime of equipment</li><li>- and so on</li></ul>	B.5.3.6	<p>- Construction costs</p> <p>The total construction costs of 2009(the 1<sup>st</sup> stage) and 2010(the 2<sup>nd</sup> stage) are based on the facility supply and installation contracts. The costs are cross-checked by those of LH Corporation's accounting documents. Both the contracts and documents are submitted to DOE.</p> <p>- Capacity factor for utilization(15.3%)</p> <p>The capacity factor is based on the report by KPX(Korea Power Exchange). The report specifies the average factor for utilization of renewable energy power plants between 2007 and 2008. The values are summarized as follows:</p> <table><tr><td></td><td>PV</td><td>Wind</td><td>Hydro</td></tr><tr><td>%</td><td>15.3</td><td>25.1</td><td>44.2</td></tr></table> <p>The report is submitted to DOE.</p> <p>- Residual value</p> <p>The residual value is based on the article 16 of Electricity business accounting rules</p>		PV	Wind	Hydro	%	15.3	25.1	44.2	<p>Acceptable.</p> <p>PP has submitted data and information used in investment analysis based on the objective evidence.</p> <p>Also PP has conducted investment analysis to assess the additionality. And the results are calculated at the attached excel spreadsheets/1-2/</p> <p>As the results of investment analysis is higher than bench mark rate, the additionality is not demonstrated by the investment analysis.</p> <p>Then PP has demonstrated the additionality using microscale project activity /2-11/</p> <p>It was reflected at section B.5 of PDD.</p> <p>Thus CAR 04 is checked and satisfied. CAR 04 is closed.</p>
	PV	Wind	Hydro									
%	15.3	25.1	44.2									

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion						
			<p>According to the article, the residual value can be less than 5% of fixed asset and the value is applied to the final year of cash flow.</p> <p>This law is submitted to DOE.</p> <p>- O&amp;M Cost</p> <p>The O&amp;M Cost is based on the feasibility report by the Ministry of Knowledge Economy, March in 2006. The report is submitted to DOE.</p> <p>- Corporation tax</p> <p>The corporation tax is based on Corporation Tax Act. The taxable standard price is summarized as follows:</p> <table><tr><td>taxable standard price</td><td>&lt; 200 million</td><td>&gt; 200 million</td></tr><tr><td>%</td><td>10%</td><td>20 million + 20%</td></tr></table> <p>- Remaining lifetime of equipment</p> <p>Expected operational lifetime of this project is 20 years which is identified from the warranty of module specification. This evidence is submitted to DOE.</p>	taxable standard price	< 200 million	> 200 million	%	10%	20 million + 20%	
taxable standard price	< 200 million	> 200 million								
%	10%	20 million + 20%								

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion						
			<p>Then, NPV applied these parameters is slightly higher than 0.</p> <p>But, as the installed capacity of this project is less than 5MW, the additionality is demonstrated by using "Guidelines for demonstrating additionality of microscale project activities(version 02)".</p> <p>Therefore, the demonstration of additionality for this project is reflected in the Section B.5 of the PDD.</p>							
CAR 05	As per LoA issued by the host party, Republic of Korea, project participants in the LoA are not consistent with the PDD.	A.2.6	<p>As PP of the LoA is inconsistent with the PP of the PDD, the LoA consistent with the PP in PDD is reissued from DNA and submitted to DOE. The modified contents of LoA are summarized as follows:</p> <table><tr><td></td><td>Before</td><td>After</td></tr><tr><td>PP</td><td>LH Corporation</td><td>LH Corporation Ecoeye Co., Ltd</td></tr></table>		Before	After	PP	LH Corporation	LH Corporation Ecoeye Co., Ltd	<p>Acceptable</p> <p>Project participants in the LoA are revised and consistent with the PDD. Thus, CAR 05 is checked and satisfied. CAR 05 is closed.</p>
	Before	After								
PP	LH Corporation	LH Corporation Ecoeye Co., Ltd								
CAR 06	Methodological tool used to calculate the emission factor is not applied the latest version.	B.1.1	<p>As for the tool to calculate the emission factor, the version 02.2.0 was used. This version is significantly no different than previous versions.(Please see the Section B.1)</p>	<p>Acceptable.</p> <p>PP have applied the latest version. And the results are reflected at section B.1 of PDD. Thus, CAR 06 is checked and satisfied. CAR 06 is closed.</p>						



