



**Programme of activities design document form**  
**(Version 09.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**BASIC INFORMATION**

<b>Title of the PoA</b>	Programme of Activities to introduce renewable energy system into collective housing, Republic of Korea
<b>Version number of the PoA-DD</b>	Version 2
<b>Completion date of the PoA-DD</b>	25/12/2019
<b>Coordinating/managing entity</b>	Korea Land & Housing Corporation
<b>Host Parties</b>	Republic of Korea
<b>Applied methodologies and standardized baselines</b>	AMS-I.F Renewable electricity generation for captive use and mini-grid, Version 03 No Standardized methodology has been selected for the PoA
<b>Sectoral scopes</b>	1.Energy industries (renewable - / non-renewable sources)

## PART I. Programme of activities (PoA)

### SECTION A. Description of PoA

#### A.1. Purpose and general description of PoA

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"Programme of Activities to introduce renewable energy system into collective housing, Republic of Korea"(hereafter the PoA) was launched by LH Corporation(hereafter CME) for help to introduce photovoltaic power plants in order to promote technological development, use and distribution of solar energy in Republic of Korea.

The PoA accords with a national policy, such as "Green Home 1 million distribution projects" and others of the government policy, and national goals which to reduce electricity based on coal or other carbon-intensive fossil fuels and thus to eventually reduce the associated CO<sub>2</sub> emissions in Republic of Korea.

The PoA has also contributed to the preservation of the environment, the sound and sustainable development by diversifying energy sources as well as growing and strengthening the solar industry in the country through the promotion of technological development, use and distribution of solar energy.

Aspects of Contribution	Detail contributions
Social/ Technological aspects	Diversifying sources of electric generation and utilizing solar energy. Contributing to revitalization of local energy industry.
Economical aspects	Supplying households with the available electric power and contribute to national energy supply. Creating job opportunities directly and indirectly through construction and operation of the plant. Improving the local residents' living standard.
Environmental and National aspects	Replacing coal-fired power plants and contributes to reduce GHG emissions of the nation. Contributing toward improvement of air quality and better living conditions of the country by reducing the air pollution.

#### Policy/measure or stated goal for the PoA

The objective of this PoA is to reduce electricity based on coal or other carbon-intensive fossil fuels and thus to reduce the associated CO<sub>2</sub> emissions in Republic of Korea.

In Korea, the Government develops policies concerning the promotion of the technological development, use and distribution of renewable energy<sup>1</sup>. However, the Government doesn't mandate the photovoltaic power plants to introduce renewable energy systems.

CME contributes to the preservation of the environment, the sound and sustainable development of the national economy, and the promotion of national welfare by diversifying energy sources through the promotion of technological development, use and distribution of solar energy. This PoA will contribute to activities aimed at growing and strengthening the solar industry in Republic of Korea.

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<sup>1</sup> It is based on "Act on the promotion of the development, use and diffusion of new and renewable energy". This act is enforced on 01/07/2005

Through this PoA, it helps to achieve the measure for efficient use of energy by introducing photovoltaic power plants in order to promote the "Green Home 1 million distribution projects" of the government.

### **A framework for the implementation of the PoA**

The programme of activities (hereafter referred to as the "PoA") involves applying photovoltaic power plant system. The programme is geographically located in Republic of Korea. These renewable energy systems will displace existing energy source based on fossil fuel and reduce GHG emissions. The PoA will be coordinated and managed by Korea Land & Housing Corporation<sup>2</sup> (hereafter referred to as LH Corporation). The generated electricity will be supplied to households displacing electricity supplied from KEPCO (Korea Electric Power Corporation, hereinafter referred to as KEPCO) grid.

This PoA will consist of project activities that install a new photovoltaic power plant where there was no renewable energy power plant operation prior to the implementation of the project activity (Greenfield plant). The installed capacity of each CPA is less than or equal to 15MW.

LH Corporation as a CME will manage general operation of PoA. In Korea, public entities including CME as well as private entities that introduce the photovoltaic power generation and satisfy the eligibility criteria for inclusion of CPA could be participated as a CPA implementer.

Sectoral Scope 1 "Energy industries (renewable-/non-renewable sources), solar energy technologies is applicable to CPAs of the POA.

The PoA include generic CPA-DD as below;

Small scale(Micro scale) CPA with AMS I.F methodology for solar photovoltaic projects

### **Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity**

This PoA is a scheme developed by LH Corporation to introduce renewable energy system in Korea. There are no mandatory law in Korea to enforce introduction of renewable energy system.

Therefore, the PoA is a voluntary action, not required by law, undertaken by LH Corporation who is the coordinating/managing entity for the PoA and host country approval to this PoA will confirm a voluntary action.

### **How the PoA contribute to sustainable development of the host Party?**

The proposed PoA will contribute to sustainable development such as acquaintance of advanced technological experiences and maintenance know-how, creation of job opportunities in the country as follows:

- Social/ Technological aspects
  - The proposed project can diversify sources of electric generation and be a model case as a PV power plant that utilizes solar energy.
  - The proposed project will contribute to revitalization of local energy industry under the corporation of a local government.

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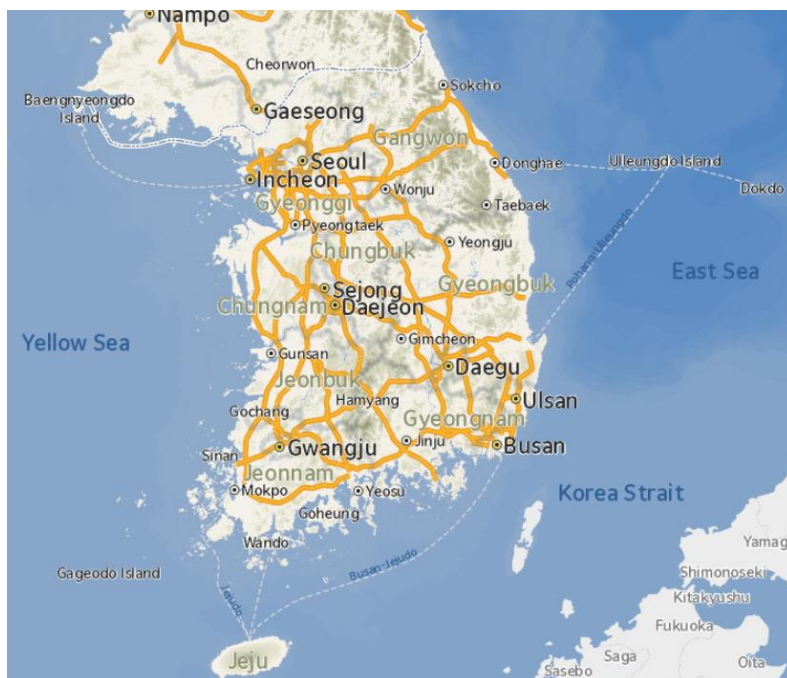
<sup>2</sup> Korea Land & Housing Corporation(LH Corporation) is one of the largest Korean Public Enterprise which has the role of improving national house life and efficient use of the country land with proper development, maintenance and management

- **Economical aspects**
  - The proposed project will supply households with the available electric power and contribute to national energy supply.
  - The proposed project will create job opportunities directly and indirectly through construction and operation of the plant.
  - The proposed project will improve the local residents' living standard.
- **Environmental and National aspects**
  - The photovoltaic power plant replaces coal-fired power plants and contributes to reduce GHG emissions of the nation.
  - The plant will contribute toward improvement of air quality and better living conditions of the country by reducing the air pollution.

## A.2. Physical/geographical boundary of PoA

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All CPAs of the PoA will be implemented in Republic of Korea.



< Figure 1. Map of Republic of Korea >

### A.3. Technologies/measures

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Sectoral Scope 1 “Energy industries (renewable-/non-renewable sources) is applicable to CPAs of the POA. The CPA comprises renewable energy generation units, such as photovoltaic power plants that supply electricity to users and will displace electricity from an electricity distribution system that is or would have been supplied by KEPCO grid.

