CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	● The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. ● As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	● The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

-Title : Gimcheon PV Power Plant Site 2 CDM Project
-PDD Version

Version	Date	Note
1.0	28/10/2008	
2.0	30/12/2008	Applied recalculated emission factor
3.0	6/1/2009	Updated following DOE comments after site visit
4.0	15/5/2009	Additionally updated following DOE comments following audit
5.0	5/6/2009	Corrected minor error before request for registration

A.2. Description of the small-scale project activity:

-the purpose of the project activity

Gimcheon PV Power Plant site 2 (9.3MW) generates electricity (annual average 12,835MWh/yr for 10-year crediting period) from solar energy Photovoltaic plants emit zero greenhouse gas (GHG) and dose not cause any natural resources depletion. The project supports the government policy which promotes development of renewable energy technology in Republic of Korea. The project also contributes to decrease dependence on electricity generation by fossil fuel power plants which take 64.2% of total generating capacity in Korea. (KEPCO in brief, June 2007)

-explanation on how the proposed project activity reduces greenhouse gas emissions

This project generates electricity from solar energy and supplies electricity to the grid. When grid connected power plants generate electricity, they cause greenhouse gas emissions because some of plants use fossil fuel. If electricity which is generated by this project is supplied to the grid, it can alternate electricity generated by other grid connected plants. Furthermore, fossil fuel power plants except domestic coal power plants are not considered as must-run plants, they can be affected by adding the project plant to the grid and this project definitely cause greenhouse gas emissions reduction.

-the view of the project participants on the contribution of the project activity to sustainable development

The project contributes to sustainable development in the following ways:

-social aspects-

- Even it was not permanent, during construction period, the project participant hired more than 1000 local residents and it contributed to creating jobs in local society.
- Tax revenue of local government will be increased by this project activity because this project activity makes money by selling electricity and pays tax. It can be considered as one of good effects upon local society.

-environmental aspects-

- Electricity generation from solar energy decreases fossil fuel use and will make nation-wide benefits.
- As one of renewable energy sources, photovoltaic power plant does not emit any pollutant into the air nor discharges residue.

• Photovoltaic can be utilized as an energy source for future generations, because it alternates fossil fuel and does not impact on resource depletion.
• Photovoltaic power plant does not emit other emissions such as SOx, NOx and particulate etc which a fossil fuel power plant normally emits.
• This project is expected to reduce 7,896 tonCO2/yr for 10-year crediting period.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Korea	Samsung Everland Inc. (private entity)	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Republic of Korea

A.4.1.2. Region/State/Province etc.:

Gyeongsangbuk-Do

A.4.1.3. City/Town/Community etc:

Gimcheon City

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

Detail address of the project site San 104, Okgye-ri, Eomo-myeon, Gimcheon City, Gyeongsangbuk-Do. (latitude of 36.14°N and longitude of 128.04°E) The project site is 270,300m^2 and slope-sided.

<Figure 1.> Location of Gimcheon PV Power Plant Site 2 (Gimcheon)

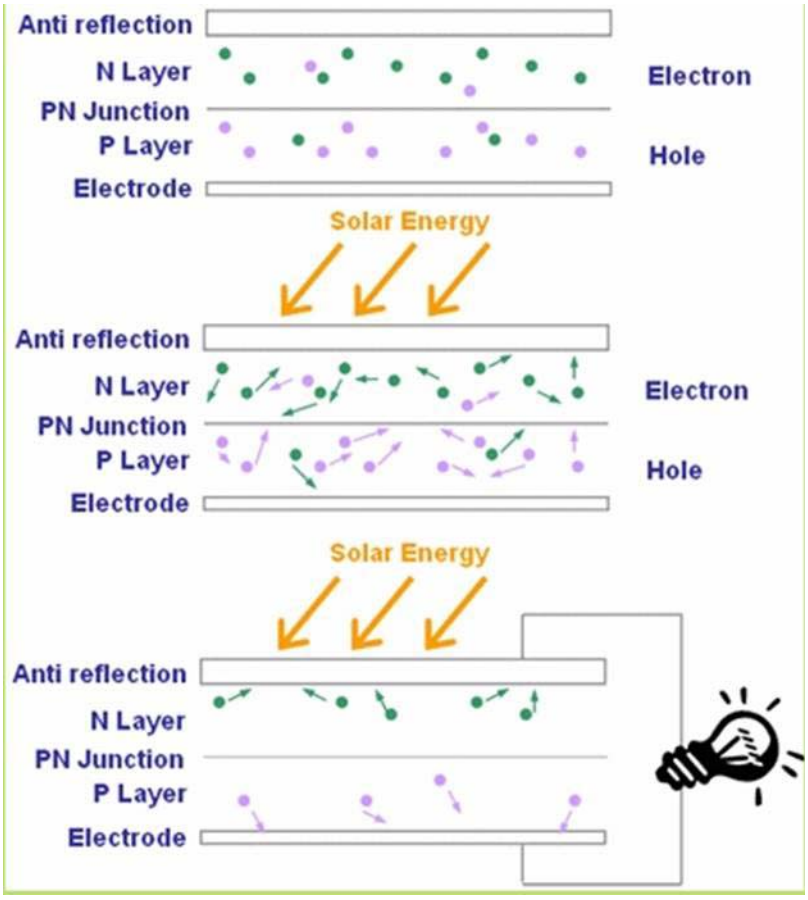
<Figure 2> Bird's-eye-view of Gimcheon PV Plant Site 2

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

The project is a small-scale CDM project activity. As defined in UNFCCC's Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project type is Type I. Renewable energy projects and the project category is D. Electricity generation for a system.

The project activity is electricity generation by converting sunlight into electricity. Therefore, the project does not emit any greenhouse gas or waste during the activity.

-Principal of photovoltaic power generation-
Solar cells are made using semiconductors such as silicon. A solar cell consists of two layers of semiconductor, one p-type and the other n-type, sandwiched together to form a 'pn junction'. This pn interface induces an electric field across the junction. When particles of light ('photons') are absorbed by the semiconductor, in a solar cell, the electrons and holes near the pn-junction are swept across in apposite directions by the action of the electric field. This separation of charge induces a volage across the device. By connecting the device to an external circuit, the electrons are able to flow and this flow of electrons is electricity.



<Figure 3> Principal of photovoltaic power generation

Total capacity of the project is 9.3MW and the project is comprised of 2 types of solar systems, stationary solar system (8.63MW) and solar system with trackers (0.67MW).
Modules are supplied by Suntech, and trackers are supplied by Poscon and SunPower.
Supplied modules are introduced in the table below.

<Table 1> Technology description-Module

Supplier	Suntech			
Capacity	170Wp	175Wp	190Wp	200Wp
Construction Capacity(kwp)	435.2	4,855.2	1,778.6	2,221.8
Efficiency (%)	15.8	16.2	14.2	15.0
PV Cell Type	Mono	Mono	Poly	Poly
Control type	Stationary	With tracker(672.0) Stationary(4,183.2)	Stationary	stationary
Module error	±3%	±3%	±3%	±3%

Among 9.3MW capacity of the project, 0.67MW of modules are installed with tracking systems. Photovoltaic arrays installed with trackers together track the sun to enhance energy collection. Therefore, they have higher efficiency than stationary systems.

