PROGRAMME DESIGN DOCUMENT FORM FOR
SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-PoA-DD)
Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA
A.1. Title of the PoA

(a) The title of the proposed PoA
The programme to introduce renewable energy system into Seoul

(b) The current version number of the PoA-DD : Version number: 06

(c) The completion date of the PoA-DD : 11/12/2012

A.2. Purpose and general description of the PoA

(a) Policy/measure or stated goal of the PoA
To confront the energy crisis and climate change of Seoul, Seoul[1] Metropolitan Government(hereafter SMG) has planned policy to reduce the consumption of energy based on fossil fuel and diffuse renewable energy, which is known as 'Seoul renewable energy master plan 2030'. The PoA to promote the achievement of master plan contains following goals.

- Reduce 40 % of GHG emissions by 2030 compared with 1990
- Reduce 20 % of energy consumption by 2030 compared with 2000
- Increase rate of renewable energy production in energy consumption to 20% by 2030

SMG has established the detailed goal introducing photovoltaic power plants of 70MW to facilities and 1,400MW to buildings of Seoul. The diffusion of photovoltaic power plants was not activated due to its high construction costs. Therefore, SMG develops the PoA as a means to overcome investment barriers and accelerate the diffusion of photovoltaic power plant throughout Seoul.

In addition, the purpose of this PoA are as follows;

- To diffuse renewable energy, secure energy independence and also reduce GHG emissions displacing the electricity supplied from KEPCO(Korea Electric Power Corporation, hereafter KEPCO) grid in Seoul
- To move towards low-carbon green growth city through the achievement of goals
- To contribute to activate domestic photovoltaic industry by diffusion of photovoltaic power plant

Contribution to sustainable development

□ Social aspect

[1] Seoul, officially the Seoul Special City, is the capital and largest metropolis of Republic of Korea.

- This PoA will contribute to revitalization of renewable energy system industry through politically targeted photovoltaic power plant consumption led by SMG, district offices, public institutions.
- This PoA boosts energy independence of Seoul through the expanded supply of photovoltaic power plant.
- This PoA leads creation of new kinds of jobs regarding with expanding investment and management of renewable energy distribution.

□ Environmental aspect
- Generated energy from photovoltaic power plant is utilized within project site, and reduction of electricity supplied from grid brings reduction in fossil fuel use. Fundamentally it will reduce greenhouse gas emissions
- Photovoltaic energy is natural renewable energy source and usable continuously without any environmental problem.

□ Economic aspect
- Each building and facility which installed renewable energy system for captive use can save energy cost required for operation

(b) Framework for the implementation of the proposed PoA

This PoA is the programme introducing photovoltaic power plants into buildings or facilities of Seoul. The electricity generated by photovoltaic power plants displaces the electricity supplied from KEPCO grid, which contributes to reduction of GHG emissions. The electricity is for captive use in buildings or facilities, not exported to grid. This PoA installs new photovoltaic power plants at a site where there was no renewable energy power plant operating prior to the implementation of this PoA (Greenfield plant). And the total installed capacity of the photovoltaic power plants is up to 15MW.

SMG as a CME is responsible for promotion and operation of PoA. Also, SMG manages the CDM registration, CPA inclusion, monitoring, and other CDM-related issues. The district offices and public institutions in Seoul as a CPA implementer that satisfy the eligibility criteria of section B.2 introduce and manage the photovoltaic power plants in buildings or facilities of Seoul. And SMG may be a CPA implementer, too. The respective responsibility and authority for PoA operation is described in section C and the structure is given below.

<u>PoA operation structure</u>

This PoA are operated with the structure as follow;

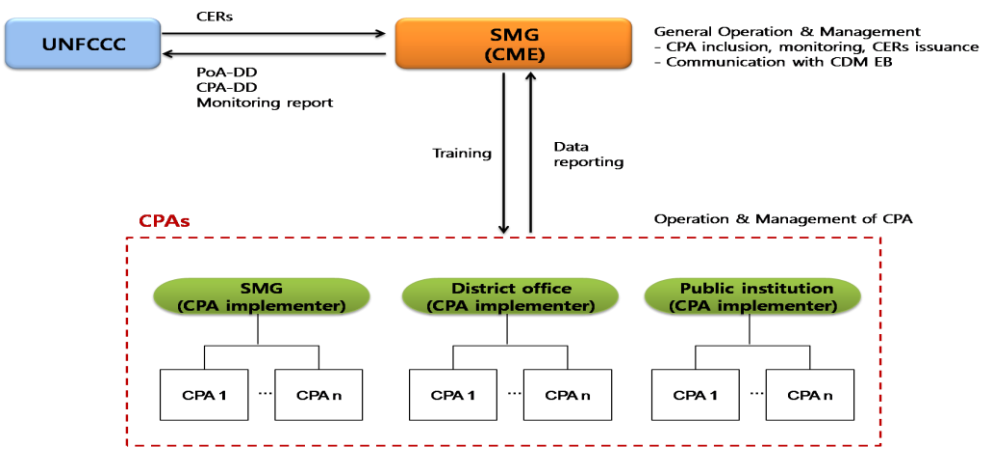


Figure 1. Operational structure of PoA

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

This PoA is a scheme developed by SMG to introduce photovoltaic power plants in buildings or facilities of Seoul. In Korea, there is a regulation to introduce renewable energy in public buildings. It is based on "Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy" [2]. Though, there is an article to introduce renewable energy systems to public sector in this act, the regulation doesn't compel to introduce only photovoltaic power plants in public sector .

According to the above description, there are no mandatory regulations that enforces introduction of photovoltaic power plants in Seoul. Therefore, this PoA is a voluntary action by SMG.

A.3. CMEs and participants of PoA

(a) Coordinating or managing entity of the PoA as the entity which communicates with the Board

Seoul Metropolitan Government(SMG)

(b) Project participants being registered in relation to the PoA. (Project participants may or may not be involved in one of the CPAs related to the PoA.)

No any other participants

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Korea	Seoul Metropolitan Government (Public entity)	no

A.5. Physical/ Geographical boundary of the PoA

All CPAs associated with this PoA will be implemented within the geographical boundary of Seoul in Republic of Korea. Seoul is located to the west of the central region of the Korean Peninsula[4]. The picture given below illustrates the location of Seoul.

[2] It is based on article 12 of Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy, Government of Republic of Korea. Enforcement date : 12/04/2010

[4] http://english.seoul.go.kr/gtk/about/history.php

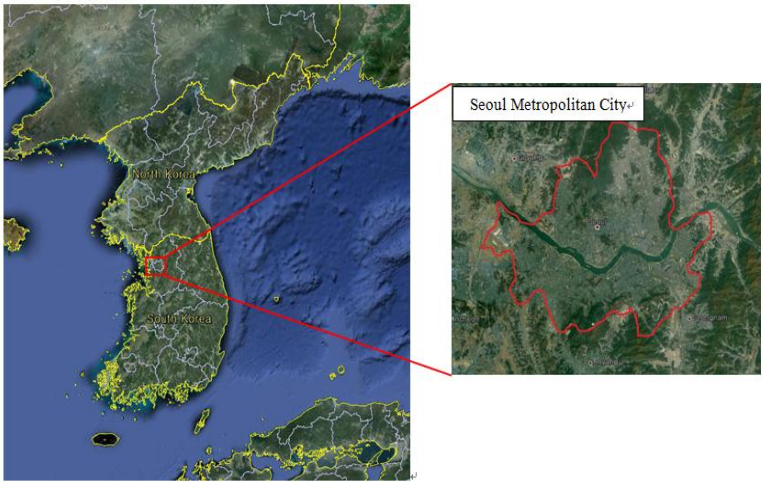


Figure 2. Geographic boundary of PoA

A.6. Technologies/measures

General description for introducing technologies

Each CPA comprises the photovoltaic power plant that supplies electricity to buildings or facilities. And the capacity of the photovoltaic power plant may be equal to or less than 15MW. The electricity generated by the photovoltaic power plant will be for captive use and displace the electricity supplied from KEPCO grid. This system will contribute to reducing the electricity supplied from KEPCO grid in buildings or facilities , which will reduce greenhouse gas emissions.

Table. 1 The introduced technologies and methodologies

Technology	Type	Methodology
Photovoltaic	- Captive use of generated electricity	AMS-I.F.

All installed photovoltaic power plants will comply with KS(Korea Standard), guideline related to photovoltaic and Korean law and regulation. The solar module shall obtain certificate of new and renewable energy facility from KEMCO[5]. The certificate is to ensure the performance and reliability of a renewable energy facility in Republic of Korea.

Components of photovoltaic power plants

Photovoltaic power plant is comprised of components as below:

- Solar module (Photovoltaic generator): generate electricity from solar energy
- Connector band: aggregate electricity
- Inverter: invert generated DC electricity to AC electricity for use

[5] The certificate is based on "Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy(Article 13-Certificate, etc. of New and Renewable Energy Facilities)". KEMCO(Korea Energy Management Corporation) certificates renewable energy facilities to guarantee the performance of the equipment.

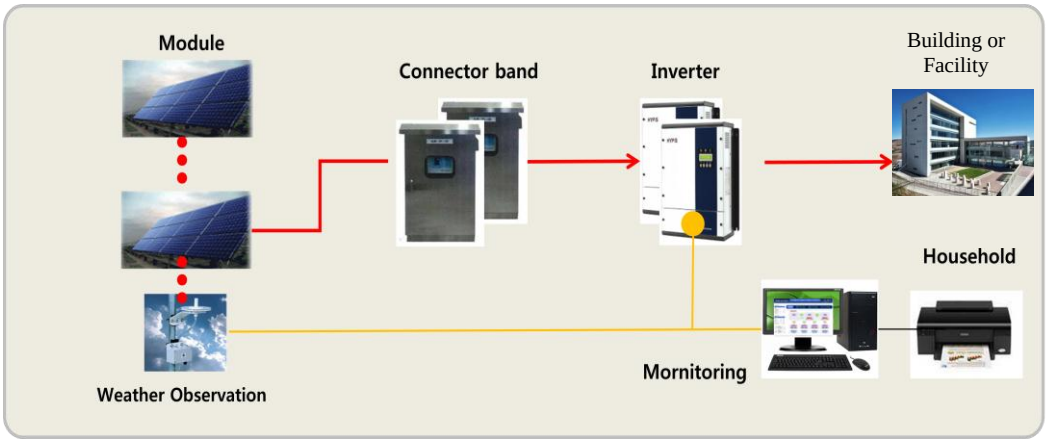


Figure 3. Photovoltaic system(Captive use type)

DC electricity energy will be generated by the solar cell module in the sunshine, and the DC electricity generated directly from the solar cell module will be converted into AC electricity by the inverter. In the end, the AC electricity will be used by end user.

The photovoltaic power plant applied to all CPAs should satisfy above described conditions for captive use. More details information applied to the CPA will be provided in the each CPA-DD.

A.7. Public funding of PoA

There is no public funding from Annex I country available for the PoA.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

As the PoA consists of one or more small-scale projects as CPAs, the additionality is demonstrated at the CPA level using eligibility criteria derived by "Guidelines on the demonstration of additionality of small-scale project activities (EB 68, Annex 27, Version 09.0).

B.2. Eligibility criteria for inclusion of a CPA in the PoA

For CPA inclusion, it should satisfy all conditions below, which is identified through the relevant evidences.