Each CPA will install renewable energy systems such as photovoltaic power plant systems. These systems will reduce electricity based on fossil fuels. The renewable energy systems are newly constructed by one or more project owners.

**A.4. Coordinating/managing entity**

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Korea Land &amp; Housing Corporation (LH Corporation)

**A.5. Parties and project participants**

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A (host Party)	Public entity A Korea Land & Housing Corporation	No

**A.6. Public funding of PoA**

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The PoA will not receive any public funds resulting from official development assistance from Parties included in Annex I.

**SECTION B. Management system**

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Operational and management for the PoA will be based on CDM operation manual for PoA. This manual involves the following procedures in order to implement and manage each CPA by CME.

<b>CDM operation manual for the PoA</b>
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- a. Roles, Responsibilities and Competencies
- b. CPA Management and Inclusion
- c. Training
- d. Monitoring
- e. Document and Data Control
- f. Internal Quality Audit
- g. Continuous Improvements of CDM Operation Manual

In this PoA, the role for operation of PoA is as below;

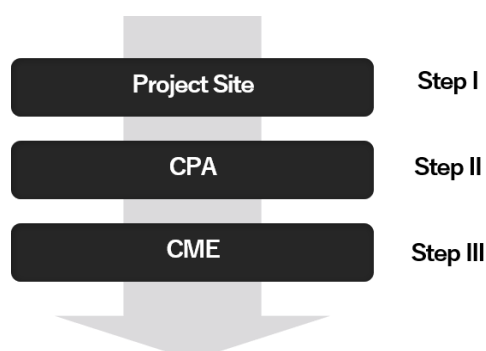
Coordinating/managing entity	CPA implementer
CDM registration and verification, communication etc. with DOE and CDM EB  Providing CPA implementers with guidance for proper CDM monitoring activity and other CDM-related process  General management of monitoring parameter of all CPAs  Inclusion of new CPAs  Double counting check  Ensure monitoring plan and establish the monitoring system	Construction and operation of photovoltaic power generation facility  Direct CDM monitoring activity  Data recording, collection, archive  Data reporting  Installation and management of monitoring equipment including QA/QC activities, etc.

Verification and storage of monitoring data  Make the monitoring report  CERs allocation with CPA implementer according to agreements, etc.	
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In addition, CME will implement the following operational elements to ensure proper management and control the PoA.

**(i) A record keeping system for each CPA under the PoA**

The CME has established a monitoring system in order to maintain recorded data. The flow of data under the PoA will occur at three different steps as follows:



< Figure 2. Typical data flow >

As described in the above flow, the data generated at project site(Step I) will first flow to the CPA(Step II) and is then finally archived at the CME(Step III). In case the CPA is implemented by CME, the flow of data can be simplified.

**Project Site(Step I) >>** The monitoring data keeping at the project site will be executed. The quantity of net electricity displaced by the project shall be monitored at each site. The quantity of net electricity which are a difference between the total quantity of electricity generated by project and the auxiliary electricity consumption shall be calculated by site data. Appropriate records supplied from each of the project sites will be kept for future verifications. All data are recorded regularly and reported to CPA.

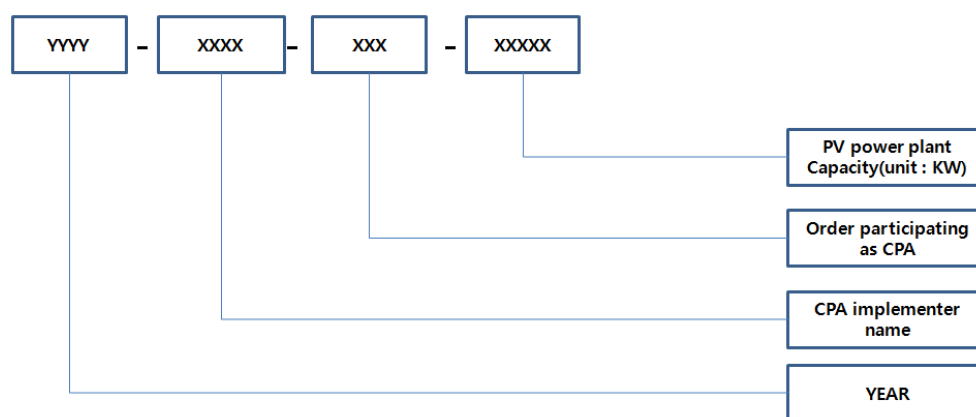
**CPA(Step II) >>** The collected data at the project sites will be transferred to the database of the each CPA.

**CME(Step III) >>** The data is transferred from each CPA step to CME, which will archive it and make available to DOE for verification.

In addition, CME will develop an electronic or manual monitoring database which contains all the basic information related to CPA subscribing to the PoA. Each CPA will be uniquely identified within the PoA monitoring database. The CME will be responsible for the management of the PoA monitoring database. All records will be stored at least for a period of two years after the end of the crediting period of each individual CPA. Storage procedure and relevant data that are collected, verified will be followed in maintaining the data to ensure its accuracy, validity and completeness.

**CPA Unique Identification >>**

CME will provide a monitoring manual to each CPA implementer, and the CPA will comply the manual for their monitoring work. In order to unambiguously identify each PV power plant participating in this PoA, CME will grant CPA implementer with ID in following forms according to the order participating as CPA and power plant capacity.



< Figure 3. ID forms of CPA implementer >

This ID numbering system will be used to record baseline and monitoring data. CME documents detail information for CPA as follows:

- Name, address, details of CPA implementer
- Capacity of PV power plant
- Geographical coordinates of CPA(GPS information)
- The record of technical specification of each power plant participating in the CPA
- Monitoring data generated by CPA
- Implementing records for CPA operation

CME will be responsible for the management of records and data associated with each CPA. The database will be updated using the data supplied by the CPA implementer. And the manual includes description, as below, for monitoring and more details for each project characteristics.

### **CME(LH Corporation)**

CME manages the whole monitoring process and takes the responsibility. CME designates a department for CDM operation. This department is qualified to manage data and records as it is part of its normal assignment. CME collects monitoring data from CPA implementer, verifies the data whether all variables are valid or not, and develops a monitoring report. Records from monitoring system will be kept during the entire crediting period of each CPA and the following two years.

### **CPA implementer**

CPA implementer should establish process to manage monitoring data in accordance with CDM Operation Manual for PoA. CPA implementer designates a department for CDM monitoring. This department manages the whole monitoring process and system and takes responsibility. Records from monitoring system will be kept during the entire crediting period of each CPA and the following two years. CPA implementer ensures reliability of monitoring system and responsibility for accidental situations.

**(ii) A system/procedure to avoid double counting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA.**

New CPA will be compared to the list of project activities that are under validation or registered at the UNFCCC or VCS<sup>3</sup>. Before the inclusion of any CPA, the CPA implementer will be required to

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<sup>3</sup> Verified Carbon Standard

certify in writing that proposed CPA is not currently registered under the CDM of UNFCCC or any voluntary scheme nor is currently in the CDM pipeline going through the process of validation or registration.

**(iii) The CPA included in the PoA is not a de-bundled component of another CDM programme activity(CPA) or CDM project activity.**

The de-bundling check will be performed as Programme of CME will perform the de-bundling check using desk review of the above database and on-site visit. Every new CPA will be compared to the list of project activities. Before the inclusion of any CPA, CME will be made aware of the de-bundling rules below.

**(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA.**

The acceptance and awareness of each CPA implementer is evidenced through the agreement between CME and CPA implementer before CPA inclusion in PoA.