Suntech which supplies modules is one of largest solar energy companies in the world and has headquarters in China and sales offices the world over including Germany, Switzerland, America and Australia etc. By adopting modules which are manufactured with developed technology, technology transfer can be achieved for this project activity.

Siemens supplies inverters and applied inverters are introduced in the table below.

<Table 2> Technology description-Inverter

Maximum current per DC input	DC 250 A
MPP Voltage range (DC)	DC 450~750V
Maximum system voltage (DC)	DC 900V
Rated input power (DC)	420kW
Number of machines	3units
Voltage	AC 380V
Voltage fluctuation range	±10%
Frequency	60 Hz
ETA Efficiency	96% <
Prevention of unilateral operation	< 0.5sec

Business related to solar energy is one of main business scopes of Siemens and this company has various advanced technology on solar energy power plants. Inverter technology is one of them. Among 10(about) largest PV power plants in the world, 5 plants have adopted inverters manufactured by Siemens. Inverters of Siemens are reliable and make it possible to monitor generation effectively and in safety.

By adopting these facilities manufactured with advanced technology, technology can be transferred and this project activity can contribute to improving technologies related to photovoltaic power plant in Korea.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2 eq.
Year 1	**8,003**
Year 2	**7,979**
Year 3	**7,955**
Year 4	**7,931**
Year 5	**7,908**
Year 6	**7,884**
Year 7	**7,860**
Year 8	**7,837**
Year 9	**7,813**
Year 10	**7,790**
Total estimated reductions (tonnes of CO_2 eq.)	**78,960**
Total number of crediting years	**10**

Annual average over the crediting period of estimated reductions (tonnes of CO_2 eq.)	**7,896**

Estimated amount of emission reductions over the 10 year-crediting period is 78,960 tons.

A.4.4. Public funding of the small-scale project activity:

Gimcheon PV Power Plant site 2 CDM project is invested by the project participant, Samsung Everland Inc. Therefore, this project is not funded by official development assistance or other sources as the financial obligations of Parties included in Annex I.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

This CDM project is 9.3MW-power plant, and it is not a part of any larger project activity.

A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

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

The project is the first Small-scale CDM project of which the project participant is Samsung Everland Inc. Even though there is another PV power plant which is 200m away from this project site, the project participant of that project is not Samsung Everland Inc. Therefore, it is not a debundled component of a large project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Version 13 of AMS-I.D. "Grid connected renewable electricity generation"

B.2 Justification of the choice of the project category:

Proposed project activity is grid-connected electricity generation of which the source is solar energy. The capacity of the project is 9.3MW which is less than 15MW. Therefore, the project is small-scale project activity and there will not be any activity which causes this project not to remain under the limits of small-scale project activity such as expanding the capacity during the crediting period.
Project type of the proposed project activity is type I. "renewable energy projects" and category is D. "Electricity generation for a system".

B.3. Description of the project boundary:

The project boundary is related to CO_2 emissions by electricity generation in fossil fuel power plants that are displaced due to this project activity.

The spatial extent of the project boundary includes the project site and all the power plants connected physically to the grid managed by Korea Electric Power Corporation (KEPCO).

In the calculation of GHG emissions from the plants which are included in the project boundary, following GHG emissions have not been considered for the baseline:
- The emissions are generated by construction activity of the power plants.
- The emissions related to electricity transmission and distribution losses.
- The emissions related to fossil-fuel transportation and mining, etc.

B.4. Description of baseline and its development:

Alternative 1
Construction of a fossil fuel power plant which has same capacity as this project activity

Alternative 2
Generating electricity by current grid-connected power plants without this project activity

Alternative 3
Generating electricity by another type of renewable energy

Recently Korean government has encouraged low-GHG emission and eco-friendly activity and depletion of fossil fuel is global topic as well. Considering the situation, even though a fossil fuel power plant is more economical than a renewable energy power plant such as this project activity, alternative 1 is less applicable to this project than alternative 2 or alternative 3 as the alternative of this project activity. Another type of renewable energy might be considered as a way to generate electricity besides photovoltaic. Among them, hydro power is not suitable for the area where the project site is located in, because there are farmland and hills around the project site and there is no resource of hydro power. In a wind power case, wind power project had already been considered by another project participant at the site which is suitable for a wind power project. Therefore, another renewable energy could not be considered as an alternative by the project participant.
As a result, alternative 2, generating electricity by current grid-connected power plants which include fossil fuel power plants, nuclear power plants and renewable energy power plants etc. without this project activity, is suited to the alternative of this project activity.

<Table 3> Data used to determine the baseline emissions

Parameter	Description	Value	Source
EG_y	Electricity supplied by the project activity to the grid	12,835MWh	-estimation -average value during the crediting period
$EG_{m,y}$	Net electricity generated and delivered to the grid by power plant/unit m in year y	Refer to <Table Annex 3-3>	Statistics of Electric Power in Korea (2006, 2007, 2008) (KEPCO)
$FC_{i,m,y}$	Amount of fossil fuel type i consumed by power plant/unit m in year y	Refer to <Table Annex 3-1>	
$NCV_{i,y}$	Net calorific value of fossil fuel type I in year y	Refer to <Table Annex 3-2>	
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type I in year y	Other Bituminous coal : 94,600kgCO2/TJ	IPCC 2006 Revised Guidelines (Energy

		Residual fuel oil : 77,400kgCO2/TJ Diesel oil : 74,100kgCO2/TJ Natural gas(dry) : 56,100kgCO2/TJ	Industries)
$EF_{grid,OM,y}$	Operating margin CO2 emission fator in year y	0.7117tonCO2/MWh	Calculation
$EF_{grid,BM,y}$	Build margin CO2 emission factor in year y	0.3258 tonCO2/MWh	Calculation
w_{OM}	Weighting of operating margin emissions factor	0.75	Tool to calculate the emission factor for and electricity system
w_{BM}	Weighting of build margin emissions factor	0.25	Tool to calculate the emission factor for and electricity system
$EF_{grid,CM,y}$	Combined margin emissions factor	0.6152 tonCO2/MWh	Calculation

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Since this project is financially unattractive, promoting this project as a CDM project has important meaning to Samsung Everland Inc.

This project had been under consideration since September, 2007 and it was decided to promote this project in January, 2008. Since then, this project has been implemented. Samsung Everland obtained electricity generation permit in March, 2008 and Environment Impact Analysis was completed in June, 2008 and feasibility study was completed by Korea Ratings Corporation in July 2008. Also it was prepared to register this project as a CDM project through collecting necessary document and data etc. in parallel with those steps. After relevant permits were obtained and EIA and feasibility study were completed, writing PDD was addressed in August, 2008. Application of baseline methodology was completed on August 1, 2008. PIN was sent to DOEs to select DOE in September, 2008 and Samsung Everland made a contract with Korean Foundation for Quality on October 27, 2008 for validation. By doing so, continuing and real actions have been taken to secure CDM status for this project in parallel with its implementation.

To promote this project, the project participant went through steps below.