Table. 2 Eligibility criteria for CPA inclusion

No.	Eligibility criteria
1	The CPA is performed within geographical boundary of Seoul in Republic of Korea.
2	The CPA is not involved in another project that is registered or under validation as a CDM project activity or as a CPA under another PoA or as other GHG reduction projects
3	The power plant of CPA comply with Korean Standards (KS), guideline related to photovoltaic and Korean law and regulation. In the case of PV module, CPA implementer shall provide Certificate of new and renewable energy facility from KEMCO.
4	The CPA start date is after PoA posting date, 26/03/2011.
5	The CPA meets the applicability criteria of AMS-I.F. as described in PoA-DD part II section B.2

6	Additionality check in each CPA-DD is performed as per the additionality related guidelines.
7	The CPA implementer performs local stakeholder consultation before the start date of CPA.
8	If required by Republic of Korea, CPA implementer shall carry out an analysis of the environmental impacts of the proposed small scale CPA. and provide a summary of the analysis and reference to all related documentation.
9	The CPA has the documentary evidence to check project costs and does not result in a diversion of official development assistance from Annex I country.
10	Target group of the proposed PoA is off-grid photovoltaic electricity generation technologies.
11	The total power plant capacity of CPA meets small-scale criteria (=<15 MW)
12	The CPA is a single project which is not a debundled component of another large-scale CDM or PoA as per the latest guidance given in CDM EB.
13	CME (SMG) makes an agreement with CPA implementer involve the CPA into PoA to ensure that CPA implementer is aware of and agreed to subscribe the CPA into PoA. The agreement between CME and CPA implementer include the debundling check, double counting, no funding from Annex I and monitoring issues. In case that CPA implementer is same with CME, the agreement is not required.

Provisions for updating eligibility criteria

It is based on "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities, version 02.1(EB 70, Annex 5)". CME will follow the process below.

i) In case the version of AMS-I.F methodology applied by PoA is revised or replaced,

Whenever the EB meeting report is issued, CME will check whether the version of AMS-I.F methodology is revised or replaced or not. If the version of the methodology is revised or replaced, CME will follow the process below.

- If the version of the AMA-I.F methodology is revised or replaced, subsequent to being placed on hold, the CME shall update the eligibility criteria to the requirements of the revised or new methodologies with immediate effect. A new version of the PoA DD (e.g. version 1.1) containing updated eligibility criteria validated[6] by a DOE shall be submitted to the Board for approval.

  (a) Once changes have been approved by the Board, the inclusion of all new CPAs shall be based on the updated eligibility criteria applying the new generic CDM-CPA-DD;

  (b) CPAs that were included before the methodology was put on hold shall apply the revised version containing updated eligibility criteria only at the time of the renewal of the crediting period.

- CME will not take the action if the version of methodologies applied by the PoA is revised without being placed on hold or is withdrawn for the purpose of inclusion in a consolidated methodologies, unless otherwise indicated in the respective report of the meeting of the Board that has approved the new methodologies.

ii) In case of the renewal of the crediting period of a PoA,

[6] In this case, the stakeholder consultation is not required.

CME shall update the eligibility criteria as per the latest revised AMS-I.F methodology. A new version of the PoA-DD containing updated eligibility criteria validated by a DOE shall be submitted to the secretariat for approval by the Board in accordance with the renewal of PoA process as defined in the "Clean development mechanism project cycle procedure, version 03.1(EB 70, Annex 4)" and CME will follow the process below.

(a) Once changes have been approved by the Board, the inclusion of all new CPAs shall be based on the revised eligibility criteria;
(b) The subsequent CPAs requesting the renewal of the crediting period shall apply the revised version of the generic CDM-CPA-DD.

B.3. Application of methodologies

The proposed PoA introduces photovoltaic power plants to displace the electricity supplied from KEPCO grid. This PoA applies the methodology which is *AMS I.F – Renewable electricity generation for captive use and mini-grid (version 2)* and details are shown as below.

- Type: I - renewable energy project
- Category: I.F – Renewable electricity generation for captive use and mini-grid (version 2)
- Eligibility
  - Renewable energy generation project activity
  - Off-grid type
  - Up to 15MW capacity

SECTION C. Management system

CME is in charge of general management and operation of the PoA. CPA implementer assists CME to manage the CPA by operating the photovoltaic power plant, collecting the data and information related to the CPA, and then regularly reporting to the CME

The detailed responsibility/ authority of CME and CPA implementer of the proposed PoA are as described below:

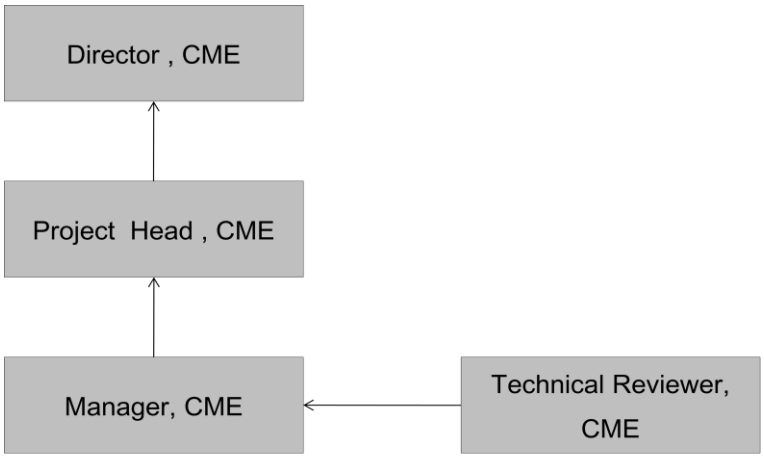
Responsibility/ Authority	
CME(SMG)	**CPA implementer**
1. CDM Registration and verification, communication with DOE, UNFCCC Secretariat and CDM EB 2. Providing CPA implementers with guidance for proper CDM monitoring activity and other CDM-related process 3. General management of monitored parameters of all CPAs 4. Technical review of inclusion of CPAs 5. Inclusion of new CPAs 6. Ensure monitoring plan and establish the monitoring system 7. Verification and recording of monitoring data 8. Make the monitoring report	1. Construction and operation of photovoltaic power plant 2. Direct CDM monitoring activity including data recording 3. Installation and management of the meter including QA/QC activities 4. Report monitoring activity records to CME

9. CERs allocation with CPA implementer according to agreements	

Especially, CME will implement the following management system to properly manage and control this proposed PoA.

(a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;

The personnel involved in the process of inclusion of CPAs are as follow:



The CME's personnel will carry out the following roles and responsibilities.

Personnel	Roles/Responsibilities
Manager	- Receives and collects documents and data from CPA implementer - Prepares eligibility criteria checklist for CPA inclusion - Checks whether all eligibility criteria are satisfied through desk review and on-site visit - Forwards the check results of eligibility criteria to project head and technical reviewer for CPA inclusion - Develops the CPA-DD - Forwards the CPA inclusion the DOE for validation
Technical Reviewer	- Cross-checks whether the means and evidences for all eligibility criteria are complete and relevant through desk review(If necessary, on-site visit) - Comments on the check results of eligibility criteria
Project Head	- Identifies the check results of eligibility criteria and forwards it to director
Director	- Reaches the final decision on CPA inclusion

The detailed information related to personnel's roles and responsibilities is based on Chapter 3. Roles, Responsibility and Competence of "CDM Operation Manual".

(b) Records of arrangements for training and capacity development for personnel;

In order to maintain and upgrade the capability and skill of the CME and CPA implementer's personnel, training will be performed according to Chapter 6. Training of "CDM Operation Manual" which includes the

necessary competence for personnel performing PoA operation and management, record-keeping of education, training plan, skills and experience, etc.

Training plan contains training date, place, trainee, trainer and theme and training content includes information in the latest EB guidelines on PoA operation, CPA inclusion, monitoring, verification and issuance. The training would be implemented periodically by CME who manages whole training process and records training results in the training management book. Also, when CME determine extra training is needed, CME can plan and implement training.

The detailed information is based on Chapter 6. Training of "CDM Operation Manual".

(c) Procedures for technical review of inclusion of CPAs;

The technical reviewer designated by CME will conduct technical review. The technical reviewer will cross-check the completeness and relevance of means for the eligibility criteria check which had conducted by CME's manager.

In addition, the technical reviewer will receive the evidence from the manager, check whether the evidence is proper and meets the condition for CPA inclusion, and then make related comments. The technical reviewer will deliver the review results such as the check results and comments to the manager. CME's director will finally confirm CPA inclusion based on technical review results. In case there is any defect on conducting the procedures above, CME could require CPA implementer to supplement the documentary evidence.

The detailed procedures are based on Chapter 4. CPA inclusion and management of "CDM Operation Manual" including technical review member, subject documents, follow-up action by CPA inclusion team.

(d) A procedure to avoid double counting;

Double counting occurs when CPA is registered or under validation as another CDM project activity, a CPA under another PoA or other GHG reduction projects. For preventing this situation, CME should verify that CPA is not a case of double counting project utilizing CPA ID including name, address and capacity, etc and written agreement(between CME and CPA implementer) which includes that it is not registered to any other greenhouse gas reduction mechanism.

The detailed procedures are based on Chapter 4. CPA inclusion and management of "CDM Operation Manual" and Annex 2 of " CDM Operation Manual".

(e) Records and documentation control process for each CPA under the PoA;

CME will provide detailed monitoring procedure to each CPA implementer and CPA implementers will comply with the procedure for their monitoring work. In order to unambiguously identify each CPA in this PoA, CME will grant CPA implementers with ID number according to the following ID numbering system.

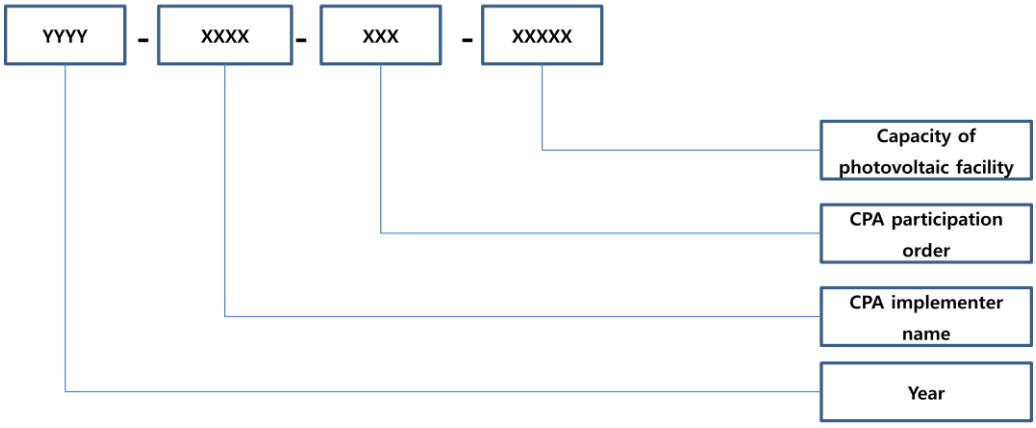


Figure 4. ID forms of CPA Implementer

This ID numbering system will be used to record baseline and monitoring data on a continuous basis with the template of excel database.

Each CPA will follow the monitoring requirements stipulated in AMS-I.F And CME will record and document CPA detail information as follows;

- Name, address, details of CPA implementer
- Capacity of photovoltaic power plant
- Geographical coordinates of CPA(GPS information)
- The record of technical specification of each photovoltaic power plant participating in the CPA

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.

In addition, the CME has established a profound system in order to maintain robustness of record keeping. The flow of data under the PoA will occur at three steps as follows:

STEP Ⅲ	CME
	↑
STEP Ⅱ	Management department(CPA implementer)
	↑
STEP Ⅰ	O & M department(CPA implementer)

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

<u>O & M department(Step I) :</u> The record keeping at the project site will be executed by using field instruments, software installed and/or manual data recording in logbook. Since the CPA under the PoA implements off grid photovoltaic power plant systems, the quantity of net electricity displaced by the project shall be monitored at each site. Appropriate records supplied from each of the project sites will be kept for future

verifications. In addition, details and calibration records of meter used for measurement of data will be kept for verification.

Management department(Step II) : The captured data at the project sites will be transferred to the database of the each CPA. At this step the data monitored at the project sites of the CPA will be compiled.

CME(Step III) : Further the data is transferred from each CPA step to CME, which will archive it and make available to DOE for verification. Other records(meter details and implementing records) as relevant will be compiled by CME for the entire PoA at any given time.