**(v) Monitoring Plan of the CPA under the PoA**

For monitoring during the crediting period, CPAs monitor the quantity of net electricity displaced in year y ( $EG_{BL,y}$ ) as the applied methodology. The monitoring plan will be implemented by CPA and the CME as follows;

- The CPA implementors operate CPAs.
- The CME will provide the manual to each CPA on how monitoring should be conducted and data should be collected, transferred, archived in regards to emission reductions calculation.
- The CPA will provide data on monitored parameters to the CME.
- The CME will document and store all parameters provided by CPA
- The CME review relevant monitoring documents, prepare the monitoring report.

## **SECTION C. Demonstration of additionality of PoA**

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As a PoA-DD during the first crediting period, the PoA has been demonstrated a voluntary action. For the renewal PoA period of a registered CDM PoA, assessment for additionality of the PoA isn't required as the standard.


The PoA is comprised of small-scale or microscale photovoltaic plants in each CPA. The additionality for small-scale(or micro-scale) CPAs should be demonstrated at the CPA level using eligibility criteria derived by "Demonstration of additionality of small-scale project activities (Version 12.)" or "Demonstration of additionality of microscale project activities (Version 09)".

In detail, the "Demonstration of additionality of small-scale project activities (Version 12.0)" and "Demonstration of additionality of microscale project activities (Version 09.0)" describe that small-scale(or microscale) PV plants are defined as automatically additional as below:

### **Small scale >>**

The positive list comprises of:

*(a) The following grid-connected and off-grid renewable electricity generation*

 (i) Solar technologies (photovoltaic and solar thermal electricity generation);

(ii) Off-shore wind technologies;

(iii) Marine technologies (wave, tidal);

(iv) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW



**Microscale >>**

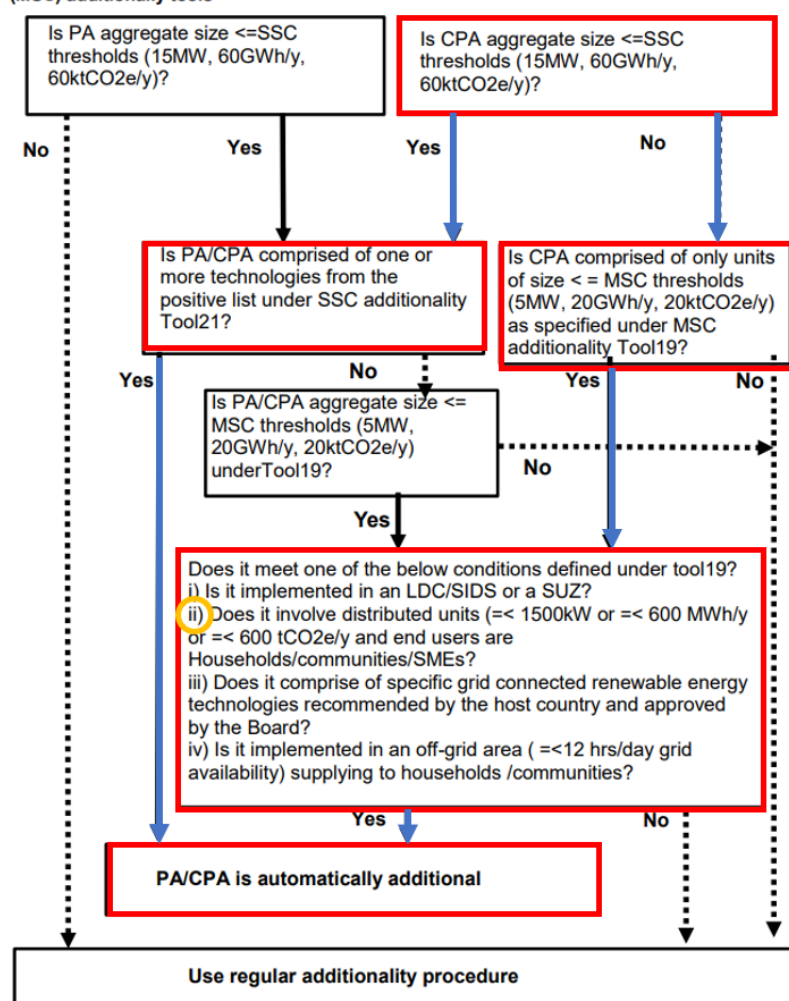
Project activities that employ renewable energy technology up to 5 MW installed capacity are additional if any one of the conditions below is satisfied:

(c) *The project activity consists of one or more of the following technologies/measures for distributed energy generation where end users are households, communities or small and medium-sized enterprises (SMEs);*

- ☞ (i) Solar technologies (photovoltaic and solar thermal electricity generation);
- (ii) Building-integrated wind turbines or rooftop wind turbines;
- (iii) Micro/pico-hydro;
- (iv) Micro/pico-wind turbine;
- (v) PV-Wind hybrid;
- (vi) Geothermal;
- (vii) Biomass gasification/biogas;
- (viii) Solar water heating system;
- (ix) Clean and energy efficient cookstoves.

Given the included CPAs, scale of each CPA amounts to a microscale (i.e. less than 5MW) and CPAs are resulted as automatically additional. If the proposed CPA applies photovoltaic electricity generation in a positive list technology, the proposed CPA are automatically additional, CPAs would not be implemented in the absence of this PoA.

**Figure 1. Criteria for automatic additionality using provisions of small-scale (SSC) or microscale (MSC) additionally tools**



< Figure 6. Flow chart for automatic additionality of the small(or micro) scale CPA/PA >

**SECTION D. Start date and duration of PoA****D.1. Start date of PoA**

>>  
01/09/2011<sup>4</sup>

**D.2. Duration of PoA**

>>  
28 years

**SECTION E. Environmental impacts****E.1. Level at which environmental impacts analysis is undertaken**

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The PoA consists of construction and operation of photovoltaic power generation in Korea. As the site specific environmental conditions at individual CPAs could affect an Environmental Analysis, it will be carried out at the CPA level and reported in each CPA-DD.

**E.2. Analysis of environmental impacts**

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The environmental impacts analysis will be done at CPA level.

**E.3. Environmental impact assessment**

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The environmental impacts analysis will be done at CPA level.

**SECTION F. Local stakeholder consultation****F.1. Level at which local stakeholder consultation is undertaken**

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The each CPA operates within a geographically defined region. For this reason local stakeholder consultation is done on a CPA level to ensure that the stakeholders within the region actually affected by the project activity are adequately informed and consulted.

**F.2. Modalities for local stakeholder consultation**

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Comments from local stakeholders will be conducted at CPA level.

**F.3. Summary of comments received**

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Report on consideration of comments will be conducted at CPA level.

**F.4. Consideration of comments received**

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Report on consideration of comments will be conducted at CPA level.

**SECTION G. Approval and authorization**

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The approval letter from host country(i.e. Republic of Korea) is received at 05/07/2012.

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<sup>4</sup> The start date of validation for PoA(the date of Public comment)

## PART II. Generic component project activity (CPA)

### SECTION H. Description of generic CPA

#### H.1. Title of generic CPA

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PV power plants project on collective housing

#### H.2. Reference number of generic CPA

&gt;&gt;

Generic CPA 1

#### H.3. Purpose and general description of generic CPA

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This CPA is a part of “Programme of Activities to introduce renewable energy system into collective housing, Republic of Korea”(hereafter PoA).

This CPA aims to mitigate GHG emissions through renewable energy project using photovoltaic power plant systems. The project activity using this system to generate electricity has a significant effect on reducing GHG emissions related to fossil fuel use. The CPA consists of XX photovoltaic power plants. The installed total capacities are XX KW. Renewable energy system's formation is as follows.

<Table 1. Photovoltaic power plant system>

No.	Plant name	Construction date	Capacity	Etc.
<b>Total</b>			<b>KW</b>	

#### H.4. Technologies/measures

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The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. i.e., in the absence of the project activity, the users would have been supplied electricity from one or more sources among a national or a regional grid, fossil fuel fired captive power plant and a carbon intensive mini-grid.