<Table 4> Promoting step of the project activity

Date	Description of a step	Facts relevant to CDM
03/09/2007	Primary report of project promotion plan (report preparation-08/2007)	- CDM was considered one of purposes of the project. - CERs sales revenue was included in financial benefit of the project.
24/10/2007	Report of project promotion plan to Samsung Group of which the project participant is an affiliated company.	- CERs sales revenue was included in financial benefit of the project. - GHG emission reduction effect of another project case was reported.

		- CERs trading plan was reported.
22/01/2008	Obtained an approval of the project execution	
23/01/2008	Concluding MOU with Gyeongsangbuk-Do Concluding MOU with Gimcheon City	- Congratulatory speech by CEO of the project participant included contribution to GHG emission reduction by this project. - Amount of CO2 emission reduction was included in the presentation material which is about project promotion plan.
15/02/2008	For objective validity, ordered feasibility study service on the project to the 3rd party, Korea Ratings Corporation	
25/02/2008	Submitted documents to Ministry of Knowledge Economy to obtain electricity generation permit	- CO2 emission reduction was included in the background of promoting the project.
14/03/2008	The project participant made the first supply contract for modules.	
31/03/2008	Obtained electricity generation permit	
06/2008	Completion of Environment Impact Analysis report.	
10/07/2008	Start of construction work	
11/07/2008	Report of changed plan for promoting the project activity to Samsung Group	
25/07/2008	Korea Ratings Corporation submitted the feasibility study report on the project	- Financial statement of the report includes CERs sales revenue and the cost which is required to promote this project activity as a CDM project
29/09/2008	Start of operation	
27/10/2008	Made a contract with DOE	
30/01/2009	Completion of a construction work	
29/05/2009	Obtainment of LOA from DNA	
07/2009	CDM project registration (expect)	

Even though this project has a barrier, this project was promoted for electricity generation by renewable energy source and CDM project. Therefore, this project has been considered as CDM project and GHG mitigation project since planning stage of this project and this fact is written in the report on the project and other documents which can be confirmed by DOE. On the feasibility study, this project was considered as CDM project (ex. Estimated CERs sales revenue was considered for economic analysis on this project.) and on the environmental analysis, GHG mitigation advantage was considered as one of purposes of this project.

To demonstrate that the proposed project activity is additional, barrier analysis is carried out in accordance with Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities. Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emission;
(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with a higher emissions;
(d) Other barriers: without the project activities, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

For this project, the project participant should tide over (a) Investment barrier. Each table below shows input values used in the investment analysis and NPV of the investment analysis.

<Table 5> Summary of the input values

Contents	Value
Discount rate	4.94%
Investment cost (million won)	63,314
O&M cost (annual average) (million won)	367
Generation capacity (MW)	9.3
Generation (annual average) (MWh)	12,654(*)
Unit price of electricity (won/kWh)	Initial price is 99.31won/kWh and future value is estimated by using regression analysis which is based on the value for past 3 years(2005~2007)
Electricity sales (annual average) (million won)	2,669
Operation period	20 years

※ 12,654(*) : Considering the efficiency of facility, annual electricity generation is expected to be changed as time goes by. Therefore, generation written in the table above is the annual average during operation period (20years) and it is different to the average generation during the crediting period (10years) which is 12,835MWh.
※ SMP was applied for unit price of electricity and SMP has been tending upwards for past 3 years. Therefore, expected SMP, which is considering the upward tendency and not a fixed value, was applied for economic analysis of this project activity

<Table 6> NPV of the project

	Without CERs	With CERs		
		€ 11/tonCO2	€ 13/tonCO2	€ 15/tonCO2
NPV (million won)	-36,720	-35,782	-35,611	-35,441
※ Korean government encourages use and development of renewable energy sources and establishes "Act on the promotion of the Development, Use and Diffusion of New and Renewable Energy" in 2002. Because high investment cost and low economic efficiency are the biggest obstacles to renewable energy projects, this regulation intends to make up for financial weak point of renewable energy project by providing subsidy to that kind of projects. However this regulation does not force into performing renewable energy projects but was established to promote the diffusion of renewable energy projects. Furthermore, according to the decision of 22nd CDM EB meeting, this regulation does not need to be taken into account in developing baseline scenario. Therefore, subsidy by the regulation has not been applied for economy analysis of this project.				

Without CERs sales, NPV is -36,720 million won which is lower than 0. It means that this project is not financially attractive.

Sensitivity analysis was performed for economic analysis of this project. For this analysis, 5 variables were applied and they are investment cost, O&M cost, unit cost of electricity sales (SMP), electricity generation and discount rate. The result of the analysis is shown in the table below.

<Table 7> Sensitivity Analysis

Variables		NPV (million won)	Comments
Investment cost	-15%	-27,222	Most facilities for this plant are made by foreign companies and the cost is related to exchange rate. Therefore, the range of fluctuation on investment cost can be decided by considering the exchange rate for past 10 years (1998~2007) and the annual average range of fluctuation is 9.90%. However, for conservativeness, ±15% has been applied as the range of fluctuation for sensitivity analysis.
	+15%	-46,217	
O&M cost	-10%	-36,259	The range of fluctuation on O&M cost can be decided by considering the inflation rate of Korea for past 5 years (2003~2007) and the annual average range of fluctuation is 2.16%. However, for conservativeness, ±10% has been applied as the range of fluctuation for sensitivity analysis.
	+10%	-37,180	
Unit cost of electricity sales	-20%	-42,753	The range of fluctuation on unit cost of electricity sales can be decided by considering SMP for past 3 years (2005~2007) and the annual average range of fluctuation is 17.21%. However, for conservativeness, ±20% has been applied as the range of fluctuation for sensitivity analysis.
	+20%	-30,685	
Electricity generation	-20%	-42,754	Electricity generation by PV power plant is affected by amount of daylight. Because amount of daylight in Gimcheon is not measured and solar condition of Daejeon is similar to one of Gimcheon, amount of daylight measured in Daejeon City was considered when this project was planned. Therefore, the range of fluctuation on electricity generation was decided by considering the amount of daylight for past 15 years (1992~2006) and the annual average range of fluctuation is 4.9%. However, considering similar CDM projects, for conservativeness, ±20% has been applied as the range of fluctuation for sensitivity analysis.
	+20%	-30,685	
Discount rate	-10%	-35,340	The range of fluctuation on discount rate was decided by considering the 10-year government bond rate for past 5 years (2003~2007) and the

	+10%	-38,008	annual average range of fluctuation is 3.27%. However, for conservativeness, ±10% has been applied as the range of fluctuation for sensitivity analysis.

The result of sensitivity analysis confirms that this project is not financially attractive and it shows that the project participant promoted this project for GHG emission reduction and clean environment not for financial benefit.

By the CERs sales revenue, NPV of this project can be higher a little but unfortunately it seems to be difficult that NPV is higher than 0 even though the project participant earns CERs sales revenue and the price of CERs gets higher. However, this small advantage can affect the project participant affirmatively to promote this project because the project participant thinks the importance of this project as GHG mitigation project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

1. Baseline emissions

Applied methodology to this project is AMS I.D. "Grid connected renewable electricity generation"(Version 13).