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 indentified 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. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

The description above is based on Chapter 9. Document and Data Control and Chapter 4. CPA inclusion and management of "CDM operation manual".

(f) Measures for continuous improvements of the PoA management system;
The PoA management system will be continually improved through audit results(internal and external), periodic management review, updating eligibility criteria, etc.

The detailed procedures are based on Chapter 11. Continuous Improvement of the PoA Management System of "CDM Operation Manual".

SECTION D. Duration of PoA
D.1. Start date of PoA
26/03/2011
The start date of PoA is based on the date of publication of the PoA-DD for global stakeholder consultation, according to the paragraph 159 of Clean development mechanism project standard, version 02.1(EB 70, Annex 02)

D.2. Length of the PoA
As per the standard for “Clean development mechanism project standard, version 02.1(EB 70, Annex 2)”, the length of the PoA is 28 years.

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

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ☑

Each CPA has different environmental condition. Therefore, environmental Analysis should be performed at CPA level.

E.2. Analysis of the environmental impacts

According to *Environmental Impact Assessment Act, Republic of Korea,* the project participant has to perform the assessments as follows:

Assessments	Division	Requirements
Strategic Environmental Assessment(SEA)	Energy development project	In case of public announcement of designation of prearranged area for electric source development business according to the electric source development promotion act, provision 11
Environmental Impact Assessment(EIA)	Energy development project	In case the installed capacity of photovoltaic power plant is more than 100,000kW
Small scale Environmental Impact Assessment(SSC EIA)	Development areas	In case the size of areas developed for the project activity is more than below: - For conservation management areas : 5,000 m^2 - For production management areas : 7,500 m^2 - For plan management areas : 10,000 m^2

According to the description above, the analysis of the environmental impacts will be justified at CPA level.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level ☑

Each CPA is comprised of different project site and related local stakeholder. Therefore, local stakeholder consultation process should be performed at the CPA level.

F.2. Summary of comments received

Not Applicable

F.3. Report on consideration of comments received

Not Applicable

SECTION G. Approval and authorization

Republic of Korea is the Party involved in the PoA. Letter of approval from DNA of Republic of Korea is issued on 05/12/2012 authorizing SMG(Seoul Metropolitan Government) as a project participant.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA
A.1. Purpose and general description of generic CPAs

The main purpose of the CPA is to contribute to reducing GHG emissions by displacing KEPCO grid electricity as a result of introducing photovoltaic power plant at the project site.

Each CPA will install photovoltaic power plant in buildings or facilities of Seoul. CPA implementers are confined to SMG, district offices or public institutions. And the total installed capacity of the photovoltaic power plant should be less than 15MW.

SECTION B. Application of a baseline and monitoring methodology
B.1. Reference of the approved baseline and monitoring methodology(ies) selected

Methodology Title:
AMS-I.F – Renewable electricity generation for captive use and mini-grid (version 02)

Methodological tool:
Tool to calculate the emission factor for an electricity system (Version 03.0)

Further information for the methodology and tool can be found at :
http://cdm.unfccc.int/methodologies/DB/9V3T8W0N5PMCJH4YVEA04YYFTVHP3Q

B.2. Application of methodology(ies)

This PoA should check application of methodology using applicable provisions in the AMS I.F as table below.

Table. 3 Applicability requirement of AMS-I.F and justification of SSC-CPA

	Applicability Criteria as per AMS I.F. ver. 02	Project Activity
1	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: (a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant; (c) A carbon intensive mini-grid.	The project which supplies electricity to end users will apply AMS-I.F. *; Photovoltaic power plant* The generated electricity through photovoltaic power plant will displace electricity supplied from KEPCO grid. In other word, in the absence of the CPA, the users get a supply of electricity from a KEPCO grid.
2	For the purpose of this methodology, a mini-grid is defined as small-scale power system with a total capacity not exceeding 15 MW (i.e. the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.	Generally, at CPA project site, the users would have been supplied electricity from grid. But the project facility and the electricity generated by CPA will not be exported to grid. So it can be considered that it does not connect to grid. And total capacity of the introduced renewable energy facility by CPA will be lower than 15MW of course.
3	Illustration of respective situations under which each	As the CPA displaces electricity supplied from

<table>
<tr><td></td><td>of the methodology (AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2.</td><td>KEPCO grid, AMS-I.F methodology is applicable.
<table>
<tr><td></td><td>Project type</td><td>AMS-I.A</td><td>AMS-I.D</td><td>AMS-I.F</td></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 diesel fuel</td><td></td><td></td><td>∨</td></tr>
<tr><td>5</td><td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td><td>∨</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>4</td><td>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:
… [ellipsis]</td><td>Not Applicable</td></tr>
<tr><td>5</td><td>For biomass power plants, no other biomass other than renewable biomass are to be used in the project plant.</td><td>Not Applicable</td></tr>
<tr><td>6</td><td>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, (c) Involve a retrofit of (an) existing plant(s); or (d)</td><td>As the CPA install a new photovoltaic power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant), this condition is applicable.</td></tr>
</table>

	Involve a displacement of (an) existing plant(s).	
7	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 from the existing units. [Reference] ***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.	Not Applicable
8	In the case of retrofit or displacement, to qualify as a small-scale project, the total output of the retrofitted or displacement unit shall not exceed the limit of 15 MW.	Not Applicable
9	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, the capacity of the entire unit shall not exceed the limit of 15 MW.	Not Applicable
10	Combined heat and power (co-generation) systems are not eligible under this category.	Not Applicable
11	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.	Not Applicable

B.3. Sources and GHGs

The gases and sources relevant to the CPA are listed below based on the AMS-I.F, Ver.2.

Table. 4 Applicability sources and gases included in the SSC-CPA boundary

	Source	Gas	Included?	Justification
Baseline Emissions	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Major source of emissions in the baseline
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project Emissions	CO2 emissions from on-site consumption	CO_2	No	Based on AMS-I.F
		CH_4	No	Based on AMS-I.F
		N_2O	No	Based on AMS-I.F

The extent of CPA boundary as per stipulated in AMS-I.F, Version 02 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.

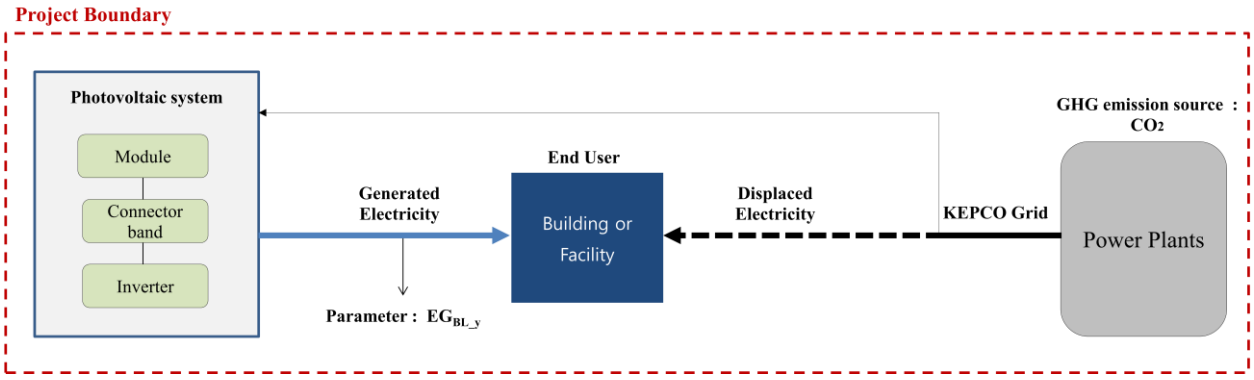


Figure 5. Flow diagram of the project

B.4. Description of baseline scenario

This PoA involves to introduce photovoltaic power plants in buildings or facilities of Seoul. The generated electricity by photovoltaic power plants will displace the electricity supplied from KEPCO grid that is or would have been supplied by at least one fossil fuel fired generating unit.

According to AMS-I.F version 02, the baseline emissions are the quantity of net electricity displaced as a result of the implementation of the CDM project activity in the year y, times the emission factor of a grid calculated as per procedures provided in AMS-I.D. i.e. the baseline emissions are calculated as follows:

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

Where :

BE_y	=	Baseline emissions in year *y* (tCO2)
$EG_{BL,y}$	=	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 (tCO2/MWh)

In paragraph 12 of AMS-I.D, ver.17, the emission factor can be calculated in a transparent and conservative manner as follows:

(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"; or

(b) The weighted average emissions (in tCO2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

This PoA choose the condition (a) and a combined margin(CM) is calculated in B.6.1 of Part II according to "Tool to calculate the emission factor for an electricity system (version 03.0.0)".

B.5. Demonstration of eligibility for a generic CPA

Table. 5 Eligibility criteria and assessment method

No	Eligibility criteria	Means of validation	Evidence
1	The CPA is performed within geographical boundary of Seoul in Republic of Korea.	Document Review On-site visit	• GPS information • CPA identification No.
2	The CPA is not involved in another project that is registered or under validation as a CDM project activity or as a CPA under another PoA or as other GHG reduction projects	Document Review	• Written Agreement between CME and CPA implementer • CPA identification No.
3	The power plant of CPA comply with Korean Standards (KS), guideline related to photovoltaic and Korean law and regulation. In the case of PV module, CPA implementer shall provide Certificate of new and renewable energy facility from KEMCO.	Document Review	• Technical Specification for the project activity • Certificate of New and Renewable energy facility from KEMCO
4	The CPA start date is after PoA posting date, 26/03/2011.	Document Review	• Purchase or Construction Contract date for PV power plant
5	The CPA meets the applicability criteria of AMS-I.F. as described in PoA-DD part II section B.2	Document Review On-site Visit	• Detailed assessment that CPA meets all the applicability criteria of AMS-I.F. • Explanation in D.2 of CPA-DD
6	Additionality check in each CPA-DD is performed as per the additionality related guidelines.	Document Review On-site visit	• Detailed assessment for additionality. • Explanation in D.5 of CPA-DD
7	The CPA implementer performs local stakeholder consultation before the start date of CPA.	Document Review	• Minutes or report of local stakeholder consultation including summary of concerns raised, clarification provided and other information such as attendance list, meeting agenda, photographs shows that a local stakeholder consultation carried out.
8	If required by Republic of Korea, CPA implementer shall carry out an analysis of the environmental impacts of the proposed small scale CPA. and provide a summary of the analysis and reference to all related documentation.	Document Review	• EIA/SSC EIA report, CEA, • Explanation in B of CPA-DD
9	The CPA has the documentary evidence to check project costs and does not result in a diversion of official development assistance from Annex I country.	Document Review	• Written Agreement between CME and CPA implementer that CPA has not received funding from Annex I parties. • Explanation in A.11 of CPA-DD
10	Target group of the proposed PoA is off-grid photovoltaic electricity generation technologies.	Document Review On-site visit	• Electric consumption diagram for consumer facility

11	The total power plant capacity of CPA meets small-scale criteria (=<15 MW)	Document Review On-site visit	• Agreement or contract related to construction or facility purchase • or If available, Certificate of Inspection Prior to Use
12	The CPA is a single project which is not a debundled component of another large-scale CDM or PoA as per the latest guidance given in CDM EB.	Document Review On-site visit	• Written Agreement between CME and CPA implementer • CPA identification No.
13	CME (SMG) makes an agreement with CPA implementer involve the CPA into PoA to ensure that CPA implementer is aware of and agreed to subscribe the CPA into PoA. The agreement between CME and CPA implementer include the debundling check, double counting, no funding from Annex I and monitoring issues. In case that CPA implementer is same with CME, the agreement is not required.	Document Review On-site Visit	• Written Agreement between CME and CPA implementer. • CPA identification No.