As the PoA produces electricity and displaces the electricity supplied from grid, AMS-I.F methodology is applicable to CPAs which introduce photovoltaic power plant system.

### SECTION I. Application of methodologies and standardized baselines

#### I.1. References to methodologies and standardized baselines

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##### Methodology:

AMS-I.F : Renewable electricity generation for captive use and mini-grid version 03

**Methodological tool:**

Tool to calculate the emission factor for an electricity system version 07.0.

**I.2. Applicability of methodologies and standardized baselines**

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As the CPA generate electricity and displace the electricity supplied from grid, AMS-I.F methodology is applicable to the CPA which introduce photovoltaic power plant system with a maximum output capacity of 15 MW. The applicability of the methodology is described as follows:

**< Table 2 Applicability of AMS-I.F(version 03) >**

AMS-I.F requirements					SSC-CPA qualification Justification																									
<p>This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to user(s). The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit i.e. in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below:</p> <p>(a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant; (c) A carbon intensive mini-grid.</p>					<p><b><u>Satisfied</u></b></p> <p>The CPA is comprised of photovoltaic power plants supplied to households displacing electricity from grid.</p>																									
<p>Illustration of respective situations under which each of the methodology (AMS-I.D., AMS-I.F. and AMS-I.A.<sup>5</sup> ) applies is included in Table 3.</p> <p>Table 3: Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types</p> <table><tr><th>No</th><th>Project type</th><th>AMS-I.A</th><th>AMS-I.D</th><th>AMS-I.F</th></tr><tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>✓</td><td></td></tr><tr><td>2</td><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)</td><td></td><td></td><td>✓</td></tr><tr><td>3</td><td>Project supplies electricity to an identified consumer facility via national/ regional grid (through a contractual arrangement such as wheeling)</td><td></td><td>✓</td><td></td></tr><tr><td>4</td><td>Project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or</td><td></td><td></td><td>✓</td></tr></table>					No	Project type	AMS-I.A	AMS-I.D	AMS-I.F	1	Project supplies electricity to a national/regional grid		✓		2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			✓	3	Project supplies electricity to an identified consumer facility via national/ regional grid (through a contractual arrangement such as wheeling)		✓		4	Project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or			✓	<p><b><u>Satisfied</u></b></p> <p>The CPA eventually displaces grid electricity or may supply electricity to a mini grid. AMS-I.F methodology is applicable.</p>
No	Project type	AMS-I.A	AMS-I.D	AMS-I.F																										
1	Project supplies electricity to a national/regional grid		✓																											
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			✓																										
3	Project supplies electricity to an identified consumer facility via national/ regional grid (through a contractual arrangement such as wheeling)		✓																											
4	Project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or			✓																										

<sup>5</sup> "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A: Electricity generation by the user".

	diesel fuel				
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	v			
<p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <p>a. The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</p> <p>b. The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m<sup>2</sup>;</p> <p>c. The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m<sup>2</sup>.</p>					<p><b><u>N/A</u></b> The CPA isn't involved in hydro power plant, this condition is not applicable.</p>
<p>This methodology is applicable for project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition<sup>6</sup>, (c) Involve a retrofit<sup>7</sup> of (an) existing plant(s); or (d) Involve a replacement<sup>8</sup> of (an) existing plant(s).</p>					<p><b><u>Satisfied</u></b> The CPA will be a capacity addition or an installation for a new PV power plant at a site where there was no renewable energy power plant (Greenfield plant), this condition is applicable.</p>
<p>In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct<sup>9</sup> from the existing units.</p>					<p><b><u>Satisfied</u></b> The added capacity of the units through the CPA is equal to or less than 15MW, this condition is applicable.</p>

<sup>6</sup> A capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) The installation of a new power plant beside the existing power plant/units; or (ii) The installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity.

<sup>7</sup> Retrofit (or rehabilitation or refurbishment). A retrofit is an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

<sup>8</sup> Replacement. Investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The new power plant or unit has the same or a higher power generation capacity than the plant or unit that was replaced.

<sup>9</sup> Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct"

In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	<b><u>N/A</u></b> The CPA isn't involved in retrofit or replacement, this condition is not applicable.
If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, <sup>10</sup> the capacity of the entire unit shall not exceed the limit of 15 MW.	<b><u>N/A</u></b> The CPA is only involved in renewable energy and its capacity is equal to or less than 15MW, this condition is not applicable.
Combined heat and power (co-generation) systems are not eligible under this category.	<b><u>N/A</u></b> The CPA isn't involved in co-generation systems, this condition is not applicable.
If electricity and/or steam/heat produced by the project activity is delivered to a third party, i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures that there is no double counting of emission reductions.	<b><u>N/A</u></b> The CPA isn't involved in production for steam/heat, this condition is not applicable.
In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	<b><u>N/A</u></b> The CPA isn't involved in biomass project activities, this condition is not applicable

### I.3. Application of multiple methodologies

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The Generic CPA1 only is applicable to AMS-I.F methodologies (small scale).

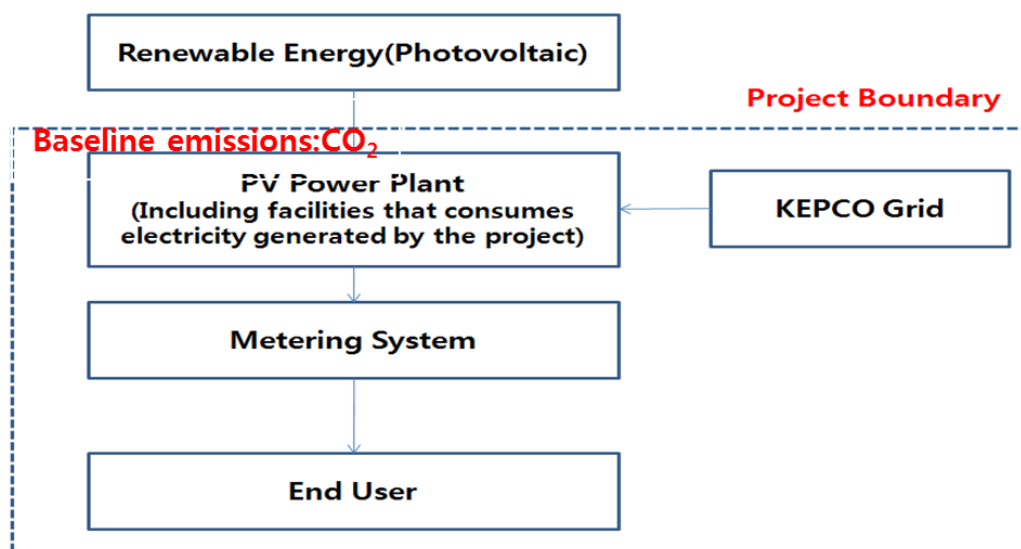
### I.4. Project boundary, sources and greenhouse gases (GHGs)

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As per stipulated in AMS-I.F (Version 03), the extent of CPA boundary includes facilities consuming electricity generated by this project. The project boundary is confined to physical, geographical site of renewable generating units. The boundary also extends to the project power plant and all power plants connected physically to the electricity system of KEPCO.

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<sup>10</sup> A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justification are provided.



&lt; Figure 7. Project Boundary &gt;

	Source	GHG	Included?	Justification/Explanation
Baseline	CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO <sub>2</sub>	Included	Major source of emissions in the baseline
		CH <sub>4</sub>	Excluded	Excluded for simplification. This is conservative
		N <sub>2</sub> O	Excluded	Excluded for simplification. This is conservative
Project activity	CO <sub>2</sub> emissions from on-site consumption	CO <sub>2</sub>	Excluded	Based on AMS-I.D or AMS-I.F
		CH <sub>4</sub>	Excluded	Based on AMS-I.D or AMS-I.F
		N <sub>2</sub> O	Excluded	Based on AMS-I.D or AMS-I.F

### 1.5. Establishment and description of baseline scenario

&gt;&gt;

The CPA of the PoA eventually displaces electricity from national or regional grid that is or would have been supplied by at least one fossil fuel fired generating unit in the absence of the project activity.