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

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

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

To calculate baseline emissions, the electricity produced by the renewable generating unit (the project activity) was estimated under consideration of facility efficiency and environmental condition. For an emission coefficient, among two options above, (a) has been chosen and the procedure to calculate CM is as follows:

Step 1. Identify the relevant electric power system

For the purpose of determining the electricity emission factors, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

Similarly, a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected

electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

Where the application of these criteria does not result in a clear grid boundary, use a regional grid definition in the case of large countries with layered dispatch systems. A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other largest) grid definition should be used by default.
In Korea, there is one grid, national grid.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to transmission capacity enable significant increases n imported electricity. In such cases, the transmission capacity may be considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO2 emission factor(s) for net electricity imports from a connected electricity system within the same country(ies):

(a) 0 tCO2/MWh, or

(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in step 3 (d) below; or

(c) The simple operating margin emission rate of the exporting grid, determined as described in step 3 (a), if the conditions for this method, as described in step 2 below, apply to the exporting grid; or

(d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in step 3 (b) below.

For this project, (b) has been chosen.

Step 2. Select an operating margin (OM) method
The calculation of the operating margin emission factor is based on one of the following method:

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

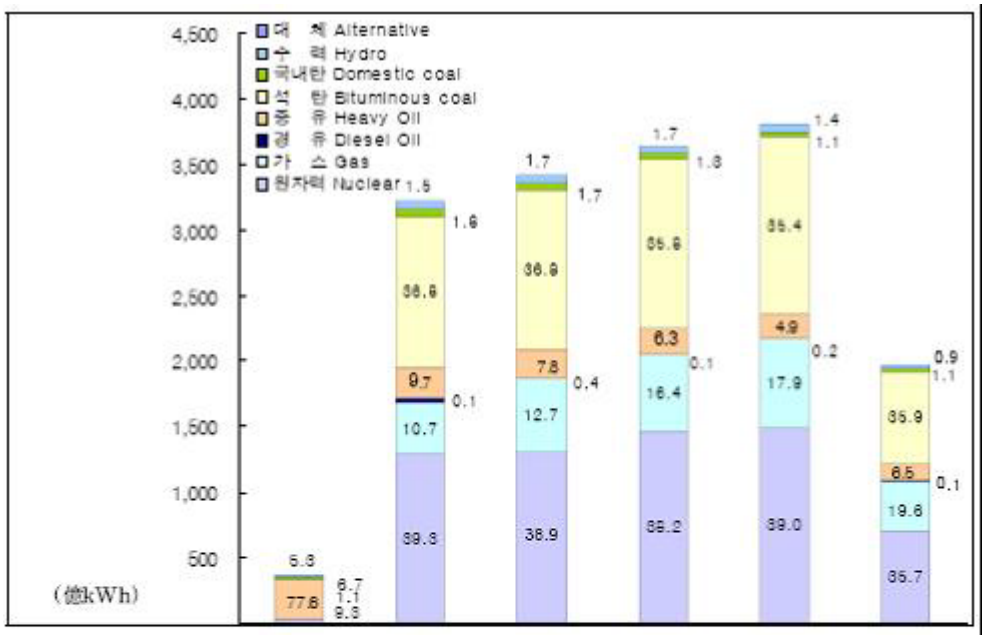
Any of the four methods can be used, however, the simple OM method (a) can only be used of low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

For simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintage;

▪ Ex ante option : A 3-year generation – weighted average, based on the most recent date available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

▪ Ex post option : 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.

In Korea, low-cost/must-run resources constitute 41.6% of total grid generation in average of the five most recent years, 2003~June 2007. (Source: KEPCO in brief June 2007) Therefore, (a) Simple OM can be applied for OM calculation.



(單位 Unit : 百萬kWh million kWh)

區分 Item \ 年度 Year		1980	2003	2004	2005	2006	2007. 6
水 力 Hydro		1,984	6,887	5,861	5,189	5,219	1,698
火 力 Thermal	國內炭Coal(Dom.)	2,481	5,398	4,603	4,484	4,312	2,261
	石 炭Coal(Bitum.)	-	114,878	122,556	129,174	134,894	70,613
	重油 Oil(Heavy)	28,876	23,656	21,591	20,079	18,596	12,838
	輕油 Oil(Diesel)	421	2,870	474	412	599	218
	가 스 Gas	-	39,091	55,999	58,118	68,302	38,492
原子力 Nuclear		3,477	129,672	130,715	146,779	148,749	70,167
代替에너지 (alternative)		-	-	350	404	511	418
計 Total		37,239	322,452	342,148	364,638	381,181	196,705

<Figure 4> Gross generation by energy sources (Source: KEPCO in brief June 2007)

Also, between 2 options for simple OM, ex-ante option and ex-post option, ex ante option is going to be applied.

Step 3. Calculate the operating margin emission factor according to the selected method

(a) Simple OM

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. It may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant /unit (Option A), or
- Base on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Operation B), or
- Based on data 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 (Option C)

Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. For this project, Option A has been chosen. [i,m]

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

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

Where :

$EF_{grid,Omsimple,y}$ = Simple operating margin CO2 emission factor in year *y* (tCO2.MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power plant / unit *m* in year *y* (mass of volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant/unit *m* in year *y* (MWh)
m = All power plants / units serving the grid in year *y* except low-cost / must-run power plants /units
i = All fossil fuel types combusted in power plant / unit *m* in year *y*
y = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

According to the method and the equation above, $EF_{grid,Omsimple,2005\sim2007}$ is 0.7117 tCO2/MWh.
For the data used to calculate OM, please refer to Annex 3 Baseline Information.

Step 4. Identify the cohort of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.
As a general guidance, a power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plants registered as CDM project activities should be excluded from the sample group m.

For the sample group m of this project, please refer to the table below.

<Table 8> sample group *m* for BM calculation

Sample group m	Annual generation (MWh)	Rate (%)
(a) The set of five power units that have been built most recently	1,297,958	0.34%
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently	77,239,700	20.19%

The annual generation of (b) group is larger than one of (a) group. Therefore, (b) group has been chosen as the sample group m for this project activity.

Step 5. Calculate the build margin emission factor
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:
$EF_{grid,BM,y}$ = Build 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 = Power units included in the build margin
y = Most recent historical year for which power generation data is available

According to the selected sample group m and equation above, $EF_{grid,BM,y}$ is 0.3258 tCO2/MWh.
For the data used to calculate OM, please refer to Annex 3 Baseline Information.

Step 6. Calculate the combined margin emissions factor
The combined margin emissions factor is calculated as follows:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission actor in year y (tCO2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

Owing to intermittent and non-dispatchable nature of wind and solar power, in wind and solar power generation project activities, the default values should be used for w_{OM} and w_{BM}. They are w_{OM} = 0.75 and w_{BM} = 0.25 for the first crediting period and for subsequent crediting periods.

After calculating the combined margin emissions factor with the equation and default values above, EFgrid,CM,2008 has been decided as 0.6152 tCO2/MWh.
Baseline emissions (BEy in tCO2) are then, the product of the baseline emissions factor (EFy in tCO2/MWh) times the electricity supplied by the project activity to the grid (EGy in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh). However, this project is not a modification or retrofit of facilities, so the equation is as follows:

$BE_y = EG_y \times EF_y$

2. Project emissions
This project activity is electricity generation of which energy source is solar energy. Therefore, no greenhouse gas is emitted by this project activity and it means that project emission (PE_y) is zero.