For more detailed assessment, there are used the following method :

Procedure to check debundling

SMG will implement debundling check for each CPA referring the guidance for determining the occurrence of de-bundling under a PoA (EB 54, Annex13). SMG will perform the debundling check using CPA implementer name, location, GPS information, installed capacity, etc.

Q1. In accordance with the guidance below, is the proposed CPA deemed to be a de-bundled component of a large scale activity?

A proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity, which satisfies both conditions (a) and (b) below:

(a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which ***also manages a large scale PoA of the same technology/measure****, and;*

(b) ***The boundary is within 1 km*** *of the boundary of the proposed small-scale CPA, at the closest point.*

No → *The proposed CPA is* ***applicable*** *under this PoA*

Yes ↓

Q2. In accordance with the guidance below, can the proposed CPA be qualified to use simplified modalities and procedures for small-scale CDM?

If a proposed small-scale CPA of a PoA is deemed to be a debundled component in accordance with ***Q1*** *above, but* ***the total size of such a CPA combined with a registered small-scale CPA of a PoA or a registered CDM project activity does not exceed the limits for small-scale CDM*** *as set out in decision 4/CMP.1 and revised in 1/CMP.2 (for energy) and 5/CMP.1 (for A/R) respectively, the CPA of a PoA can qualify to use simplified modalities and procedures for small-scale CDM project activities.*

Yes → *The proposed CPA is* ***applicable*** *under this PoA*

No → *The proposed CPA is* ***not applicable*** *under this PoA*

Confirmation of additionality of the generic CPA for its inclusion into the PoA

As per described in B.1 of Part I, the additionality is demonstrated at the CPA level.

The paragraph 2 of "Guidelines on the demonstration of additionality of small-scale project activities(EB 68, Annex 27, Version 09.0) " suggests that the positive list of off-grid renewable electricity generation technologies are automatically defined as additional, without further documentation of barriers. The list includes the photovoltaic power generation activities that are off-grid renewable electricity generation with the installed capacity up to 15 MW, which corresponds to the typical CPA of this PoA.

If the SSC-CPA corresponds the positive list, the SSC-CPA is automatically additional.

B.6. Estimation of emission reductions of a generic CPA
B.6.1. Explanation of methodological choices

1. Determination of Grid Emissions Factor

Emissions Factor is calculated according to "Tool to calculate the emission factor for an electricity system (version 03.0.0)". CM as a baseline grid emission factor is calculated, which is based on OM and BM.

The emission factor will be calculated as following six steps:

- STEP 1. Identify the relevant electricity systems;
- STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional)
- STEP 3. Select a method to determine the operating margin (OM)
- STEP 4. Calculate the operating margin emission factor according to the selected method
- STEP 5. Calculate the build margin (BM) emission factor
- STEP 6. Calculate the combined margin (CM) emissions factor

Table. 6 Major parameter of emission factor

Items	Value	Source
FC i, m, y is the amount of fuel i (in a mass or volume unit) consumed by a relevant power source m in year(s) y, which supplies electricity to the grid, not including low-operating cost and must-run power plants.	Refer to <Table Appendix 4-1>	Statistics of Electric Power in KOREA 2008-2010 (Source: KEPCO 2009-2011)
Net Calorific Values by Power Plant		Caloric value sourced from Statistics of Electric Power in 2008-2010 (Source: KEPCO 2009-2011) (Net Caloric Value = Caloric value net × caloric value conversion factor)

EGm, y (MWh) is the electricity delivered to the grid by source m		Statistics of Electric Power in KOREA 2008-2010 (Source: KEPCO 2009-2011)
Net Caloric Values Conversion Factor	Solid/Liquid fossil fuel : 0.95 Gaseous fuel : 0.90	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Fuel CO2 Emission Factor(EFCO2,i,y)	Refer to <Table Appendix 4-3>	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Operating Margin Emissions Factor (EFgrid,OM,y) (ton CO2/MWh)	0.6933	Calculated
Build Margin Emissions Factor (EFgrid,BM,y) (ton CO2/MWh)	0.6357	Calculated
Baseline Emissions Factor (EFgrid,CM,y) (ton CO2/MWh)	0.6789	Calculated (for solar, wind power)

STEP 1. Identify the relevant electricity systems

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 electricity from the project activities is connected to KEPCO grid, which is the only one in Korea and so relevant electric power system is KEPCO grid.

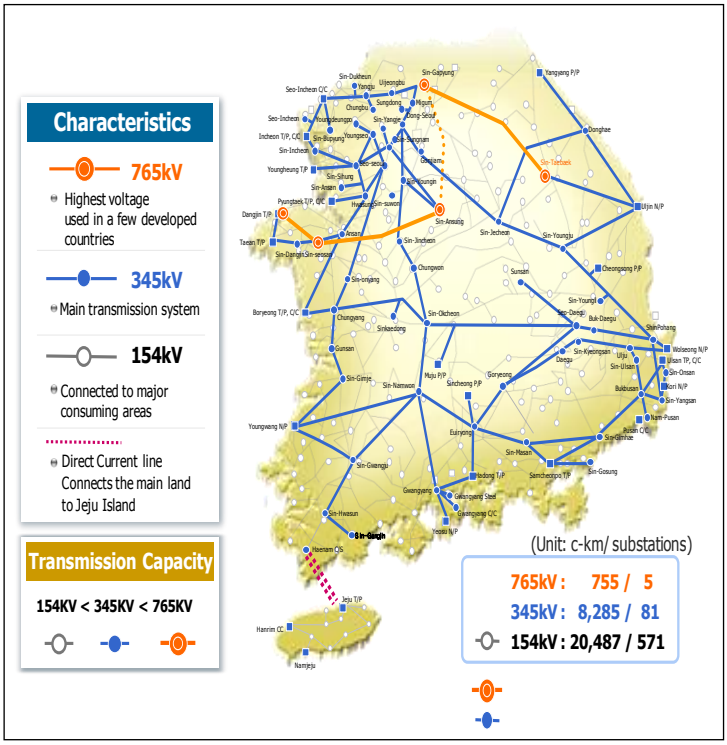


Figure 6. The transmission map of Korea (Source: Korea power exchange, 2011)

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

According to "Tool to calculate the emission factor for an electricity system (version 03.0.0), there are two options to calculate the operating margin and build margin emission factor:

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.

This project chooses option 1. Only grid power plants are including 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 03.0.0)", the OM emission factor is calculated as the generation-weighed 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:

Option (a) Simple OM
Option (b) Simple adjusted OM
Option (c) Dispatch Data Analysis OM
Option (d) Average OM

If low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most

recent years, simple OM can be chosen.

Table. 7 Gross electricity generation of the Republic of Korea in last 5 years[7]

(Unit: GWh, million kWh)

Item \ Year		2006	2007	2008	2009	2010	Sum
Hydro		5,219	5,042	5,563	5,641	6,472	27,937
Thermal	Coal(Dom.)	4,312	4,470	5,010	5,559	4,613	23,964
	Coal(Bitum.)	134,894	150,204	168,498	187,657	189,156	830,409
	Oil	19,195	21,215	15,425	19,912	25,356	101,103
	Gas	68,302	78,427	75,809	65,273	96,483	384,294
Nuclear		148,749	142,937	150,958	147,771	148,596	739,011
alternative		511	829	1,092	1,791	3,984	8,207
Total		381,181	403,124	422,355	433,604	474,660	2,114,924

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 (2006~2010) average data shows that the rate of low cost/must run is 37.78%. (Source: KEPCO) The low-cost/must-run plants –hydro, coal (dom), nuclear and alternative– are indicated in yellow.

Low-cost/ Must-run sources ratio

$$= \frac{[\text{ Hydro (27,937) + Coal-Dom (23,964) + Nuclear (739,011) + Alternative (8,207)}]}{\text{Total generation (2,114,924)}} \times 100$$

$$= 37.78\%$$

Therefore, for this project case, "***Option (a) Simple OM***" is available.

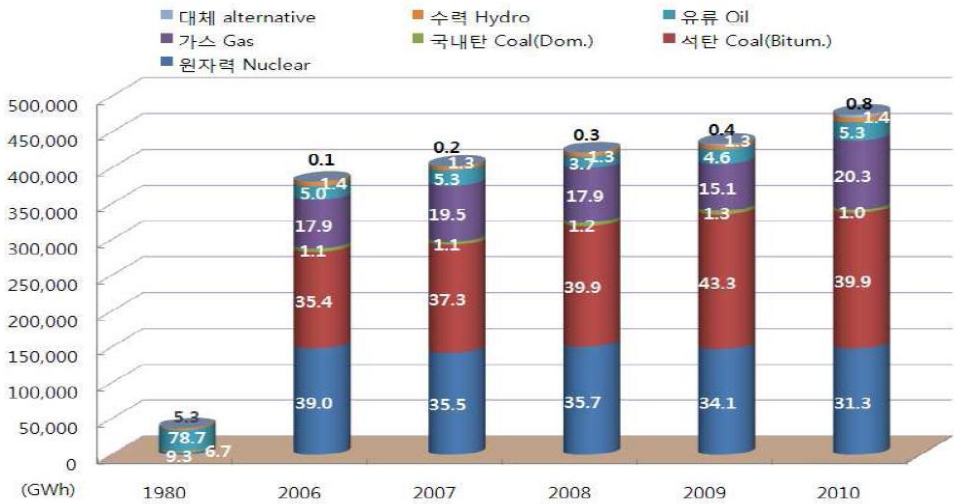


Figure 7. Gross electricity generation in the Republic of Korea during last 5 years (Korea Electric Power Corporation, 2011)

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

[7]Source : Korea Electric Power Corporation, 2011

• *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.

• *Ex post option*: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For this project, *Ex-ante option* is chosen.

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 CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated using one of the following options;

Option A: Based on the net electricity generation and a CO2 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.

For this project, option A is chosen to calculate the simple OM.

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 CO2 emission factor in year *y* (tCO2/MWh)

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

$EF_{EL,m,y}$ CO2 emission factor of power unit *m* in year *y* (tCO2/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 is chosen as follows;

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_2 emission factor of power unit *m* in year *y* (tCO_2/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_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/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

In the case of this project, 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 gloss 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 at tables in Appendix 4.

Determination of $EG_{m,y}$

For grid power plants, $EG_{m,y}$ should be determined as per the provisions in the monitoring tables.

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 0.6933 (tCO_2/MWh).

STEP 5. Calculate the build margin (BM) emission factor

According to “Tool to calculate the emission factor for an electricity system (version 03.0.0)”, there are two options to choose in order to calculate the BM.

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.

Option 2. For the first crediting period, the build Margin emission factor ($EF_{grid,BM,y}$)shall be updated annually, *ex-post,* including those unit built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ant,* as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For this project case, **Option 1** is chosen to calculate the BM emission factor.

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 (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, 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% of AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid.

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

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set (SETsample-CDM) the annual electricity generation (AEGSET-sample-CDM, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. AEGSET-sample-CDM ≥ 0.2 × AEGtotal), then use

the sample group SETsample-CDM to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

(e) Include in the sample group SETsample-CDM the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set (SETsample-CDM->10yrs).

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

Table. 8 Calculation of the build margin (BM) emission factor

<table>
<tr><th></th><th>Step Guidance</th><th>Result</th></tr>
<tr><td>Step (a)</td><td>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 (SET5-units) and determine their annual
electricity generation (AEGSET-5-units, in MWh);</td><td>- Five power units that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$):
<table><tr><td>1. Haengwon solar park</td><td>2010.11</td></tr><tr><td>2. Gunwi (small hydro power)</td><td>2010.11</td></tr><tr><td>3. Dangjin solar park</td><td>2010.10</td></tr><tr><td>4. Yeoicheon solar park</td><td>2010.10</td></tr><tr><td>5. Yeongheung-wind power</td><td>2010.10</td></tr></table>- Total electricity generation in 2010: 7,788 MWh</td></tr>
<tr><td>Step (b)</td><td>Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, 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% of AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);</td><td>- AEG_{total}: 454,859,932 MWh
- 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% of AEG_{total}: Refer to the Annex 3.
- $AEG_{SET\text{-}\geq 20\%}$: 92,307,726 MWh (20.29% of AEG_{total})</td></tr>
</table>

Step (c)	From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. Ignore steps (d), (e) and (f).	- SET_{sample} : $SET_{\geq 20\%}$ because it is larger than $SET_{5\text{-units}}$. - Because none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, steps (d), (e) and (f) are ignored.
Step (d)~(f)	Ignored	

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

Where;

$\mathbf{EF_{grid,BM,y}}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$\mathbf{EG_{m,y}}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$\mathbf{EF_{EL,m,y}}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

According to the BM calculation formula and variables of above tables, $EF_{BM,y}$ is 0.6357 (tCO_2/MWh).