In case of renewal of crediting period for an included CPA, data and parameter used for determining the original baseline of the CPA only assess whether they are valid or not at time of requesting renewal of the CPA as “CDM project standard for programmes of activities” and “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period(version 03.0.1)” as below:

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)	Justification
--	---------------

<p><b>Step 1 &gt;&gt;</b> Assess the validity of the current baseline for the next crediting period</p> <p>Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies</p> <p>Step 1.2: Assess the impact of circumstances</p> <p>Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.</p> <p>Step 1.4: Assessment of the validity of the data and parameters</p>	<p>There are no changes on national policies and circumstances for renewable energy(i.e. photovoltaic plants). Lifetimes of the project equipment are enough to cover the renewal crediting period. Therefore, a consistent operation of the CPA are positive.</p> <p>But, the CPA should update emission factors for renewal of crediting period.</p>
<p><b>Step 2 &gt;&gt;</b> Update the current baseline and the data and parameters</p> <p>Step 2.1: Update the current baseline</p> <p>Step 2.2: Update the data and parameters</p>	<p>Emission factor for the CPA is consistent with emission factor(i.e. <math>EF_{BL,y}</math>) for its PoA-DD.</p>

Baseline emissions for other systems are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor.

$$BE_y = EG_{BL,y} \times EF_{CO_2,y}$$

Where :

$BE_y$	=	Baseline emissions in year $y$ ( $tCO_2$ )
$EG_{BL,y}$	=	Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year $y$ (MWh)
$EF_{CO_2,y}$	=	Emission Factor of a grid calculated as per the procedures provided in AMS-I.D ( $tCO_2/MWh$ )

As per the procedures provided in AMS-I.D, the emission factor of a grid is calculated in a transparent and conservative manner as below:

- a. A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”;

This PoA choose the condition (a) and a combined margin (CM) is calculated as “Tool to calculate the emission factor for an electricity system (version 07.0)”.

## I.6. Estimation of emission reductions

### I.6.1. Explanation of methodological choices

>>

The emission reductions to be achieved as a result of each CPA under the proposed PoA are calculated according to the approved methodology AMS-I.F “Renewable electricity generation for captive use and mini-grid (version 03.0)”.

The CPA includes the installation of a new power plant at a site where there was no PV power plant operating prior to the implementation of the project activity(Greenfield plant). In the calculation of emission reductions of a CPA, the following methodological tools will be referred as suggested by the methodology;



&lt;Table 3. Referred tool for ER calculation &gt;

No.	Methodological Tool	Parameters	Purpose of reference
1	Tool to calculate the emission factor for an electricity system (version 07.0)	$EF_{grid,CM,y}$	Combined margin CO2 emission factor for the project electricity system in year y
2		$EF_{grid,BM,y}$	Build margin CO2 emission factor for the project electricity system in year y
3		$EF_{grid,CM,y}$	Operating margin CO2 emission factor for the project electricity system in year y

**a). Baseline Emissions**

According to the applied methodology, baseline emission of this system displacing KEPCO grid electricity is calculated as below:

$$BE_y = EG_{BL,y} * EF_{CO2,y}$$

Where :

$BE_y$	=	Baseline emissions in year y (tCO <sub>2</sub> )
$EG_{BL,y}$	=	Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,y}$	=	Emission Factor of a grid calculated as per the procedures provided in AMS-I.D (tCO <sub>2</sub> /MWh)

**b). Project Activity Emissions**

Project emissions of a photovoltaic project activities are zero as the applied methodology.

**c). Leakage**

As a photovoltaic project activities in programme of activities, leakage is not to be considered.

**d). Emission Reductions**

$$ER = BE_y - PE_y - LE_y$$

Where:

$ER_y$	=	Emission reductions in year y (tCO <sub>2e/y</sub> )
$BE_y$	=	Baseline Emissions in year y (tCO <sub>2/y</sub> )
$PE_y$	=	Project emissions in year y (tCO <sub>2/y</sub> )
$LE_y$	=	Leakage emissions in year y (tCO <sub>2/y</sub> )

**✖ Determination of Emissions Factor of a grid:**

The emission factor of a grid is calculated in a transparent and conservative manner as below:

☞ (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”;

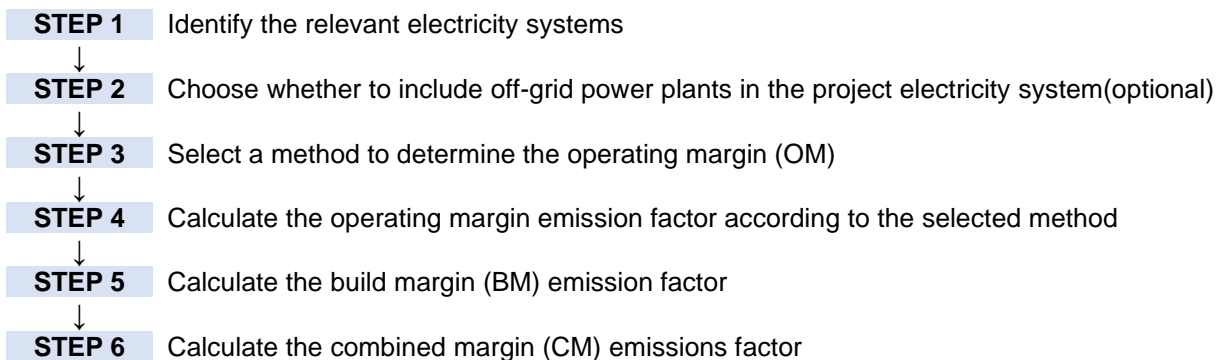
(b) The weighted average emissions (in tCO<sub>2</sub>/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Given the PoA and the host country, the CPA is applicable to condition (a). Emissions Factor is calculated according to “Tool to calculate the emission factor for an electricity system (version

07.0)". Combined margin(CM) as a baseline grid emission factor is calculated, which is based on Operating Margin(OM) and Build Margin(BM).

OM(Operating Margin) and BM(Build Margin) are calculated by using the data from existing power plants that provide electricity with the current grid-connected electricity generation, and with this result, the  $EF_{grid,CM,y}$ (Baseline Emission Factor) can be calculated. The steps for the Baseline calculation methodology are as follows

The emission factor will be calculated as following six steps:



The emission factor for the CPA is calculated on "Statistics of electric power in Korea 2016~2018", which published by Korea electric power corporation(hereafter KEPCO).

### STEP 1 >> Identify the relevant electricity systems

Form determining the electricity emission factors, Option 2 is selected from the option 1, 2, 3 of the "Tool to calculate the emission factor for an electricity system (version 07.0)".

**Option 2.** A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity. Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher level area shall be used as a delineation of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);

The generic CPA of the PoA is implemented in Republic of Korea which is comprise a solely one grid(i.e. KEPCO grid).

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

Option 1 is selected from two options to calculate the operating margin and build margin emission factor according to "Tool to calculate the emission factor for an electricity system"(Version 07.0),:

**Option I :** Only grid power plants are include in the calculation

**Option II :** Both grid power plants and off-grid power plants are included in the calculation

### STEP 3 >> Select a method to determine the operating margin (OM)

As described in "Tool to calculate the emission factor for an electricity system Version 07.0", the OM emission factor is calculated as the generation-weighted emissions per electricity unit of all generating units serving the system, excluding low-operating cost and must-run power plants. Low-operating cost and must run power plants include hydro, nuclear, low cost biomass, geothermal and domestic coal.