3. Leakage
Leakage due to the project is not occurred.

4. Emission reductions
$ER_y = BE_y - PE_y$

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**EF_{2008}**
Data unit:	tCO2/MWh
Description:	Baseline CO2 emission factor in year y
Source of data used:	Calculation
Value applied:	0.6152
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is calculated according to “Tool to calculate the emissions factor for an electricity system”.
Any comment:	-This value will be applied for the crediting period. -For detail calculation procedure, please refer to Annex 3.

Data / Parameter:	$EF_{grid,OM,2008}$
Data unit:	tCO2/MWh
Description:	Operating margin CO2 emission factor in year y
Source of data used:	Calculation
Value applied:	0.7117
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is calculated according to "Tool to calculate the emissions factor for an electricity system". The sources of the data used to calculate this value are Statistics of Electric Power in Korea, Statistics of Electric Power in Korea and Statistics of Electric Power in Korea (2005, 2006, 2007) (Source: KEPCO).
Any comment:	For detail calculation procedure, please refer to Annex 3.

Data / Parameter:	$EF_{grid,BM,2008}$
Data unit:	tCO2/MWh
Description:	Build margin CO2 emission factor in year y
Source of data used:	Calculation
Value applied:	0.3258
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is calculated according to "Tool to calculate the emissions factor for an electricity system". The sources of the data used to calculate this value are Statistics of Electric Power in Korea (2007) (Source: KEPCO) and Status of Generation Facility (2007) (Source: Korea Power Exchange).
Any comment:	For detail calculation procedure, please refer to Annex 3.

B.6.3 Ex-ante calculation of emission reductions:

The capacity of the project, PV power plant, is 9.3MW and it is estimated that 12,835MWh of electricity will be produced annually by this project.

$PE_y = 0$

$BE_y = EG_y \times EF_y$
$= 12,835MWh \times 0.6152\ tCO2/MWh$
$= 7,896\ tCO2$

$ER_y = 7,896\ tCO2 – 0\ tCO2$
$= 7,896\ tCO2$

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tCO2e)	Estimation of baseline emissions (tCO2e)	Estimation of leakage (tCO2e)	Estimation of overall emission reductions (tCO2e)
Year 1	**0**	**8,003**	**0**	**8,003**
Year 2	**0**	**7,979**	**0**	**7,979**

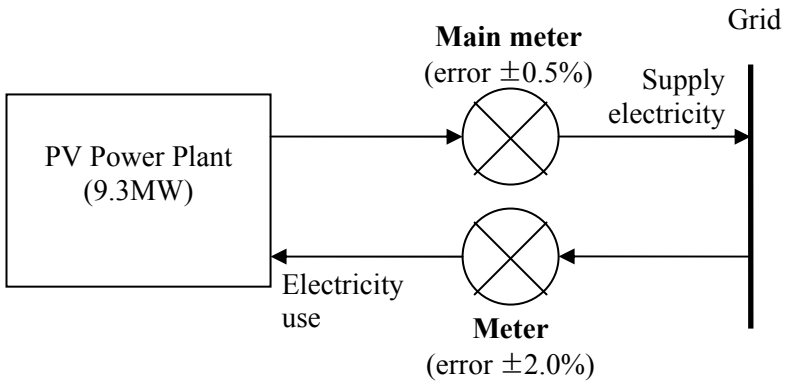
Year 3	**0**	**7,955**	**0**	**7,955**
Year 4	**0**	**7,931**	**0**	**7,931**
Year 5	**0**	**7,908**	**0**	**7,908**
Year 6	**0**	**7,884**	**0**	**7,884**
Year 7	**0**	**7,860**	**0**	**7,860**
Year 8	**0**	**7,837**	**0**	**7,837**
Year 9	**0**	**7,813**	**0**	**7,813**
Year 10	**0**	**7,790**	**0**	**7,790**
Total (tCO2e)	**0**	**78,960**	**0**	**78,960**

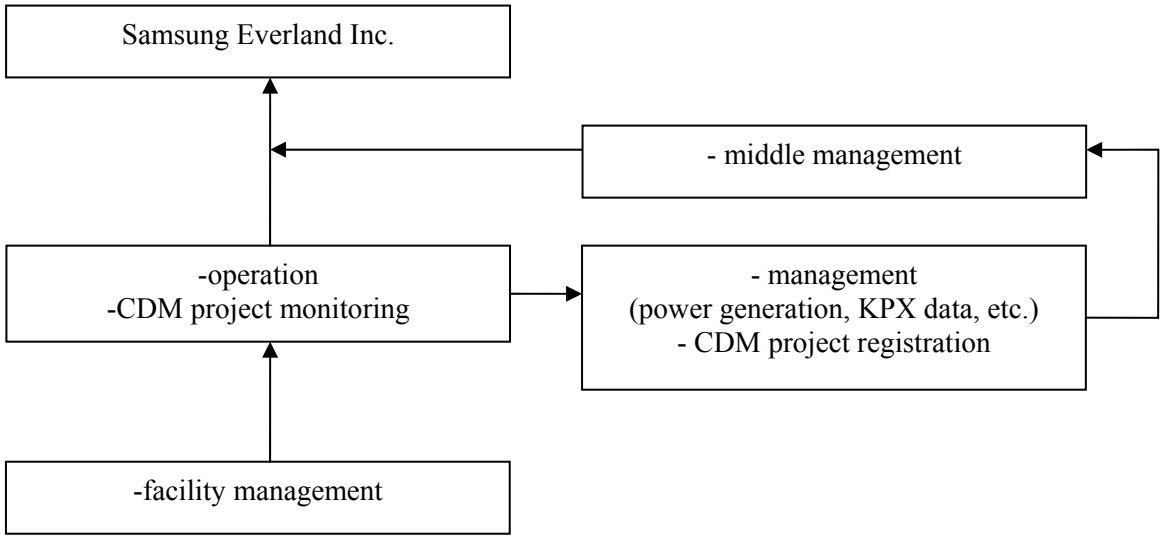
B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**EGy**
Data unit:	MWh
Description:	Net electricity generate and delivered to the grid by the project activity
Source of data to be used:	Actual measurement
Value of data	12,835MWh/yr
Description of measurement methods and procedures to be applied:	Read from a watt-hour meter
QA/QC procedures to be applied:	-Uncertainty is low -A measuring instrument will be calibrated every 2 years. -QA/QC guidance and procedure will follow Measures Act and Rules on Electricity Market Management.
Any comment:	-Data will be kept for 2 years after the end of the crediting period. -Data will be measured hourly and recorded monthly. -Measured data will be double checked against receipt of sales. -Electricity supplied from the grid to the project site will be monitored and it will be subtracted from total electricity generation.

B.7.2 Description of the monitoring plan:





Sales Support Team is in charge of all tasks related to this project (operation, management, monitoring etc.).

Responsible department and person for the monitoring are as follows:
- total management : Samsung Everland Inc.