No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion
CAR 07	The operating language of the CDM shall be English. Figure B-4 shall be translated into English.	B.5.1.3	As requested, the language of Figure B-4 is modified in English.(Please see the Section B.5 of the PDD).	Acceptable Korean letter was translated into English. And the results are reflected section B.5 and E.3 of PDD. Thus, CAR 07 is checked and satisfied. CAR 07 is closed.
CAR 08	Some information in table of section 4.2 of PDD are not match with the actual situation on the project site. For example) module capacity, no. of module and etc	A.5.1	As some figures based on the inspection certificate prior to operation are rounded, some information are a difference with the actual situation. Therefore, based on the construction documents from contractors consistent with actual situation, the information on module capacity, number and etc. are reflected in the Section 4.2 of the PDD.	Acceptable PP has checked the module capacity and so on. And PP revised the table of section 4.2 of PDD. Thus, CAR 08 is checked and satisfied. CAR 08 is closed.
CAR 09	Each of the applicability condition for AMS-I.D. "Grid connected renewable electricity generation" are not mentioned in the PDD with justifications.	B.1.1	In PDD(ver.1) of this project, the methodology was used AMS-I.D(ver.15). However, due to validity period of AMS-I.D(ver. 15), AMS-I.F(ver.2) is applied to this project. As the ver.16 of AMS-I.D is distinguished the project that solely supply electricity to a grid from the this project that displace electricity from a grid, the ver.1 of AMS-I.F is applied to the project.(i.e. As this project displaces the electricity from grid and the end user of the electricity displaced is households, this project meets the applicability condition for AMS-I.F(ver.2)).	Acceptable PP has reviewed the applicability condition for AMS-I.D. But as this project activity is renewable energy and the generated electricity is supplied to households displacing the KEPCO grid. AMS-I.F is applied to the project activity instead of AMS-I.D. Thus, CAR 09 is checked and satisfied. CAR 09 is closed.

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion																			
CAR 10	To calculate net electricity generation, PP is required to consider standby power electric consumption by the auxiliary electricity (e.g. connector band and inverter).	B.3.1	<p>In this project, net electricity generation is the difference between the total quantity of electricity generated by this project and the auxiliary electricity consumption(of connector bands and inverters).</p> <p>The auxiliary electricity consumption is calculated using on recording annually the number of systems operating and estimating the annual hours of systems operating.</p> <p>The equation for calculating net electricity is described in the Section B.7.2.</p>	<p>Acceptable</p> <p>PP has considered the auxiliary electric consumption to calculate the net electric generation based on the manufacturer's letter.</p> <p>Validation team checked the content of letter and it was reasonable.</p> <p>And the results are reflected at section B7.2. of PDD.</p> <p>Thus, CAR 10 is checked and satisfied. CAR 10 is closed.</p>																			
CAR 11	<p>There are discordance between the PV construction documents and inspection certificate prior to operation in the installed capacity. Please clarify discordance in the installed capacity and reflect the actual installed capacity on the PDD.</p> <p>Example sites: Icheon Galsan(2) Nonsan Daegyo</p>	A.5.2	<p>On investigating this project site, the installed capacity and module power of some PV power plants was confirmed that mistyped in the PDD. So , the plants is modified based on the PV construction documents.</p> <p>Those contents are reflected in the Section A.4.2 and summarized as follows:</p> <table border="1"> <thead> <tr> <th rowspan="2">PV power plant</th><th colspan="2">In the PDD(ver.1)</th><th colspan="2">Based on PV construction documents</th></tr> <tr> <th>Module power (W)</th><th>installed capa. (kW)</th><th>Module Power (W)</th><th>installed capa. (kW)</th></tr> </thead> <tbody> <tr> <td>Icheon Galsan(2)</td><td>220</td><td>76.80</td><td>200</td><td>76.80</td></tr> <tr> <td>Nonsan Daegyo</td><td>299</td><td>88.80</td><td>200</td><td>91.20</td></tr> </tbody> </table>	PV power plant	In the PDD(ver.1)		Based on PV construction documents		Module power (W)	installed capa. (kW)	Module Power (W)	installed capa. (kW)	Icheon Galsan(2)	220	76.80	200	76.80	Nonsan Daegyo	299	88.80	200	91.20	<p>Acceptable</p> <p>PP has checked the installed capacity based on the number of PV module again and revised the installed capacity.</p> <p>And the results are reflected at section A.4.2 of PDD</p> <p>Thus, CAR 11 is checked and satisfied. CAR 11 is closed.</p>
PV power plant	In the PDD(ver.1)		Based on PV construction documents																				
	Module power (W)	installed capa. (kW)	Module Power (W)	installed capa. (kW)																			
Icheon Galsan(2)	220	76.80	200	76.80																			
Nonsan Daegyo	299	88.80	200	91.20																			

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion																																					
			<p>In addition, As the installed capacity in the inspection certificate prior to operation of some PV power plants is rounded, the installed capacity considering module power and number from the PV construction documents is reflected in the Section A.4.2.</p> <p>The modified contents are summarized as follows:</p> <table> <tr> <th rowspan="2">PV power plant</th><th rowspan="2">Based on Inspection certificate  Capa. (kW)</th><th colspan="3">Based on PV construction documents</th></tr> <tr> <th colspan="2">Module</th><th rowspan="2">Capa. (kW)</th></tr> <tr> <th></th><th></th><th>Power (W)</th><th>Number</th></tr> <tr> <td>Gunsan Guam</td><td>46.00</td><td>200</td><td>228</td><td>45.60</td></tr> <tr> <td>Gyeongsan Sadon(1)</td><td>159.00</td><td>200</td><td>792</td><td>158.40</td></tr> <tr> <td>Gyeongsan Sadon(2)</td><td>89.00</td><td>200</td><td>444</td><td>88.80</td></tr> <tr> <td>Cheongyang Eumnae</td><td>41.00</td><td>200</td><td>204</td><td>40.80</td></tr> <tr> <td>Geoje Irun</td><td>53.00</td><td>200</td><td>264</td><td>52.80</td></tr> </table>	PV power plant	Based on Inspection certificate  Capa. (kW)	Based on PV construction documents			Module		Capa. (kW)			Power (W)	Number	Gunsan Guam	46.00	200	228	45.60	Gyeongsan Sadon(1)	159.00	200	792	158.40	Gyeongsan Sadon(2)	89.00	200	444	88.80	Cheongyang Eumnae	41.00	200	204	40.80	Geoje Irun	53.00	200	264	52.80	
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Geoje Irun	53.00	200	264	52.80																																					