Operating Margin emission factor( $EF_{grid,OM,simple,y}$ ) shall be calculated basis on one of the four following methods

(a) Simple OM, (b) Simple adjusted OM, (c) Dispatch data analysis OM, (d) Average OM


Referring to the gross electricity generation rate by energy sources of the host country (Republic of Korea), the rate of low cost/must run power generation does not exceed 50% of the total grid. Actually, the most recent 5-year (2014~2018) average data shows that the rate of low cost/must run is 33.7%. (Source: KEPCO) The source of low-cost/must-run plants are hydro, nuclear, group, alternatives. therefore, for the case, "**Option (a) Simple OM**" is available.

< Table 4. Gross electricity generation in the Republic of Korea during past 5 years (GWh) >

Source \ Year	2018	2017	2016	2015	2014	LCMR
Hydro	7,270	6,995	6,633	5,796	7,820	O
Coal	241,817	238,238	213,740	204,230	203,446	
Heavy Oil	7,117	8,648	14,253	31,616	24,950	
LNG	152,867	123,232	120,852	100,783	114,654	
Nuclear	133,505	148,427	161,995	164,762	156,407	O
Alternative	28,071	27,928	22,967	20,904	14,695	O
Total	570,647	553,468	540,440	528,091	521,972	
Ratio	29.6%	33.1%	35.5%	36.3%	34.3%	

Source : Korea electric power Corporation, 2018

For the simple OM, *EX ante* option of the emissions factor is chosen from two data vintages:


 **Ex ante option:** If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation

#### STEP 4 >> Calculate the operating margin emission factor according to the selected method

(a) Simple OM option is chosen for the project as described in STEP 3 above.

The simple OM emission factor is calculated as the generation-weighted average CO<sub>2</sub> emissions per unit net electricity generation (tCO<sub>2</sub>/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

For calculation of the simple OM, Option A is chosen from two options;

 **Option A:** Based on the net electricity generation and a CO<sub>2</sub> emission factor of each power unit; or

**Option B:** Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Where Option A is used, the simple OM emission factor is calculated as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

- $EF_{grid,OMsimple,y}$  = Simple operating margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)  
 $EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)  
 $EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)  
 $m$  = All power units serving the grid in year  $y$  except low-cost/must-run power units  
 $y$  = The relevant year as per the data vintage chosen in Step 3

### Determination of $EF_{EL,m,y}$

For calculating  $EF_{EL,m,y}$ , Option A1 or Option A2 is chosen as follows;

Data requirements under respective options	Simple OM	BM
Power generation per plant Option A1 prescribed under the Simple OM	✓	✓
Fuel consumption per plant Option A1 prescribed under the Simple OM	✓	✓
Fuel type and technology Option A2 prescribed under the Simple OM	✓	✓
Hourly load of the grid	✓	
Date of commissioning of power plants/units		✓

☞ Option A1, If for a power unit  $m$  data on fuel consumption and electricity generation is available, the emission factor ( $EF_{EL,m,y}$ ) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

- $EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)  
 $FC_{i,m,y}$  = Amount of fossil fuel type  $i$  consumed by power unit  $m$  in year  $y$  (Mass or volume unit)  
 $NCV_{i,y}$  = Net calorific value (energy content) of fossil fuel type  $i$  in year  $y$  (GJ/mass or volume unit)  
 $EF_{CO2,i,y}$  = CO<sub>2</sub> emission factor of fossil fuel type  $i$  in year  $y$  (tCO<sub>2</sub>/GJ)  
 $EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)  
 $m$  = All power units serving the grid in year  $y$  except low-cost/must-run power units  
 $i$  = All fossil fuel types combusted in power unit  $m$  in year  $y$   
 $y$  = The relevant year as per the data vintage chosen in Step 3

☞ Option A2, If for a power unit  $m$  data on electricity generation and the fuel type used is available, the emission factor ( $EF_{EL,m,y}$ ) should be determined as follows:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}$$

Where:

- $EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)  
 $EF_{CO2,i,y}$  = Average CO<sub>2</sub> emission factor of fuel type  $i$  used in power unit  $m$  in year  $y$  (t CO<sub>2</sub>/GJ)  
 $\eta_{m,y}$  = Average net energy conversion efficiency of power unit  $m$  in year  $y$  (ratio)  
 $m$  = All power units serving the grid in year  $y$  except low-cost/must-run power units  
 $y$  = The relevant year as per the data vintage chosen in Step 3  
3.6 = Conversion factor (GJ/MWh)

The applied values of  $EF_{CO2,i,y}$  are based on using conversion factor suggested in the 2006 IPCC Guidelines. And those of  $NCV_{i,y}$  and  $EF_{CO2,i,y}$  are country-specific. Actually, the calorific values are indicated as country-specific data of gross calorific value (GCV), and this was recalculated for this PDD as net calorific value (NCV) using conversion factor suggested in the 2006 Revised IPCC Guidelines. The detailed information used in the calculation is presented in emission factor sheet.


### **Determination of $EG_{m,y}$**

For grid power plants,  $EG_{m,y}$  should be determined as per the provisions in the monitoring tables and off-grid power plants are not considered in determination of  $EG_{m,y}$ .

As a result, the OM emission factor ( $EF_{grid,OM,simple,y}$ ) is 0.7079 (tCO<sub>2</sub>/MWh).

### **STEP 5 >> Calculate the build margin (BM) emission factor;**

For calculating BM emission factor, **Option 1** is chosen from two options of to “Tool to calculate the emission factor for an electricity system (Version 07.0.0)”

 **Option 1).** For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group  $m$  at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

The sample group of power units  $m$  used to calculate the build margin should be determined as per the following procedure as described in the methodology, consistent with the data vintage selected in the steps above:

- (a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ( $SET_{5-units}$ ) and determine their annual electricity generation ( $AEG_{SET-5-units}$ , in MWh);
- (b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities ( $AEG_{total}$ , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 percent of  $AEG_{total}$  (if 20 percent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation)

( $SET_{\geq 20\%}$ ) and determine their annual electricity generation ( $AEG_{SET \geq \text{percent}}$ , in MWh);

- (c) From  $SET_{5\text{-units}}$  and  $SET_{\geq 20 \text{ percent}}$  select the set of power units that comprises the larger annual electricity generation ( $SET_{\text{sample}}$ ); Identify the date when the power units in  $SET_{\text{sample}}$  started to supply electricity to the grid.

If none of the power units in  $SET_{\text{sample}}$  started to supply electricity to the grid more than 10 years ago, then use  $SET_{\text{sample}}$  to calculate the build margin. Ignore steps (d), (e) and (f).

Following the guidance above, the sample group of power units  $m$  is established to calculate the build margin.

The build margin emissions factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units  $m$  during the most recent year  $y$  for which power generation data is available, calculated as follows:

$$EF_{\text{grid,BM},y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where;

$EF_{\text{grid,BM},y}$  = Build margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

$EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)

$m$  = Power units included in the build margin

$y$  = Most recent historical year for which power generation data is available

$EF_{\text{BM},y}$  is 0.5537 (tCO<sub>2</sub>/MWh).

## STEP 6 >> Calculate the combined margin (CM) emission factor

The calculation of the combined margin (CM) emission factor ( $EF_{\text{grid,CM},y}$ ) is based on one of the following methods:

- ☞ (a) Weighted average CM; or
- (b) Simplified CM.

The weighted average CM method (option A) is used for this project .

### (a) Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} \times W_{OM} + EF_{\text{grid,BM},y} \times W_{BM}$$

Where;

$EF_{\text{grid,BM},y}$  = Build margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

$EF_{\text{grid,OM},y}$  = Operating margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

$W_{OM}$  = Weighting of operating margin emissions factor (percent)

$W_{BM}$  = Weighting of build margin emissions factor (percent)

Photovoltaic system:

According to “Tool to calculate the emission factor for an electricity system”, all other project activities are  $w_{OM}=0.75$  and  $w_{BM}=0.25$  for the first crediting period and for subsequent crediting periods. And  $EF_{grid,OM,y}$ ,  $EF_{grid,BM,y}$  are calculated as described in Steps 1 and 2 above and are expressed in tCO<sub>2</sub>/MWh.