Step 6. Calculate the combined margin(CM) emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) 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:

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

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_2/MWh.

Therefore baseline emission factor ($\boldsymbol{EF_{grid,CM,y}}$) for this project is = 0.6789(tCO_2/MWh) as follows:

$$\boldsymbol{EF_{grid,CM,y,}} = \boldsymbol{w_{OM}} \cdot \boldsymbol{EF_{grid,OM\,y}} + \boldsymbol{w_{BM}} \cdot \boldsymbol{EF_{grid,BM,\,y}}$$

$$= 0.75 \cdot 0.6933(tCO_2/MWh) + 0.25 \cdot 0.6357\ (tCO_2/MWh)$$

$$= \boldsymbol{0.6789}(tCO_2/MWh)$$

Based on the value obtained for the operating margin (0.6933 tCO_2/MWh) and build margin (0.6357 tCO_2/MWh) emissions factors, a **combined margin emissions factor of 0.6789 tCO_2/MWh** will be used for this PoA, until the renewal of the PoA crediting period is undertaken at which point the Emission Factor will be revised.

2. Baseline Emissions

According to AMS-I.F methodology, baseline emission of this system displacing KEPCO grid electricity is calculated as below:
Baseline emissions include only CO_2 emission from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.
The methodology applied to this project activity assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants.

The baseline emissions are to be calculated as follows:

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

Where:

BE_y	= Baseline emissions in year y (tCO_2)
$EG_{BL,y}$	= Quantity of net electricity displaced in year *y* (MWh)
$EF_{CO2,\,y}$	= Emission factor in year *y* (tCO_2/MWh)

* The parameter, $\boldsymbol{EF_{grid,CM,y}}$ used in 'Determination of Grid Emissions Factor' equates to $\boldsymbol{EF_{CO2,\,y}}$.

Calculation of $EG_{BL,y}$

In case CPA introduces photovoltaic power plant (Greenfield plant) and consumes electricity for captive use, Ex-ante calculation of EG_{BL_y} is as below

$EG_{BL,y}$ = Total quantity of electricity generated by this project($EG_{export,y}$) - the auxiliary electricity consumption (of connector bands and inverters) ($EG_{import,y}$)

$EG_{export,y}$ is calculated based on the equation below :

*Capacity of photovoltaic power plant introduced by project activity (MW) * Yearly Operating hours(hr/yr) * utilization coefficient of photovoltaic power plant (%)*[8]"

$EG_{import,y}$ is calculated based on the equation below :

Standby power[9]*(of connector bands and inverters) * Numbers * Hours*

3. Project Activity Emissions

According to AMS I.F methodology, project activity emissions of photovoltaic power plant are zero as the plant does not use any energy source for operation

4. Leakage

According to AMS I.F methodology, if the energy generating facility is transferred from another activity, leakage is to be considered. Photovoltaic power plant in this project is not transferred from another activity, so leakage is not considered.

5. Emission Reductions

$$ER_y = (BE_y - PE_y) - LE_y$$

Where:

ER_y	=	Emission reductions in year y (tCO_2)
BE_y	=	Baseline emissions in year y (tCO_2)
PE_y	=	Project emissions in year y (tCO_2)
LE_y	=	Leakage emissions in year y (tCO_2)

B.6.2. Data and parameters that are to be reported ex-ante

Data / Parameter	$EF_{CO2,y}$ ($EF_{grid,CM,y}$)
Unit	tCO2 / MWh
Description	CO_2 emission factor of the grid in year *y* (tCO_2/MWh)
Source of data	Calculated
Value(s) applied	0.6789
Choice of data or Measurement methods and procedures	Emission factor used for the calculation of the CO_2 emission from grid electricity use. Calculation process of this parameter is B.6.1.
Purpose of data	Calculation of baseline emissions
Additional comment	Value will be revised at the point of renewal of the crediting period of the PoA

Data / Parameter	$EF_{grid,OM,simple,y}$
Unit	tCO_2/MWh
Description	Operating Margin emission factor

[8] The utilization coefficient is based on the report available by public entity.

[9] 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.

Source of data	Calculated
Value(s) applied	0.6933
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 03.0.0)." Applied value was calculated by referring Statistics of Electric Power in KOREA (2008, 2009, 2010) (KEPCO) and Status of Generation facility (2011) (Korea Power Exchange).
Purpose of data	Calculation of baseline emissions
Additional comment	Value will be revised at the point of renewal of the crediting period of the PoA

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build Margin emission factor
Source of data	Calculated
Value(s) applied	0.6357
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 03.0.0)." Applied value was calculated by referring Statistics of Electric Power in KOREA (2008, 2009, 2010) (KEPCO) and Status of Generation facility (2011) (Korea Power Exchange).
Purpose of data	Calculation of baseline emissions
Additional comment	Value will be revised at the point of renewal of the crediting period of the PoA

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	Values from national energy statistics
Value(s) applied	See <Table Annex4 - 1> in appendix 4
Choice of data or Measurement methods and procedures	This value is based on national average default values as values are reliable and documented in national energy statistics.
Purpose of data	Calculation of baseline emissions
Additional comment	Value will be revised at the point of renewal of the crediting period of the PoA

Data / Parameter	$EF_{CO2i,y}$
Unit	tCO2/GJ
Description	CO2 emission factor of fossil fuel type *i in* year *y*
Source of data	IPCC default values at the lower limit of the uncertainty at a 96% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	See < Table Annex 4-3> in appendix 4

Choice of data or Measurement methods and procedures	IPCC default value is used for fuel type i as no country specific data is available.
Purpose of data	Calculation of baseline emissions
Additional comment	Value will be revised at the point of renewal of the crediting period of the PoA

B.6.3. Ex-ante calculations of emission reductions

1. Baseline Emissions

The baseline emissions are to be calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO_2)
$EG_{BL,y}$ = Quantity of net electricity displaced in year *y* (MWh)
$EF_{CO2,y}$ = Emission factor in year *y* (tCO_2/MWh)

* The parameter, $EF_{grid,CM,y}$ used in 'Determination of Grid Emissions Factor' equates to $EF_{CO2,y}$.

Ex-ante calculation for $EG_{BL,y}$ *is as below:*

$EG_{BL,y}$ = Total quantity of electricity generated by this project($EG_{export,y}$) - the auxiliary electricity consumption (of connector bands and inverters) ($EG_{import,y}$)

$EG_{export,y}$ is calculated based on the equation below :

*Capacity of photovoltaic power plant introduced by project activity (MW) * Yearly Operating hours(hr/yr) * utilization coefficient of photovoltaic power plant (%)*[10]"

$EG_{import,y}$ is calculated based on the equation below :

Standby power[11]*(of connector bands and inverters) * Numbers * Hours*

2. Project Activity Emissions

$PE_y = 0$

3. Leakage

$LE_y = 0$

4. Emission Reductions

[10] The utilization coefficient is based on the report available by KPX(Korea Power Exchange). The report specifies the average coefficient for utilization of photovoltaic power plants between 2007 and 2008.

[11] 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.

$$ER_y = (BE_y - PE_y) - LE_y$$

Where:

ER_y	=	Emission reductions in year y (tCO_2)
BE_y	=	Baseline emissions in year y (tCO_2)
PE_y	=	Project emissions in year y (tCO_2)
LE_y	=	Leakage emissions in year y (tCO_2)

B.7. Application of the monitoring methodology and description of the monitoring plan
B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter	$EG_{BL,y}$
Unit	MWh
Description	Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year *y*
Source of data	SSC-CPA database
Value(s) applied	To be filled by CPA
Measurement methods and procedures	$EG_{BL,y}$ means the quantity of net electricity supplied to end users. The net electricity generation is the difference between the total quantity of electricity generated by this project and the auxiliary electricity consumption. ($EG_{BL,y} = EG_{export,y} - EG_{import,y}$) As for the total quantity of electricity generated by this project($EG_{export,y}$) Meter: watt hour meter, measuring device of inverter, etc As for the auxiliary electricity consumption (of connector bands and inverters) ($EG_{import,y}$), The auxiliary electricity consumption is calculated as follows: The auxiliary electricity consumption = Standby power[12](of connector bands and inverters) * Numbers * Hours
Monitoring frequency	Continuous monitoring, hourly measurement
QA/QC procedures	- Calibration frequency: According to Measures act or manufacturer's specifications - Accuracy of meter: within ±3.0%(According to Guideline for the support on the new & renewable energy equipments)
Purpose of data	Calculation of baseline emissions
Additional comments	Data should be recorded at least monthly Data should be kept 2 years after the credit period

Data / Parameter	$EG_{export,y}$
Unit	MWh

[12] 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.

Description	Total quantity of electricity generated by this project in year *y*
Source of data	SSC-CPA database
Value(s) applied	To be filled by CPA
Measurement methods and procedures	As for the total quantity of electricity generated by this project, Meter: watt hour meter, measuring device of inverter, etc
Monitoring frequency	Continuous monitoring, hourly measurement
QA/QC procedures	- Calibration frequency: According to Measures act or manufacturer's specifications - Accuracy of meter: within ±3.0%(According to Guideline for the support on the new & renewable energy equipments)
Purpose of data	Calculation of baseline emissions
Additional comments	Data should be recorded at least monthly Data should be kept 2 years after the credit period

Data / Parameter	$EG_{import,y}$
Unit	MWh
Description	Auxiliary electricity consumption (of connector bands and inverters) in year *y*
Source of data	SSC-CPA database
Value(s) applied	To be filled by CPA
Measurement methods and procedures	As for the auxiliary electricity consumption (of connector bands and inverters), The auxiliary electricity consumption is calculated as follows: The auxiliary electricity consumption = Standby power[13](of connector bands and inverters) * Numbers * Hours)
Monitoring frequency	Monthly recording
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	Data should be recorded at least monthly Data should be kept 2 years after the credit period

B.7.2. Description of the monitoring plan for a generic CPA

The objective of the monitoring plan is to assure the complete, consistent, clear and accurate monitoring of data and calculation of the project emission reductions during the whole crediting period.

(a) Monitoring Data

Total quantity of electricity generated

It is the total quantity of electricity generated by photovoltaic power plant and the meter will be used for the measurement. Variable and unit are as below.

[13] 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.

Type	Meter	Measurement variable	Unit
Photovoltaic technology	Watt hour meter, measuring device of inverter, etc	Quantity of generated electricity	MWh

Auxiliary electricity consumption
Practically, the quantity of net electricity displaced as a result of the implementation of the CDM project activity is the difference between the total quantity of electricity generated by photovoltaic power plant and the total auxiliary electricity consumption from inverter and connector band. To calculate the total auxiliary electricity consumption, following equation is used.

*Total auxiliary electricity consumption = Standby power (of connector bands and inverters) * Numbers * Hours)*

Net electricity
During monitoring, net electricity by photovoltaic power plant is calculated as below

Net electricity = Total quantity of electricity generated - Auxiliary electricity consumption

(b) Monitoring data management

Collection and record
Every CPA in this PoA should be monitored. The meter continuously measures generated electricity. A person in charge of monitoring at CPA project site collects and records the generated electricity using the meter.