- middle management : Sales Support Team

- operation and CDM project monitoring: Sales Support Team

- management (power generation, KPX data, etc.)
: Sales Support Team

- facility management : Sales Support Team

- CDM project registration : Sales Support Team

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

- date of completion of the application of the methodology to the project activity

: 01/08/2008

- responsible person/entity for the application of the methodology to the project activity

: Cho, A-ra / Samsung Everland Inc.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

14/03/2008 – the date on which the project participant made the first supply contract for modules.

C.1.2. Expected operational lifetime of the project activity:

20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

N/A

C.2.1.2. Length of the first crediting period:

N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/08/2009 or on the date of registration of the CDM project activity, whichever is later.

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The analysis of the environmental impacts of the project activity was performed and analysis items are air, water, soil, ecology and life environment.
The report on the environmental analysis which consists of 673pages has been submitted to DOE.
For the summary of the report, please refer to D.2.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Short summary of the report is as follows:

Air

Impacts	Countermeasures
Air pollution forecast during the construction complies the environmental regulation.	For prevention, install washing facility for cars and wheels which are used for the construction.

Water

Impacts	Countermeasures
Increase of floodwaters under construction	Installation of temporary settlement tank and reservoir

Soil/Topography

Impacts	Countermeasures
Soil pollution by waste oil which is from a car in a process of construction Topographical change	Prohibit changing oil of a car inside the project site To minimize topographical change, construct a retaining wall at the bottom of the site By installation of pipelines for rainwater, make it easy to drain rainwater

Ecology

Impacts	Countermeasures
Trees which need protect or precious natural treasure is not distributed around the site. Impact on trees planted at the site can be happened.	Transplant some trees which are in good condition

Life environment

Impacts	Countermeasures
Noise: noise level during the construction is forecasted as 55.3dB~86.0dB which exceeds the limit of regulation 65dB.	Avoid using construction equipments at the same time Limit that construction equipments should be used during the day time (08:00~18:00)

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

To collect stakeholders' comments, project participant performed activities as below:

1. receive residents' proposal – 30 January, 2008

2. public inspection of the report on prior environmental review – 19 March,2008 ~ 2 April, 2008

3. Presentation of the report on prior environmental review – 26 March, 2008

4. notice on decision of city management plan of Gimcheon and topographical map – 26 May, 2008
: The regional government of Gyeongbuk-Do noticed that the purpose of land which is the project site had changed from farmland to photovoltaic power plant. The regional government also noticed topographical map would change after construction of this project.

5. Public inspection and presentation of the report on environmental analysis – 23 May, 2008
: Project participant could collect the opinion of Daegu Regional Environmental Office, Gimcheon and local residents.

6. Public inspection of permission on the execution plan – 11 June 2008

E.2. Summary of the comments received:

Most comments are related to the environment and are similar to section D. The related document, the report on the environmental analysis, has been submitted to DOE.

Besides comments on environmental impact, the effect of sunlight reflection caused by solar panels was mentioned. It was concerned that sunlight reflection by the solar panels may impact vehicles and residents around the site.

E.3. Report on how due account was taken of any comments received:

Comment received	Countermeasure
Solar cells can reflect sunlight and it can impact vehicle and residents around the site.	- For the analysis of the environment impacts, the impact of sunlight reflection was simulated. According to the simulation result, the impact is expected to be insignificant. * simulation results - A road and residents around the project site seem not to be affected by the sunlight reflection. - Solar panels, of which reflexibility is 20%, absorb most sunlight and reflected sunlight is toward the sky. Therefore, reflected sunlight which is toward the earth's surface will be insignificant. - Even though simulation results show that sunlight

	reflection impact is expected to be insignificant, PP will keep trying to let local residents not to have disadvantage caused by sunlight refection PP will communicate with local residents continuously and monitor their comments and correspond properly.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Samsung Everland Inc.
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E-Mail:	
URL:	
Represented by:	
Title:	CEO
Salutation:	Mr.
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Middle Name:	
First Name:	JooHyeon
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This project does not receive any public funding.

Annex 3

BASELINE INFORMATION

(1) Calculating OM

Year	Generation (MWh)	CO2 emissions (tonCO2)	CEF (tonCO2/MWh)
2005	195,045,065	141,038,293	0.7231
2006	206,605,293	147,500,772	0.7139
2007	234,054,759	164,192,329	0.7002
$EF_{grid,OM,2008}$			0.7117

<Table Annex 3-1> Data on fuel consumption for calculating OM
-Fuel consumption in 2005-

Plant name		Fuel consumption			
		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Honam	#1	870,214	961	278	-
	#2	912,497	338	185	-
Samchonpo	#1	1,534,223	-	1,220	-
	#2	1,731,265	-	626	-
	#3	1,723,152	-	377	-
	#4	1,632,334	-	1,029	-
	#5	1,516,654	-	1,415	-
	#6	1,546,663	-	1,001	-
Yongheng	#1	2,081,972	-	4,541	-
	#2	1,761,395	-	2,903	-
Boryeong	#1	1,440,343	-	761	-
	#2	1,388,532	-	551	-
	#3	1,589,150	-	90	-
	#4	1,421,343	-	603	-
	#5	1,587,999	-	156	-
	#6	1,260,305	-	627	-
Taean	#1	1,508,570	-	621	-
	#2	1,323,078	-	395	-
	#3	1,494,175	-	650	-

Plant name		Fuel consumption			
		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Taean	#4	1,383,297	-	365	-
	#5	1,411,398	-	742	-
	#6	1,504,962	-	417	-
Hadong	#1	1,513,930	-	284	-
	#2	1,410,099	-	792	-
	#3	1,422,196	-	472	-
	#4	1,511,054	-	567	-
	#5	1,345,648	-	614	-
	#6	1,520,774	-	331	-
Dangjin	#1	1,438,702	-	637	-
	#2	1,437,473	-	632	-
	#3	1,549,041	-	141	-
	#4	1,544,010	-	134	-
	#5	499,714	-	5,701	-
	#6	38,671	-	1,779	-
Ulsan	#1	-	70,183	750	-
	#2	-	67,296	585	-
	#3	-	53,085	662	-
	#4	-	375,417	1,971	-
	#5	-	363,992	1,676	-
	#6	-	352,776	1,708	-
Youngnam	#1	-	359,910	844	-
	#2	-	190,085	584	-
Yosu	#1	-	106,919	434	-
	#2	-	218,356	346	-
Pyongtaek	#1	-	293,214	118	3,553
	#2	-	321,188	140	2,641
	#3	-	308,042	132	1,784
	#4	-	311,245	138	2,047
Namjeju	#1	-	14,628	15	-
	#2	-	15,031	12	-
Jeju	#1	-	12,564	12	-
	#2	-	129,516	-	-
	#3	-	122,866	48	-
Seoul	#4	-	-	-	49,143