No. of CAR/CL	Description of CAR and CL	Ref. to Checklist Table 2	Comments/Response from project proponent	Final Conclusion
CL 01	Project participant's address in Annex I of PDD is not consistent with that of LoA.	A.3.1	As requested, contact information on participants is modified to be consistent with that of LoA. Please See the Section Annex I.	Acceptable. PP's address in Annex was revised. And the results are reflected at Annex I of PDD. Thus, CL 01 is checked and satisfied. CL 01 is closed.
CL 02	The geographical coordinates in the section A.4.1.4 of PDD are in minutes and seconds format. Please revised with the decimal system.	A.6.1.1.	Using the decimal system, the geographical coordinates of 36 PV power plants are modified. The coordinates are reflected in the Section A.4.1.4 of the PDD.	Acceptable. GPS is revised with the decimal system. And the results are reflected at A.4.1.4 of PDD. Thus, CL 02 is checked and satisfied. CL 02 is closed.
CL 03	PPs are required to submit the documents related to stakeholders consultation to the validation team.	D.1	PP has conducted a presentation with interested parties of PV power plant's installation area of 2009(1st stage) and of 2010(2nd stage) and written the reports on result. The reports are submitted to DOE and those contents are reflected in the Section E.3. of the PDD.	Acceptable. PP have submitted the documents related to stakeholders consultation. Thus, CL 03 is checked and satisfied. CL 03 is closed.
CL 04	PV power plant's address in the section A.5 of PDD are mistyped. PPs required to revise the PV power plant's address.	A.5.1	Based on the PV construction document, PV power plant's address is modified overall and properly corrected. Its contents are reflected in the Section A.5 of the PDD.	Acceptable. PV power plant's address in the section A.5 of PDD was revised. And the results are reflected at A.5 of PDD. Thus, CL 04 is checked and satisfied. CL 04 is closed.

## **APPENDIX B**

### CERTIFICATES OF COMPETENCE



## GHG Validator/Verifier Certificate

Kyoo-Il Sohn

Certificate No. : CDM-001

Technical Area : 13.1

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

2011.1.21

VALID UNTIL

2014.1.20

PRESIDENT OF KSA

A handwritten signature in black ink, appearing to read "Kaphong Choo", is written over a faint, circular official stamp.

**KOREAN STANDARDS ASSOCIATION**

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



## GHG Validator/Verifier Certificate

Chang-Woo Lee

Certificate No. : CDM-004

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**

2009.4.22

**VALID UNTIL**

2012.4.21

**PRESIDENT OF KSA**

A handwritten signature in black ink, appearing to read "Kaphong Choo", is written over a faint, larger handwritten signature that also appears to read "Kaphong Choo".

**KOREAN STANDARDS ASSOCIATION**

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

# KSA

## CDM Validator/Verifier Certificate

Sung-Yong Park

Certificate No. : CDM-014

Technical Area : -

Korean Standards Association hereby certifies that the above person is qualified by KSA's Qualification requirements as a technical expert for CDM validation and verification activities.

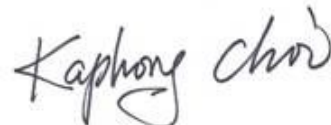
VALID FROM

2011.01.21

VALID UNTIL

2014.01.20

PRESIDENT OF KSA



**KOREAN STANDARDS ASSOCIATION**

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





## Technical Expert Certificate

Chung-kook Lee

Certificate No. : CDM-013

Technical Area : 1.2, 2.1, 2.2, 3.1

Korean Standards Association hereby certifies that the above person is qualified by KSA's Qualification requirements as a technical expert for CDM validation and verification activities.

VALID FROM

2010.09.20

VALID UNTIL

2013.09.19

PRESIDENT OF KSA

A handwritten signature in black ink, appearing to read 'Kaphong Choo', is written over the printed name of the President of KSA.

**KOREAN STANDARDS ASSOCIATION**

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



## GHG Validator/Verifier Certificate

Chan-Sik Yoon

Certificate No. : CDM-006

Technical Area : 1.2, 2.1, 2.2, 3.1

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

2010.9.20

VALID UNTIL

2013.9.19

PRESIDENT OF KSA

A handwritten signature in black ink, appearing to read "Kaphong Choo", is written over the printed name of the President of KSA.

**KOREAN STANDARDS ASSOCIATION**

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