Transmission
A person in charge of monitoring of CPA implementer should transmit quarterly accumulated motoring data in the form of electronic file and monitoring data book to CME.

Storage
CME and CPA implementer should store monitoring data on a monitoring computer or back-up server. It should be kept 2 years after the credit period. CME utilizes the collected data to write up a monitoring report.

Verification
The CME opts for a verification method that does not use sampling but verifies each CPA. Therefore, monitoring and verification will be carried out for each CPA under the PoA. Verification will occur either separately for each CPA or in groups. In any case, data shall be verified per each CPA and the verification status of each CPA will be recorded in the CME's management system using database. The system will provide the information related to monitoring periods, parameter, value, etc of each CPA to be made available to DOE for verification anytime.

(c) The roles of CME and CPA implementer

The personnel in charge of monitoring at each CPA project site (O&M department) are responsible for operating and monitoring CPA. They record monitoring data, which is delivered to management department of CPA implementer. They transmit monitoring data to CME which writes up the monitoring report using monitoring data.

Monitoring structure

CME

↑

Management department(CPA implementer)

↑

O & M department(CPA implementer)

(d) Quality Assurance and Quality Control (QA/QC)

The quality assurance and quality control system for recording, maintaining and calibration shall be maintained by each CPA. In order to maintain and upgrade the capability and skill of the person in charge of monitoring, training related to photovoltaic power plant will be performed according to CDM Operation Manual. Prior to the operation of the project, trainings are to be conducted for each CPA personnel in order to ensure that the persons in charge are competent in performing their duties.

(e) Contingency plan

In case of meter trouble or data transferring error, the person in charge of monitoring is responsible for prompt grasping the problem and restoring it in due course. Also the person will comply with CDM Operation Manual.

Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	Seoul Metropolitan Government
Street/P.O. Box	110 Sejong-daero, Jung-gu
Building	
City	Seoul
State/Region	Seoul
Postcode	100-744
Country	Republic of Korea
Telephone	+82-2-2115-7437
Fax	+82-2-2115-7799
E-mail	baeksj@seoul.go.kr
Website	http://www.seoul.go.kr
Contact person	Mr. Baek Seung Joo
Title	Officer
Salutation	Mr
Last name	Baek
Middle name	
First name	Seung Joo
Department	Climate change & Air quality Department
Mobile	+82-10-9304-7754
Direct fax	+82-2-2115-7799
Direct tel.	+82-2-2115-7437
Personal e-mail	baeksj@seoul.go.kr

Appendix 2: Affirmation regarding public funding

There is no public funding from Annex I country available for the PoA.

Application of methodology(ies)

Information on the applicability of the selected methodology is described in Part II B.2.

Appendix 3: Application of methodology(ies)

Data used to determination of Grid emission factor

[Table Appendix 4-1] Calculation of Operating Margin Emission factor

year	Plant name		Amount of fossil fuel (FCi,m,y)				Net caloric value (NCVi,y)				Net electricity generated (EGm,y, MWh)	Emission factor for each plant tonCO2/MWh
			Coal (t)	Heavy oil (kl)	Diesel oil (kl)	L. N. G (t)	Coal (kcal/kg)	Heavy oil (kcal/l)	Diesel oil (kcal/l)	L. N. G (kcal/kg)		
2008	Honam	#1	793,048	808	177		5,089	9,310	8,464		1,614,014	0.9388
		#2	887,772	1,225	167		5,105	9,309	8,470		1,816,464	0.9371
	Samchonpo	#1	1,759,936		137		5,524		4,584		4,230,470	0.8612
		#2	1,628,693		1,065		5,506		8,370		3,931,527	0.8554
		#3	1,635,809		614		5,506		8,347		4,024,666	0.8389
		#4	1,662,981		726		5,524		8,352		4,118,892	0.8362
		#5	1,718,759		874		4,839		8,548		3,779,114	0.8253
		#6	1,844,647		448		4,836		8,552		4,071,070	0.8213
	Yonghung	#1	1,894,596		5,594		5,871		8,246		5,137,490	0.8141
		#2	1,881,013		3,033		5,870		8,445		5,112,704	0.8107
		#3	1,694,625		2,173		5,767		9,563		4,535,951	0.8087
		#4	1,217,547		769		5,771		8,414		3,193,481	0.8251
	Boryeong	#1	1,697,622		566		5,402		8,493		4,017,302	0.8558
		#2	1,328,646		196		5,442		8,497		3,247,137	0.8346
		#3	1,528,112		233		5,377		10,870		3,733,602	0.8249
		#4	1,694,212		339		5,387		8,553		4,162,971	0.8217
		#5	1,503,611		642		5,380		9,210		3,677,963	0.8247
		#6	1,704,157		301		5,386		8,667		4,170,094	0.8250
		#7	1,102,498		2,696		5,451		8,139		2,878,738	0.7846
		#8	227,312		1,060		5,401		4,824		748,005	0.6171
	Taean	#1	1,493,418		589		5,636		8,368		3,894,659	0.8103
		#2	1,570,393		146		5,639		8,420		4,093,884	0.8106

		#3	1,442,632		551		5,632		8,397		3,763,910	0.8092
		#4	1,582,461		122		5,638		8,223		4,119,808	0.8116
		#5	1,566,721		363		5,660		8,228		4,089,287	0.8127
		#6	1,419,495		626		5,662		8,338		3,711,227	0.8119
		#7	1,285,747		1,224		5,700		8,354		3,482,731	0.7894
		#8	1,553,992		635		5,666		8,396		4,186,293	0.7885
	Hadong	#1	1,478,000		355		5,579		8,379		3,827,102	0.8076
		#2	1,551,832		311		5,569		8,342		4,012,667	0.8072
		#3	1,573,892		474		5,575		8,480		4,074,310	0.8073
		#4	1,469,828		495		5,572		8,462		3,804,790	0.8069
		#5	1,592,246		256		5,573		8,491		4,114,218	0.8084
		#6	1,525,471		521		5,572		8,413		3,953,083	0.8061
		#7	310,138		2,900		5,798		7,545		870,781	0.7814
	Dangjin	#1	1,559,086		60		5,520		8,629		3,991,074	0.8080
		#2	1,621,753		136		5,501		8,536		4,162,369	0.8032
		#3	1,474,550		751		5,513		8,549		3,800,792	0.8020
		#4	1,457,994		771		5,503		8,467		3,737,406	0.8050
		#5	1,490,658		250		5,570		8,615		3,908,658	0.7961
		#6	1,509,171		132		5,562		8,543		4,006,307	0.7852
		#7	1,264,913		645		5,581		7,675		3,336,619	0.7933
		#8	1,494,311		314		5,566		8,550		3,992,732	0.7807
	Ulsan	#1		30,689	565			9,440	8,642		114,753	0.8109
		#2		29,228	562			9,444	8,667		108,931	0.8146
		#3		32,541	480			9,440	8,671		123,706	0.7952
		#4		228,138	4,016			9,516	8,662		945,479	0.7370
		#5		163,748	2,965			9,530	8,662		678,426	0.7386
		#6		225,645	3,757			9,513	8,661		937,531	0.7343
	Yeongnam	#1		59,763	1,476			9,674	8,446		229,316	0.8135
		#2		40,030	802			9,676	8,454		149,357	0.8336
	Yeosu	#1		32,576	202			9,449	8,371		130,854	0.7475
		#2		111,854	341			9,447	8,352		454,052	0.7376
	Pyeongtaek	#1		91,937	77	2,562		9,423	8,525	11,591	386,361	0.7268
		#2		125,789	90	4,744		9,430	8,529	11,664	534,121	0.7260
		#3		135,720	145	4,232		9,426	8,426	11,614	576,432	0.7216

		#4		86,454	100	3,020		9,418	8,493	11,661	365,269	0.7272
	Namjeju	#1										
		#2										
		#3		132,984	146			9,415	8,543		559,817	0.7077
		#4		119,301	127			9,356	8,587		517,866	0.6819
	Jeju	#1										
		#2		84,258	81			9,423	8,491		336,676	0.7461
		#3		89,652	101			9,421	8,456		357,666	0.7472
	Seoul	#4			1	55,095			6,650	11,739	258,052	0.5698
		#5				138,068				11,734	596,641	0.6173
	Incheon	#1				28,582				11,736	141,085	0.5405
		#2				30,186				11,737	152,576	0.5279
		#3			292	32,472			8,478	11,738	162,092	0.5393
		#4			238	27,637			8,458	11,734	139,637	0.5324
	Pyongtaek	C/C				150,276				11,744	903,201	0.4442
	Ilsan	C/C				636,633				11,732	3,491,175	0.4864
	Bundang	C/C				651,005				11,737	3,748,232	0.4634
	Ulsan	C/C				655,938				11,648	4,454,326	0.3900
	Seoincheon	C/C			721	1,436,788				11,739	10,308,626	0.3720
	Shinincheon	C/C				1,607,180				11,739	11,531,252	0.3720
	Boryeong	C/C				894,790				11,733	6,126,641	0.3896
	Incheon	C/C				459,923				11,697	3,420,631	0.3575
	Busan	C/C				1,456,370				11,730	10,848,484	0.3580
	Hallim	C/C			6,883				8,535		23,547	0.7584
	Anyang	C/C				292,931				11,816	1,638,638	0.4802
	Bucheon	C/C				302,746				11,191	1,657,898	0.4646
	POSCO POWER	C/C				587,956				11,740	3,328,129	0.4715
	GS Bugog	C/C				709,116				12,084	5,509,092	0.3536
	Yulchon	C/C				347,123				11,737	2,488,267	0.3722
	Kwangyang	C/C										
	Hyundai-Daesan											
	Namjeju	D/P		19,875	482			9,392	8,548		93,201	0.6466
	Jeju	G/T			503				8,457		643	2.0110

	Jeju	D/P		46,728				9,407			223,630	0.6214
2008 Total			62,694,298	1,888,943	59,590	10,515,373					237,888,671	0.6874
2009	Honam	#1	923,895	471	167		5,012	9,323	8,510		1,843,823	0.9420
		#2	853,508	818	201		4,982	9,314	8,507		1,696,597	0.9409
	Samchonpo	#1	1,611,736		299		5,582		8,496		3,881,067	0.8689
		#2	1,596,153		447		5,543		8,446		3,869,863	0.8570
		#3	1,818,061		110		5,545		8,490		4,494,850	0.8404
		#4	1,552,530		486		5,557		8,384		3,873,780	0.8349
		#5	1,909,143		151		4,850		8,537		4,225,306	0.8213
		#6	1,765,537		576		4,854		8,557		3,902,690	0.8232
	Yonghung	#1	2,316,758		1,996		5,681		8,446		6,121,660	0.8065
		#2	2,437,083		1,632		5,654		8,218		6,309,794	0.8190
		#3	2,533,024		966		5,642		8,469		6,711,338	0.7983
		#4	2,740,096		117		5,647		6,764		7,183,514	0.8071
	Boryeong	#1	896,958		1,982		5,259		8,496		2,076,329	0.8538
		#2	1,361,908		5,689		5,292		8,385		3,148,655	0.8623
		#3	1,686,579		180		5,363		8,476		4,153,516	0.8162
		#4	1,554,579		672		5,337		8,551		3,823,603	0.8136
		#5	1,681,591		516		5,354		8,425		4,136,937	0.8159
		#6	1,538,187		935		5,378		8,363		3,802,516	0.8158
		#7	1,438,768		568		5,390		8,319		3,720,811	0.7814
		#8	1,701,650		341		5,384		8,661		4,417,673	0.7773
	Taean	#1	1,561,372		348		5,646		8,400		4,087,057	0.8085
		#2	1,483,233		22		5,651		8,248		3,858,541	0.8139
		#3	1,550,278		209		5,650		8,327		4,041,441	0.8123
		#4	1,471,251		410		5,641		8,351		3,843,816	0.8094
		#5	1,409,802		978		5,672		8,369		3,689,068	0.8129
		#6	1,548,690		285		5,688		8,393		4,064,658	0.8122
		#7	1,576,347		394		5,674		8,437		4,232,409	0.7921
		#8	1,382,469		1,397		5,676		8,385		3,730,433	0.7891
	Hadong	#1	1,647,434		341		5,469		8,416		4,064,233	0.8310
		#2	1,551,648		648		5,428		8,456		3,799,030	0.8312
		#3	1,554,931		473		5,462		8,442		3,862,769	0.8242
		#4	1,634,941		226		5,465		8,441		4,049,790	0.8268