Plant name	Fuel consumption			
	bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Seoul #5	-	-	1	108,761
Incheon #1	-	-	-	4,365
#2	-	-	-	8,505
#4	-	-	400	6,620
Namjeju D/P	-	56,727	37	-
Jeju G/T	-	-	2,869	-
Jeju D/P	-	31,808	72	-
Pyongtaek C/C	-	-	1	110,953
Ilsan C/C	-	-	-	533,188
Bundang C/C	-	-	-	671,944
Ulsan C/C	-	-	-	470,131
Seoincheon C/C	-	-	335	989,645
Shinincheon C/C	-	-	-	1,458,763
Boryeong C/C	-	-	-	1,161,510
Incheon C/C	-	-	-	281,813
Busan C/C	-	-	-	1,211,144
Hallim C/C	-	-	29,686	-
Anyang C/C	-	-	-	261,202
Bucheon C/C	-	-	-	261,705
POSCO POWER	-	-	-	445,253
G S Bugog	-	-	-	297,976
Yulchon	-	-	159	194,534

-Fuel consumption in 2006-

Plant name	Fuel consumption			
	bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Honam #1	781,139	1,113	279	-
#2	859,736	1,251	359	-
Samchonpo #1	1,696,271	-	860	-
#2	1,508,082	-	1,362	-
#3	1,519,385	-	457	-
#4	1,521,263	-	1,818	-

Plant name		Fuel consumption			
		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Samchonpo	#5	1,665,339	-	977	-
	#6	1,770,348	-	428	-
Yongheng	#1	2,004,193	-	2,548	-
	#2	2,129,118	-	2,545	-
Boryeong	#1	1,638,140	-	306	-
	#2	1,389,425	-	1,137	-
	#3	1,323,779	-	514	-
	#4	1,610,928	-	82	-
	#5	1,296,455	-	541	-
	#6	1,553,273	-	518	-
Taean	#1	1,354,832	-	514	-
	#2	1,532,209	-	162	-
	#3	1,338,967	-	575	-
	#4	1,548,909	-	133	-
	#5	1,542,775	-	544	-
	#6	1,294,577	-	1,113	-
	#7	61,910	-	4,799	-
Hadong	#1	1,373,049	-	515	-
	#2	1,543,074	-	293	-
	#3	1,549,094	-	153	-
	#4	1,376,612	-	796	-
	#5	1,554,524	-	242	-
	#6	1,371,801	-	690	-
Dangjin	#1	1,380,527	-	966	-
	#2	1,570,077	-	161	-
	#3	1,402,916	-	433	-
	#4	1,386,317	-	1,549	-
	#5	1,456,458	-	745	-
	#6	1,216,582	-	3,051	-
	#7	1,008	-	505	-
Ulsan	#1	-	72,243	605	-
	#2	-	80,187	469	-
	#3	-	96,459	518	-
	#4	-	360,919	3,729	-
	#5	-	375,985	3,678	-

Plant name		Fuel consumption			
		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Ulsan	#6	-	378,331	3,694	-
Youngnam	#1	-	107,090	1,016	-
	#2	-	95,127	1,494	-
Yosu	#1	-	99,129	281	-
	#2	-	215,957	291	-
Pyongtaek	#1	-	261,458	141	3,997
	#2	-	277,025	166	5,687
	#3	-	303,858	134	3,891
	#4	-	245,602	103	3,473
Namjeju	#1	-	11,406	17	-
	#2	-	9,772	14	-
	#3	-	46,504	2,509	-
Jeju	#1	-	8,603	23	-
	#2	-	113,679	64	-
	#3	-	117,464	67	-
Seoul	#4	-	-	1	69,383
	#5	-	-	1	152,891
Incheon	#1	-	-	-	6,945
	#2	-	-	-	5,223
	#3	-	-	311	15,426
	#4	-	-	311	12,454
Namjeju	D/P	-	51,347	111	-
Jeju	G/T	-	-	8,264	-
Jeju	D/P	-	52,907	-	-
Pyongtaek	C/C	-	-	45	84,054
Ilsan	C/C	-	-	1,384	556,504
Bundang	C/C	-	-	-	720,381
Ulsan	C/C	-	-	-	536,196
Seoincheon	C/C	-	-	1,066	1,199,196
Shinincheon	C/C	-	-	-	1,641,038
Boryeong	C/C	-	-	-	998,683
Incheon	C/C	-	-	-	484,606
Busan	C/C	-	-	-	1,396,417
Hallim	C/C	-	-	48,475	-
Plant name		Fuel consumption			

	bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Anyang C/C	-	-	-	230,969
Bucheon C/C	-	-	215	225,713
POSCO POWER	-	-	-	408,018
G S Bugog	-	-	-	389,811
Yulchon	-	-	-	315,132

-Fuel consumption in 2007-

Plant name		Fuel consumption			
		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Honam	#1	866,853	889	281	-
	#2	846,931	811	262	-
Samchonpo	#1	1,631,706	-	296	-
	#2	1,804,695	-	384	-
	#3	1,755,374	-	434	-
	#4	1,543,140	-	677	-
	#5	1,850,764	-	315	-
	#6	1,714,320	-	619	-
Yonghung	#1	1,902,557	-	3,320	-
	#2	2,296,289	-	1,779	-
	#3	119,883	-	3,964	-
Boryeong	#1	1,466,761	-	811	-
	#2	1,655,488	-	169	-
	#3	1,648,008	-	187	-
	#4	1,347,303	-	646	-
	#5	1,629,904	-	195	-
	#6	1,490,809	-	387	-
Taean	#1	1,524,391	-	410	-
	#2	1,434,221	-	374	-
	#3	1,521,349	-	350	-
	#4	1,320,380	-	422	-
	#5	1,342,358	-	676	-
	#6	1,535,931	-	491	-
Plant name		Fuel consumption			

		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Taean	#7	1,430,171	-	2,321	-
	#8	919,055	-	3,636	-
Hadong	#1	1,582,726	-	178	-
	#2	1,396,830	-	637	-
	#3	1,424,033	-	375	-
	#4	1,572,409	-	292	-
	#5	1,486,776	-	452	-
	#6	1,585,307	-	109	-
Dangjin	#1	1,512,904	-	269	-
	#2	1,358,316	-	543	-
	#3	1,516,065	-	119	-
	#4	1,519,231	-	342	-
	#5	1,279,796	-	1,038	-
	#6	1,281,318	-	878	-
	#7	1,059,612	-	6,681	-
	#8	467,807	-	4,873	-
Ulsan	#1	-	107,844	406	-
	#2	-	108,381	483	-
	#3	-	120,571	576	-
	#4	-	341,170	3,525	-
	#5	-	370,712	4,711	-
	#6	-	216,409	3,021	-
Youngnam	#1	-	174,082	1,232	-
	#2	-	122,249	796	-
Yosu	#1	-	121,572	332	-
	#2	-	257,420	367	-
Pyongtaek	#1	-	269,284	114	3,316
	#2	-	359,870	140	6,339
	#3	-	349,481	157	4,874
	#4	-	255,443	117	4,047
Namjeju	#1	-	-	-	-
	#2	-	-	-	-
	#3	-	124,559	225	-
	#4	-	127,900	341	-
Jeju	#1	-	1,049	4	-
Plant name		Fuel consumption			