Therefore baseline emission factor ( $EF_{grid,CM,y}$ ) for this project is = 0.6693(tCO<sub>2</sub>/MWh) as follows:

#### The first and second crediting period for CPAs of the PoA>>

$$\begin{aligned}
 EF_{grid,CM,y} &= w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y} \\
 &= 0.75 \cdot 0.7079 \text{ (tCO}_2\text{/MWh)} + 0.25 \cdot 0.5537 \text{ (tCO}_2\text{/MWh)} \\
 &= \mathbf{0.6693} \text{ (tCO}_2\text{/MWh)}
 \end{aligned}$$

Based on the value obtained for the operating margin(0.7079 tCO<sub>2</sub>/MWh) and build margin (0.5537 tCO<sub>2</sub>/MWh) emissions factors, a combined margin emissions factor of 0.6693 tCO<sub>2</sub>/MWh will be used in 2<sup>nd</sup> crediting period for this PoA.

#### I.6.2. Data and parameters fixed ex ante

Data/Parameter	EF <sub>grid, CM,y</sub>
Data unit	tCO <sub>2</sub> / MWh
Description	Combined margin CO <sub>2</sub> emission factor for the project electricity system in year y
Source of data	Calculated
Value(s) applied	0.6693
Choice of data or Measurement methods and procedures	This value is calculated according to “Tool to calculate the emission factor for an electricity system (version 07.0.0).” Applied value was calculated by referring Statistics of Electric Power in KOREA (2016, 2017, 2018) (KEPCO) and Status of Generation facility (2018) (Korea Power Exchange).
Purpose of data	Calculation of baseline emissions
Additional comment	This value is ex-ante value which is calculated at the time of PDD submission and will be applied during the crediting period without update.



**I.6.3. Modalities for ex ante calculation of emission reductions**

&gt;&gt;

Emission reduction for the CPA is calculated as below:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

- $ER_y$  = Emission reductions in year y (tCO<sub>2</sub>e/y)  
 $BE_y$  = Baseline Emissions in year y (tCO<sub>2</sub>e/y)  
 $PE_y$  = Project emissions in year y (tCO<sub>2</sub>e/y)  
 $LE_y$  = Leakage emissions in year y (tCO<sub>2</sub>e/y)

**a) Baseline Emissions**

According to AMS-I.F methodology, baseline emission of this system displacing KEPCO grid electricity is calculated as below:

$$BE_y = EG_{BL,y} * EF_{CO_2,y}$$

Where:

- $BE_y$  = Baseline Emissions in year y (tCO<sub>2</sub>)  
 $EG_{BL,y}$  = Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)  
 $EF_{CO_2,y}$  = Emission factor (tCO<sub>2</sub>/MWh)  
 Emission factor of a grid shall be calculated as per the procedures provided in AMS-I.D

In ex-ante calculation of emission reductions,  $EG_{BL,y}$  is estimated as follows :

$$\begin{aligned}
 EG_{BL,y} &= \text{XXXX} \text{ kW} \times 24 \text{ hours/day} \times 365 \text{ days/yr} \times 15.3 \%^{11} / 1000 \\
 &= \text{XXXX} \text{ MWh/yr}
 \end{aligned}$$

$$\begin{aligned}
 BE_y &= \text{XXXX} \text{ MWh/yr} * 0.6693 \text{ tCO}_2/\text{MWh} \\
 &= \text{XXXX} \text{ tCO}_2/\text{yr}
 \end{aligned}$$

**b) Project Activity Emissions**

Project emissions of a photovoltaic project activities are zero as the applied methodology.

**c) Leakage**

As a photovoltaic project activities in programme of activities, leakage is not to be considered.

Thus,

$$\begin{aligned}
 ER_y &= BE_y - PE_y - LE_y \\
 ER_y &= BE_y - 0 - 0
 \end{aligned}$$

---

<sup>11</sup> The utilization coefficient is based on a press release written by Ministry of Trade, Industry and Energy. The report specifies the average coefficient for utilization of photovoltaic power plants in 2018.



Therefore,  $ER_y$  is XXXX tCO<sub>2</sub>/yr.

## I.7. Monitoring plan

### I.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{BL,y}$
Data unit	MWh
Description	Quantity of net electricity displaced in year y
Source of data	Calculated
Value(s) applied	XXXX
Measurement methods and procedures	<p>Measuring methods : measuring electricity meter</p> <p>As for the auxiliary electricity consumption (of connector bands and inverters), the auxiliary electricity consumption is calculated as follows:</p> <p>The auxiliary electricity consumption = Standby power (of connector bands or inverters) * Numbers * 24 Hours). The auxiliary electricity consumption will be calculated during the monitoring period and the operating hours are considered as 24 hours in conservative approach.</p>
Monitoring frequency	Continuous monitoring, Monthly recording
QA/QC procedures	<p>Calibration frequency and accuracy of measurement equipment :</p> <ul style="list-style-type: none"> <li>- Compliance with local regulation(Measuring Act etc) or specification from Manufacturer.</li> </ul> <p>To ensure the quantity of generated electricity from CDM project, the data shall be cross-checked in accordance with the operations manual.</p>
Purpose of data	Calculation of baseline emissions
Additional comment	Data will be at least recorded monthly and aggregated yearly and will be kept at least for two years after the end of the last crediting period.

### I.7.2. Sampling plan

>>

The CPA has not involved with procedure of sampling plan.

### I.7.3. Other elements of monitoring plan

>>

Monitoring process will be carried out in CPA level. Monitoring data for each CPA will be monitored by the implementing entity of the CPA as the procedures and monitoring framework under the PoA and will be submitted to the managing entity.

The main monitoring data is electricity supplied to households displacing electricity supplied from KEPCO grid. To check the quantity of electricity, the electricity meter will be installed and ensure QA/QC as relevant local regulation.

The monitoring plan has been developed based on the applied methodology AMS- I.F. and more details are as follows:

- Monitoring equipment : Electricity meter

- Relevant laws and standards of Korea : Measures Act or relevant regulations etc

### < Data Recording & Archiving>

The generated electricity is continuously measured, stored and accumulated through electricity meter of PV power plants. All data collected will be kept at least for two years after the end of the last crediting period.

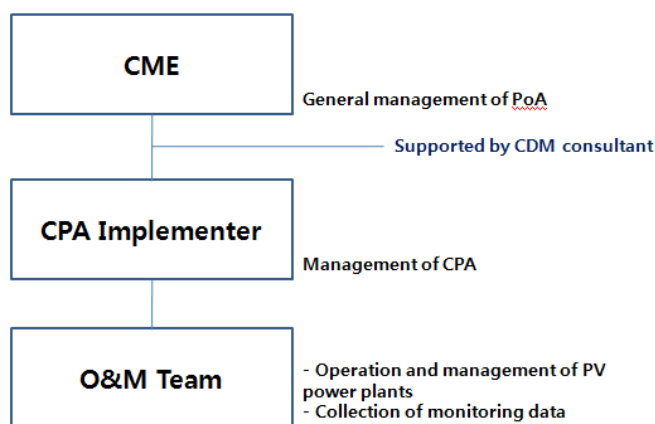
The net electricity generation is the difference between the total quantity of electricity generated by this project and the auxiliary electricity consumption.

The auxiliary electricity consumption will be conservatively calculated using recording annually the number of systems operating and estimating the annual hours of systems operating

Equation: The auxiliary electricity consumption = Standby power<sup>12</sup> \* Numbers \* Hours

### < Quality Assurance and Quality Control>

- Contingency plan :  
In case of electricity meter trouble or data error, the person in charge of monitoring is responsible for prompt grasping the problem and restoring it in due course.
- Calibration :  
Electricity meter should be recalibrated or replaced at appropriate intervals as local regulation.
- Monitoring organization and responsibility :



< Figure 8. Monitoring organization >

Person in charge of O&M team in CPA implementer will operate and manage PV power plants and collect monitoring data. All collected data will be reported to CME as electronically or manually manner.