		#5	1,543,027		547		5,467		8,434		3,848,711	0.8217
		#6	1,637,877		286		5,465		8,407		4,085,588	0.8211
		#7	1,500,309		72		5,614		8,497		4,068,510	0.7757
		#8	1,169,132		692		5,625		7,654		3,153,402	0.7820
	Dangjin	#1	1,601,422		677		5,425		8,602		4,025,605	0.8092
		#2	1,572,097		291		5,423		8,547		3,964,389	0.8060
		#3	1,669,969		155		5,431		8,575		4,232,358	0.8031
		#4	1,658,923		110		5,432		8,585		4,195,301	0.8050
		#5	1,324,949		582		5,445		8,553		3,400,082	0.7956
		#6	1,330,803		517		5,468		8,530		3,471,850	0.7857
		#7	1,609,342		133		5,478		8,564		4,172,321	0.7918
		#8	1,334,679		625		5,513		8,550		3,531,321	0.7812
	Ulsan	#1		30,963	35			9,415	8,767		116,425	0.7923
		#2		27,250	41			9,416	8,689		104,292	0.7787
		#3		7,139	35			9,399	8,631		26,061	0.8174
		#4		253,330	2,938			9,486	8,517		1,058,708	0.7247
		#5		313,474	2,805			9,488	8,619		1,318,789	0.7185
		#6		288,842	2,460			9,491	8,601		1,215,616	0.7181
	Yeongnam	#1		108,767	764			9,681	8,657		437,034	0.7662
		#2		104,675	647			9,684	8,709		415,404	0.7755
	Yeosu	#1		113,633	187			9,419	8,357		466,519	0.7263
		#2		193,394	203			9,427	7,792		805,262	0.7163
	Pyeongtaek	#1		56,671	354	2,922		9,456	11,684	11,446	251,576	0.7085
		#2		280,992	696	4,203		9,388	11,900	11,480	1,211,425	0.6995
		#3		282,894	581	4,046		9,378	11,595	11,598	1,225,561	0.6947
		#4		192,380	545	3,838		9,399	10,619	11,617	834,285	0.6994
	Namjeju	#1										
		#2										
		#3		140,564	143			9,387	8,510		550,851	0.7579
		#4		153,841	89			9,385	8,529		603,417	0.7567
	Jeju	#1										
		#2		82,010	103			9,360	8,495		324,784	0.7479
		#3		91,221	72			9,348	8,537		356,297	0.7570
	Seoul	#4				36,893				11,745	157,606	0.6250

		#5				91,258				11,740	412,265	0.5908
	Incheon	#1				15,168				11,738	72,854	0.5556
		#2				15,317				11,739	76,672	0.5332
		#3			47	2,411			8,550	11,753	11,865	0.5533
		#4										
	Pyongtaek	C/C				80,050				11,740	483,959	0.4415
	Ilsan	C/C				595,190				11,737	3,270,241	0.4856
	Bundang	C/C			13,142	541,739				11,540	3,108,338	0.4572
	Ulsan	C/C				489,946				11,558	3,299,104	0.3902
	Seoincheon	C/C				1,061,332				11,740	7,503,395	0.3775
	Shinincheon	C/C				1,394,939				11,739	9,901,080	0.3760
	Boryeong	C/C			86	543,342				11,726	3,655,848	0.3962
	Incheon	C/C				806,154				11,784	6,075,599	0.3555
	Busan	C/C				1,247,488				11,747	9,268,113	0.3595
	Hallim	C/C										
	Anyang	C/C				202,108				14,084	1,301,286	0.4973
	Bucheon	C/C				230,085				14,232	1,556,502	0.4783
	POSCO POWER	C/C				342,724				11,739	1,859,273	0.4919
	GS Bugog	C/C				603,232				12,532	4,344,271	0.3956
	Yulchon	C/C				282,344				11,744	1,995,914	0.3777
	Kwangyang	C/C										
	Hyundai-Daesan	C/C										
	Namjeju	D/P		29,527	275			9,407	8,498		136,189	0.6499
	Jeju	G/T			626				8,503		842	1.9215
	Jeju	D/P		72,724				6,082			345,163	0.4050
2009 Total			70,242,669	2,825,580	55,323	8,596,729					247,025,690	0.7117
2010	Honam	#1	661,468	1,855	301		5,014	9,321	8,458		1,321,140	0.9454
		#2	722,994	897	350		5,057	9,322	8,482		1,462,407	0.9392
	Samchonpo	#1	1,899,819		518		5,385		8,466		4,433,574	0.8649
		#2	1,891,944		421		5,388		8,457		4,418,264	0.8647
		#3	1,581,512		1,261		5,373		8,478		3,766,380	0.8462
		#4	1,909,672		369		5,358		8,473		4,544,757	0.8439

		#5	1,949,826		293		4,714		8,563		4,174,333	0.8252
		#6	1,758,651		573		4,718		8,557		3,767,928	0.8256
	Yonghung	#1	2,201,446		2,189		5,432		8,387		5,558,681	0.8071
		#2	2,264,564		1,531		5,433		8,381		5,627,774	0.8199
		#3	2,778,041		739		5,386		8,391		6,887,344	0.8144
		#4	2,821,533		663		5,379		8,381		6,943,045	0.8193
	Boryeong	#1	1,771,953		732		5,176		8,402		4,012,817	0.8569
		#2	1,635,347		1,068		5,175		8,353		3,706,927	0.8562
		#3	1,618,460		464		5,206		8,321		3,855,846	0.8191
		#4	1,775,851		289		5,206		8,349		4,232,288	0.8188
		#5	1,604,934		911		5,201		8,313		3,817,181	0.8200
		#6	1,778,254		359		5,202		8,317		4,226,837	0.8203
		#7	1,670,727		662		5,244		8,322		4,189,558	0.7840
		#8	1,493,422		439		5,255		8,316		3,787,312	0.7767
	Taean	#1	1,512,930		865		5,458		8,428		3,817,336	0.8111
		#2	1,626,596		518		5,427		8,429		4,058,392	0.8154
		#3	1,506,479		476		5,433		8,436		3,776,949	0.8123
		#4	1,656,710		296		5,456		8,422		4,165,579	0.8133
		#5	1,450,465		680		5,491		8,437		3,657,234	0.8166
		#6	1,319,263		1,094		5,486		8,428		3,339,271	0.8130
		#7	1,521,262		879		5,469		8,430		3,940,580	0.7918
		#8	1,674,579		240		5,456		8,431		4,335,230	0.7899
	Hadong	#1	1,651,998		386		5,263		7,561		3,948,643	0.8253
		#2	1,758,216		133		5,262		8,421		4,181,012	0.8292
		#3	1,760,793		94		5,264		8,671		4,229,016	0.8213
		#4	1,623,350		610		5,260		8,416		3,877,595	0.8255
		#5	1,762,407		369		5,259		8,643		4,210,179	0.8251
		#6	1,642,064		367		5,263		8,423		3,972,047	0.8155
		#7	1,314,119		674		5,528		8,474		3,497,189	0.7789
		#8	1,586,695		34		5,525		8,578		4,221,464	0.7782
	Dangjin	#1	1,802,866		89		5,140		8,294		4,240,235	0.8190
		#2	1,812,592		168		5,133		8,522		4,271,208	0.8163
		#3	1,660,911		430		5,140		8,532		3,924,887	0.8153
		#4	1,593,667		974		5,134		8,469		3,757,184	0.8167

		#5	1,676,374		332		5,198		8,533		4,133,329	0.7902
		#6	1,722,658		157		5,195		8,520		4,242,960	0.7904
		#7	1,572,939		347		5,207		8,534		3,870,155	0.7932
		#8	1,729,056		90		5,191		8,497		4,272,886	0.7872
	Ulsan	#1		59,593	278			9,420	8,369		220,710	0.8072
		#2		50,627	249			9,423	8,382		185,534	0.8162
		#3		70,519	286			9,352	8,361		261,312	0.8006
		#4		229,069	4,116			9,511	8,350		927,792	0.7535
		#5		204,124	4,395			9,526	8,350		823,717	0.7597
		#6		217,795	3,058			9,506	8,350		887,331	0.7463
	Yeongnam	#1		91,050	1,170			9,705	8,785		354,224	0.7974
		#2		80,387	786			9,702	8,696		304,146	0.8174
	Yeosu	#1		118,289	370			9,539	8,350		481,530	0.7426
		#2		236,662	278			9,543	8,345		956,556	0.7471
	Pyeongtaek	#1		188,829	121	3,409		9,435	8,542	11,693	794,103	0.7210
		#2		172,352	102	6,484		9,430	8,485	11,691	742,439	0.7156
		#3		194,662	115	4,814		9,443	8,517	11,702	830,437	0.7155
		#4		158,042	91	3,646		9,443	8,540	11,651	669,443	0.7195
	Namjeju	#1									-	-
		#2									-	-
		#3		151,950	105			9,410	8,505		594,537	0.7607
		#4		146,544	134			9,410	8,472		580,342	0.7517
	Jeju	#1									-	
		#2		76,706	78			9,379	8,440		298,469	0.7626
		#3		89,373	82			9,379	8,492		344,920	0.7688
	Seoul	#4				77,219				11,746	356,493	0.5784
		#5			1	169,145			6,650	11,746	815,062	0.5542
	Incheon	#1				95,108				11,747	477,252	0.5322
		#2				105,649				11,748	544,351	0.5184
		#3				-					-	-
		#4				-					-	
	Pyongtaek	C/C				237,805				11,691	1,472,808	0.4291
	Ilsan	C/C				755,305				11,745	4,306,850	0.4683
	Bundang	C/C				725,097				11,747	4,311,466	0.4491

	Ulsan	C/C				846,672				11,576	5,709,782	0.3902
	Seoincheon	C/C			76	1,633,316			8,750	11,745	11,756,041	0.3710
	Shinincheon	C/C				1,349,902				11,747	9,595,856	0.3757
	Boryeong	C/C				1,016,783				11,747	7,053,566	0.3850
	Incheon	C/C				1,035,486				11,745	7,789,931	0.3549
	Busan	C/C			12	1,666,675			4,275	11,748	12,489,596	0.3564
	Hallim	C/C			12,737				8,536		45,450	0.7271
	Anyang	C/C				308,918				12,447	1,824,654	0.4791
	Bucheon	C/C				303,789				12,454	1,806,919	0.4760
	POSCO POWER	C/C				809,100				11,411	4,297,788	0.4884
	GS Bugog	C/C				807,082				11,756	6,053,971	0.3563
	Yulchon	C/C				372,560				11,748	2,680,710	0.3712
	Kwangyang	C/C									-	-
	Hyundai-Daesan	C/C									-	-
	Kunsan	C/C				398,151				11,746	2,937,873	0.3619
	Yungwol	C/C			263	182,365			8,499	11,750	1,281,206	0.3807
	Namjeju	D/P		20,334	369			9,385	8,493		91,340	0.6709
	Jeju	G/T			697				8,550		1,115	1.6246
	Jeju	D/P		85,093				9,371			405,634	0.6214
2010 Total			74,729,407	2,644,752	54,403	12,914,480					279,038,209	0.6820

** Operating Margin emission factor

Year	Electricity generation by OM plants	CO2 emissions by OM plants
2008	237,888,671	163,529,778
2009	247,025,690	175,798,820
2010	279,038,209	190,305,054
Total	763,952,570	529,633,652

EFgrid, OM,simple,y = 0.6933 tonCO2/MWh

[Table Appendix 4- 2] Sample group plants used in the Build Margin calculation and CO2 emission factor of Build Margin

Year	No.	Plant name		Technology	Type of Fossil Fuel	year operation	Net electricity Generated (EGm,y)	CO2 emission factor (EFEL,m,y) (tCO2/MWh)	EF for each plant (tonCO2eq. /MWh)
2010	1	Haengwon solar park		solar		2010.11	-		
	2	Gunwi		small hydro power		2010.11	228		
	3	Dangjin solar park		solar		2010.10	265		
	4	Yeoicheon solar park		solar		2010.10	5,057		
	5	Yeongheung-wind power		wind		2010.10	2,238		
	6	Hangwon		small hydro power		2010.10	1		
	7	Seolibo		small hydro power		2010.08	108		
	8	Kyeongcheon	#2	small hydro power		2010.07	-		
	9	Gunsan		Combined		2010.06	2,937,873	0.3619	0.0115
	10	Tapjeong		small hydro power		2010.03	-		
	11	Sinkori	#1	nuclear		2010.02	1,121,956		
	12	Pangweo		small hydro power		2010	2,154		
	13	Yeongwol		Combined		2010	1,281,206	0.3807	0.0053
	14	Dangjin		small hydro power		2010			
	15	Rural community corp.		small hydro power		2010	-		
	16	New solar energy and others				2010	-		
2009	1	Gosan		small hydro power		2009.12	-		
	2	Ilsan fuel cell		fuel cell		2009.09	18,492		
	3	Gosado solar		solar		2009.07			
	4	Pyeongsado solar		solar		2009.07			
	5	Yukdo solar		solar		2009.07			
	6	Yuldo solar		solar		2009.07			
	7	Hadong	#8	steam power	Bituminous coal	2009.06	4,221,464	0.7782	0.0356
	8	Daehanboryeong		small hydro power		2009.05	-		
	9	Hankukhaeyang		small hydro power		2009.05	-		
	10	Wooldolmok		small hydro power		2009.05	1,039		
	11	Dangsado solar		solar		2009.04			
	12	Hahwado solar		solar		2009.04			
	13	Hwangjedo solar		solar		2009.04			

	14	Seongsan-wind		wind		2009.04	-		
	15	Yeongwol solar		solar		2009.01	54		
	16	Boseong		small hydro power		2009	3,973		
	17	Seongju		small hydro power		2009	4,171		
	18	New solar energy and others				2009	-		
	1	Boryeong	#8	steam power	Bituminous coal	2008.12	3,787,312	0.7767	0.0319
	2	Hadong	#7	steam power	Bituminous coal	2008.12	3,497,189	0.7789	0.0295
	3	Yeongheung	#4	steam power	Bituminous coal	2008.12	6,943,045	0.8193	0.0616
	4	Kyeongcheon		small hydro power		2008.11	1,214		
	5	Seongnam 2		small hydro power		2008.10	-		
	6	Nulokdo solar		solar		2008.09	-		
	7	Jeju solar		solar		2008.09	57		
	8	Boryeong fuel cell		fuel cell		2008.09	1,999		
	9	Naebyeong solar		solar		2008.08	-		
	10	Yulhyeon		small hydro power		2008.07	1,248		
2	11	Busan C/C solar		solar		2008.07			
0	12	Hadong solar		solar		2008.07			
0	13	Hongikdongjin		small hydro power		2008.06	-		
8	14	Daecheongdaem		small hydro power		2008.06	-		
	15	Boryeong	#7	steam power	Bituminous coal	2008.06	4,189,558	0.7840	0.0356
	16	Yeongheung	#3	steam power	Bituminous coal	2008.06	6,887,344	0.8144	0.0608
	17	Kori-wind power		wind		2008.05	-		
	18	Samlangjin solar				2008.04	-		
	19	Boryeong solar		solar		2008.04	-		
	20	Boryeong		small hydro power		2008.03	-		
	21	Yeongheung		small hydro power		2008.03	-		
	22	Yeonggwang solar park				2008.03	-		
	23	Boryeong 2		small hydro power		2008.03	1,338		
	24	POSCO fuel cell		fuel cell		2008.03	-		
	25	Gunjang heat & power		combined		2008.01	-		

	26	Seocheon solar		solar		2008.01	-		
	27	New solar energy and others		solar		2008	-		
2007	1	Taean		small hydro power		2007			
	2	Hanbit Sungsan the second solar		solar		2007.12	-		
	3	Taein gangjin solar		solar		2007.12	-		
	4	Suni gangjin solar		solar		2007.12	-		
	5	Korea yeongcheon solar		solar		2007.12	-		
	6	Solar yungam solar		solar		2007.12	-		
	7	Changwhan yeongduk solar		solar		2007.12	-		
	8	Samsung jindo		solar		2007.12	-		
	9	Hwaseong heat & power		combined		2007.12	-		
	10	Dangjin	#8	steam power	Bituminous coal	2007.12	4,272,886	0.7872	0.0364
	11	SP solar yonggwang		solar		2007.11	-		
	12	Dongyang energy sinan		solar		2007.11	-		
	13	Ef yungam solar		solar		2007.11	-		
	14	Dongwon gangjin solar		solar		2007.11	-		
	15	Solec yonggwang solar		solar		2007.11	-		
	16	Solar jungeub solar		solar		2007.11	-		
	17	Sinbuk yungam solar		solar		2007.11	-		
	18	Hyein haenam solar		solar		2007.11	-		
	19	Samlangjin solar		solar		2007.11	-		
	20	Hyosung daegi-wind power		wind		2007.11	-		
	21	Nonhyun heat & power		combined		2007.10	-		
	22	Wuriyungam solar		solar		2007.08	-		
	23	Hwasung solar		solar		2007.08	-		
	24	Yeongju the first solar		solar		2007.08	-		
	25	Muan solar		solar		2007.08	-		
	26	Jangheung solar		solar		2007.08	-		
	27	Gomun		small hydro power		2007.08	-		
	28	Taean	#8	steam power	Bituminous coal	2007.08	4,335,230	0.7899	0.0371
	29	Dangjin	#7	steam power	Bituminous coal	2007.06	3,870,155	0.7932	0.0333

	30	Munkyung solar		solar		2007.06	-		
	31	Younggwang solar park		solar		2007.06	-		
	32	Yungam Solar		solar		2007.06	-		
	33	Wonjungsu		small hydro power		2007.05	-		
	34	Baekgok		small hydro power		2007.05	1,144		
	35	damyangho		small hydro power		2007.05	1,727		
	36	Juam		small hydro power		2007.05	-		
	37	Namjeju	#4	thermal	heavy oil	2007.03	580,342	0.7517	0.0047
	38	Eco energy		solar		2007.03	-		
	39	hapcheon		small hydro power		2007.02	7,472		
	40	Jeonju-resource recovery facility				2007.02	-		
	41	Seoul Marin(suncheon)		solar		2007.02	-		
	42	Mirae energy		solar		2007.02	-		
	43	samcheonpo		small hydro power		2007.02	-		
	44	dalbang		small hydro power		2007.02	-		
	45	Taean	#7	steam power	Bituminous coal	2007.02	3,940,580	0.7918	0.0338
	46	Yeongju the second solar		solar		2007.01	-		
	47	Hyundaedaesan		combined		2007.01			
2006	1	Cheongsong pumping	#2	pumping		2006.12	305,821		
	2	S&P Solar		solar		2006.10	-		
	3	Bundang fuel cell		fuel cell	LNG	2006.10	1,769		
	4	Namhae Solar		solar		2006.10	-		
	5	HanlaJeunggong Solar		solar		2006.10	-		
	6	Yungam Solar		solar		2006.09	-		
	7	Enepark		solar		2006.09	-		
	8	Yeongheung solar		solar		2006.09	1,160		
	9	Cheongsong pumping	#1	pumping		2006.09	301,551		
	10	Namjeju	#3	thermal	heavy oil	2006.09	594,537	0.7607	0.0049
	11	yangyang(pumping)	#4	pumping		2006.08	204,280		
	12	Donghae Solar		solar		2006.08	-		
	13	Kangwon-wind power		wind		2006.07	-		
	14	Woljeong-wind power		wind		2006.07	-		
	15	yangyang pump windpower		wind		2006.06	-		

	16	Hadongho		small hydro power		2006.06	2,923		
	17	yangyang (pumping)	#3	pumping		2006.06	194,083		
	18	Goheung Solar		solar		2006.06	-		
	19	Jangseong		small hydro power		2006.05	2,056		
	20	yangyang (pumping)	#2	pumping		2006.04	194,653		
	21	Dangjin	#6	thermal	Bituminous coal	2006.04	4,242,960	0.7904	0.0363
	22	Sinchang-wind power		wind		2006.03	-		
	23	yangyang (pumping)	#1	pumping		2006.02	122,320		
2005	1	Janghengdam		small hydro power		2005.12	-		
	2	Suncheon Solar		solar		2005.12	-		
	3	Samcheonpo solar energy		solar		2005.12	1,129		
	4	Dangjin	#5	steam power	Bituminous coal	2005.10	4,133,329	0.7902	0.0354
	5	yangyang pump small hydro		small hydro power		2005.10	-		
	6	Taean solar energy		solar		2005.10	116		
	7	Jeju DP		internal combustion	heavy oil	2005.07	405,634	0.6214	0.0027
	8	WunjeongLFG		internal combustion	LFG	2005.07	-		
	9	Yulchon		combined	LNG	2005.07	2,680,710	0.3712	0.0108
	10	Incheon		combined	LNG	2005.07	7,789,931	0.3549	0.0300
	11	Daegok		small hydro power		2005.07	1,038		
	12	Donghwa		small hydro power		2005.07	3,289		
	13	Ulchin	#6	nuclear		2005.04	7,991,038		
	14	Hanrye		LFG	LFG	2005.04	-		
	15	Busan Bio-gas		internal combustion	LFG	2005.03	-		
	16	Sungnam		small hydro power		2004.12	-		
	17	Yungduk-wind power		wind		2004.12	-		
	18	Yongdam		small hydro power		2004.12	26,825		
	19	Maebongsan-wind power		wind		2004.12	-		
	20	Daegwanryeong-wind power		wind		2004.12	-		
	21	Yeongheung	#2	steam power	Bituminous coal	2004.11	5,627,774	0.8199	0.0500
	22	Yeongheung	#1	steam power	Bituminous coal	2004.07	5,558,681	0.8071	0.0486
BM TOTAL							92,307,726		0.6357

Source: Statistics of Electric Power in KOREA (2011) (KEPCO), Current status of power generating facility (2011, Korea power exchange)
EFgrid,BM,y = 0.6357 tonCO2/MWh

[Table Appendix 4- 3] Default CO2 Emission factor for combustion

Fuel type	Default carbon content (kg/GJ)	Default carbon oxidation factor	Effective CO2 emission factor (kg/TJ)		
			Default Value	96% confidence interval	
	A	B	C=A*B*44/12*1000	Lower	Upper
Motor Gasoline	18.9	1	69300	67500	73000
Aviation Gasoline	19.1	1	70000	67500	73000
Jet Gasoline	19.1	1	70000	67500	73000
Gas/Diesel oil	20.2	1	74100	72600	74800
Residual fuel oil	21.1	1	77400	75500	78800
Anthracite	26.8	1	98300	94600	101000
Other bituminous coal	25.8	1	94600	89500	99700
Natural Gas	15.3	1	56100	54300	58300

Chap.1 Introduction, Vol.2 Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Appendix 4: Further background information on the monitoring plan

The monitoring record form is provided in this section.

Period: 20YY

Power plant information		Total quantity of generated electricity	Total auxiliary electricity consumption	Total quantity of net electricity
ID number	Monitoring period			
Total				

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