### < Training>

CME will train its staff that will operate and maintain photovoltaic power plants. The training

<sup>12</sup> Standby power is the electric power consumed by electronic appliances while they are switched off or in a standby mode and is based on the letter (or evidence) from manufacturers.

includes contingency plan, calibration, monitoring process, etc. The person in charge of monitoring will be trained according to CDM Operation Manual.

## SECTION J. Crediting period type and duration

>>

Type of crediting period for generic CPA : Renewable or fixed

The length of crediting period : 27/12/2019 ~ 26/12/2026

## SECTION K. Eligibility criteria for inclusion of CPAs

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In case of AMS.I-F methodology, the eligibility criteria for inclusion of a CPA in the PoA are provided in two types, small scale and micro-scale as below:

### 1) Criteria for Small scale CPA

No .	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Geographical boundary	The CPA is performed within the Republic of Korea.	GPS information and address, etc.
2	Target groups CPA and remains within SSC thresholds	The CPA applies photovoltaic power plants to housing, buildings and the installed capacity is less than or equal to 15MW.	Schematic diagram, plant design, project plan document, etc
3	Double counting and confirmation that CPAs are not included in other PoAs or de-registered CDM project activities	The CPA is not involved in another renewable energy project that is registered or under validation as a CDM project activity or as a CPA under another PoA, in accordance with the signed certificate by CPA implementer.	Relevant section in a CPA-DD.
4	Specifications of technology/ measure	The solar modules and inverters applied to CPA obtain certification from Korea.	Certificate from facility certification institution.
5	Start date of the CPA	The CPA has the documentary evidence to check its start date and does not commence prior to the start date of validation for PoA (01/09/2011)	Agreement or contract for its start date
6	Conditions that ensure applicability of the applied methodologies	The CPA meets the applicability of AMS-I.F.	Relevant sections in a CPA-DD
7	Additionality demonstration	The CPA meets the requirements pertaining to demonstration of additionality	Relevant sections in a CPA-DD
8	Requirements for Local stakeholder consultation	The CPA performs local stakeholder consultation before the inclusion of CPA.	Documents related to local stakeholder consultation
9	Requirements for environmental impact analysis	The CPA considers the environmental impacts analysis according to the regulation of the Republic of Korea.	Environmental impacts section in a CPA-DD
10	Diversion of official development assistance	The CPA has the documentary evidence to check project costs and does not result in a diversion of official development assistance from Annex I.	Investment plan, Official notice, Similar evidence including the sources of funds, etc
11	Debundling check	The CPA is not a de-bundled component of a large scale activity through the de-bundling check.	Check of address or GPS cords and CDM project activities under validation or registered

12	Others	The CPA makes the agreement with CME to involve the CPA in PoA and obtain CERs rights. In case that CPA implementer is same with CME, the agreement is not necessary.	Agreement or Contract between CME and CPA implementer.
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## 2) Criteria for microscale CPA

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Geographical boundary	The CPA is performed within the Republic of Korea.	GPS information and address, etc.
2	Target groups CPA and remains within SSC thresholds	The CPA applies photovoltaic power plants to housing, buildings and the installed capacity is less than or equal to 5MW.	Schematic diagram, plant design, project plan document, etc
3	Double counting and confirmation that CPAs are not included in other PoAs or de-registered CDM project activities	The CPA is not involved in another renewable energy project that is registered or under validation as a CDM project activity or as a CPA under another PoA, in accordance with the signed certificate by CPA implementer.	Relevant section in a CPA-DD.
4	Specifications of technology/ measure	The solar modules and inverters applied to CPA obtain certification from Korea.	Certificate from facility certification institution.
5	Start date of the CPA	The CPA has the documentary evidence to check its start date and does not commence prior to the start date of validation for PoA (01/09/2011)	Agreement or contract for its start date
6	Conditions that ensure applicability of the applied methodologies	The CPA meets the applicability of AMS-I.F.	Relevant sections in a CPA-DD
7	Additionality demonstration	The CPA meets the requirements pertaining to demonstration of additionality	Relevant sections in a CPA-DD
8	Requirements for Local stakeholder consultation	The CPA performs local stakeholder consultation before the inclusion of CPA.	Documents related to local stakeholder consultation
9	Requirements for environmental impact analysis	The CPA considers the environmental impacts analysis according to the regulation of the Republic of Korea.	Environmental impacts section in a CPA-DD
10	Diversion of official development assistance	The CPA has the documentary evidence to check project costs and does not result in a diversion of official development assistance from Annex I.	Investment plan, Official notice, Similar evidence including the sources of funds, etc
11	Debundling check	The CPA is not a de-bundled component of a large scale activity through the de-bundling check.	Check of address or GPS cords and CDM project activities under validation or registered
12	Others	The CPA makes the agreement with CME to involve the CPA in PoA and obtain CERs rights. In case that CPA implementer is same with CME, the agreement is not necessary.	Agreement or Contract between CME and CPA implementer.

## Appendix 1. Contact information of coordinating/managing entity and project participants

<b>Coordinating/managing entity and/or project participants</b>	<input checked="" type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Project participant
<b>Organization name</b>	LH Corporation
<b>Country</b>	Republic of Korea
<b>Address</b>	19, Chungui-ro, Jinju-si, Gyeongsangnam-do
<b>Telephone</b>	+82-55-922-3696
<b>Fax</b>	-
<b>E-mail</b>	birdrd77@lh.or.kr
<b>Website</b>	www.lh.or.kr
<b>Contact person</b>	Jonghyun Cho

## Appendix 2. Affirmation regarding public funding

There is no public funding from Annex I for this project.

## Appendix 3. Applicability of methodologies and standardized baselines

Refer to a relevant section of the PoA-DD.

## Appendix 4. Further background information on ex ante calculation of emission reductions

Detail information for data used to determination of grid emission factor is in a grid emission factor sheet of the PoA.

## Appendix 5. Further background information on monitoring plan

Refer to relevant section of the PoA-DD.

## Appendix 6. Summary report of comments received from local stakeholders

N/A

## Appendix 7. Summary of post-registration changes

### During the first PoA period >>

Description of the monitoring plan on the prior Project Design Document had some errors and was not sufficient for monitoring plan and monitoring equipment.

Monitoring devices are changed from measuring devices in inverter to electricity meters installed separately and monitoring plan is complemented.

Minor change is below;

- Changes in the completion date of application of methodology and the name of body which certified renewable energy equipment from KEMCO to KEA

### Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN);</li> <li>• Make editorial improvements.</li> </ul>

<i>Version</i>	<i>Date</i>	<i>Description</i>
08.1	28 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Remove a duplicated instruction;</li> <li>• Make editorial improvement.</li> </ul>
08.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Improve consistency with the “CDM project standard for programmes of activities” and with the PDD and CPA-DD forms;</li> <li>• Make editorial improvement.</li> </ul>
07.0	25 May 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN) (version 01.0);</li> <li>• Incorporate the “Programme design document form for small-scale CDM programmes of activities” (CDM-SSC-PoA-DD-FORM);</li> <li>• Make editorial improvement.</li> </ul>
06.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: <ul style="list-style-type: none"> <li>• Include provisions related to choice of start date of PoA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Add exception for generic CPA where technology is under positive lists;</li> <li>• Make editorial improvement.</li> </ul>
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1;</li> <li>• Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6;</li> <li>• Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM;</li> <li>• Make editorial improvement.</li> </ul>
03.0	3 December 2012	EB 70 Revision to reflect changes to the <i>Guideline: Completing the programme design document form for CDM programmes of activities</i> (EB 70, Annex 6).

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.
Decision Class: Regulatory		
Document Type: Form		
Business Function: Registration		
Keywords: programme of activities, project design document		