		bituminous coal (t)	heavy oil (kl)	diesel oil (kl)	LNG (t)
Jeju	#2	-	70,122	112	-
	#3	-	98,846	34	-
Seoul	#4	-	-	1	75,080
	#5	-	-	1	206,908
Incheon	#1	-	-	-	30,402
	#2	-	-	-	31,528
	#3	-	-	354	41,270
	#4	-	-	201	18,892
Bundang fuel cell		-	-	-	313
Namjeju	D/P	-	35,297	238	-
Jeju	G/T	-	-	850	-
Jeju	D/P	-	49,613	-	-
Pyongtaek C/C		-	-	67	151,414
Ilsan	C/C	-	-	-	635,260
Bundang	C/C	-	-	3	660,899
Ulsan	C/C	-	-	-	649,494
Seoincheon	C/C	-	-	-	1,495,687
Shinincheon	C/C	-	-	-	1,761,001
Boryeong	C/C	-	-	-	1,121,251
Incheon	C/C	-	-	-	494,690
Busan	C/C	-	-	-	1,552,997
Hallim	C/C	-	-	17,753	-
Anyang	C/C	-	-	-	289,384
Bucheon	C/C	-	-	-	269,651
POSCO POWER	C/C	-	-	-	660,445
G S Bugog	C/C	-	-	-	371,586
Yulchon	C/C	-	-	-	292,336

<Table Annex 3-2> Caloric Value
-2005-

		Caloric Value			
		bituminous coal (kcal/kg)	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)
Honam	#1	5,122	9,343	8,368	-
	#2	5,107	9,362	8,364	-
Samchonpo	#1	5,618	-	8,399	-
	#2	5,628	-	8,439	-
	#3	5,602	-	8,550	-
	#4	5,603	-	8,496	-
	#5	5,079	-	8,183	-
	#6	5,107	-	8,550	-
Yongheng	#1	5,824	-	8,488	-
	#2	5,750	-	8,500	-
Boryeong	#1	5,539	-	8,496	-
	#2	5,525	-	8,496	-
	#3	5,588	-	8,303	-
	#4	5,596	-	8,311	-
	#5	5,588	-	8,312	-
	#6	5,606	-	8,312	-
Taean	#1	5,700	-	8,257	-
	#2	5,708	-	8,249	-
	#3	5,707	-	8,242	-
	#4	5,699	-	8,270	-
	#5	5,730	-	8,242	-
	#6	5,716	-	8,256	-
Hadong	#1	5,703	-	8,493	-
	#2	5,697	-	8,481	-
	#3	5,698	-	8,533	-
	#4	5,699	-	8,491	-
	#5	5,695	-	8,526	-
	#6	5,695	-	8,481	-
Dangjin	#1	5,664	-	8,392	-
	#2	5,664	-	8,469	-
	#3	5,638	-	8,402	-
	#4	5,644	-	8,387	-
	#5	5,809	-	8,458	-
	#6	5,910	-	10,540	-
Ulsan	#1	-	9,405	8,660	-
	#2	-	9,408	8,657	-
	#3	-	9,413	8,663	-
		Caloric Value			

		bituminous coal (kcal/kg)	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)
	#4	-	9,501	8,666	-
	#5	-	9,494	8,666	-
	#6	-	9,480	8,662	-
Youngnam	#1	-	7,108	8,495	-
	#2	-	7,342	8,496	-
Yosu	#1	-	9,462	8,442	-
	#2	-	9,447	8,441	-
Pyongtaek	#1	-	9,407	8,496	11,608
	#2	-	9,409	8,513	11,585
	#3	-	9,412	8,502	11,647
	#4	-	9,413	8,502	11,604
Namjeju	#1	-	9,384	8,853	-
	#2	-	9,385	8,842	-
Jeju	#1	-	9,435	8,441	-
	#2	-	9,433	-	-
	#3	-	9,429	8,491	-
Seoul	#4	-	-	-	11,702
	#5	-	-	8,617	11,707
Incheon	#1	-	-	-	11,729
	#2	-	-	-	11,723
	#4	-	-	8,506	11,723
Namjeju	D/P	-	9,383	8,526	-
Jeju	G/T	-	-	8,473	-
Jeju	D/P	-	-	8,506	-
Pyongtaek	C/C	-	-	8,503	11,727
Ilsan	C/C	-	-	-	11,710
Bundang	C/C	-	-	-	11,723
Ulsan	C/C	-	-	-	11,475
Seoincheon	C/C	-	-	8,740	11,709
Shinincheon	C/C	-	-	-	11,712
Boryeong	C/C	-	-	-	11,727
Incheon	C/C	-	-	-	11,711
Busan	C/C	-	-	-	11,700
Hallim	C/C	-	-	8,524	-
* Anyang C/C	(Other co.)	-	-	-	11,723
* Bucheon C/C	(")	-	-	-	11,702
* POSCO POWER	(")	-	-	-	11,721
		Caloric Value			
		bituminous	heavy oil	diesel oil	LNG

		coal (kcal/kg)	(kcal/l)	(kcal/l)	(kcal/kg)
* G S Bugog	(")	-	-	-	12,381
Yulchon	(")	-	-	10,384	11,721

-2006-

		Caloric Value			
		bituminous coal (kcal/kg)	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)
Honam	#1	5,164	9,318	8,472	-
	#2	5,137	9,332	8,426	-
Samchonpo	#1	5,640	-	8,373	-
	#2	5,645	-	8,373	-
	#3	5,565	-	8,373	-
	#4	5,568	-	8,363	-
	#5	4,974	-	8,550	-
	#6	4,993	-	8,550	-
Yongheng	#1	5,768	-	8,447	-
	#2	5,782	-	8,454	-
Boryeong	#1	5,479	-	8,412	-
	#2	5,478	-	8,496	-
	#3	5,552	-	8,496	-
	#4	5,533	-	8,496	-
	#5	5,552	-	8,312	-
	#6	5,542	-	8,312	-
Taean	#1	5,683	-	8,312	-
	#2	5,679	-	7,952	-
	#3	5,684	-	8,216	-
	#4	5,680	-	8,232	-
	#5	5,638	-	8,232	-
	#6	5,662	-	8,232	-
	#7	5,667	-	8,130	-
Hadong	#1	5,670	-	8,396	-
	#2	5,662	-	8,482	-
	#3	5,660	-	8,481	-
	#4	5,671	-	8,384	-
	#5	5,665	-	8,466	-
	#6	5,669	-	8,456	-
Dangjin	#1	5,588	-	8,526	-
	#2	5,611	-	8,529	-
		Caloric Value			
		bituminous coal	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)

		(kcal/kg)			
	#3	5,592	-	8,556	-
	#4	5,581	-	8,564	-
	#5	5,743	-	8,507	-
	#6	5,814	-	8,450	-
	#7	5,527	-	8,535	-
Ulsan	#1	-	9,419	8,664	-
	#2	-	9,427	8,664	-
	#3	-	9,423	8,664	-
	#4	-	9,529	8,664	-
	#5	-	9,531	8,664	-
	#6	-	9,533	8,664	-
Youngnam	#1	-	9,631	8,403	-
	#2	-	9,605	8,419	-
Yosu	#1	-	9,465	8,358	-
	#2	-	9,456	8,356	-
Pyongtaek	#1	-	9,222	8,496	11,647
	#2	-	9,233	8,496	11,647
	#3	-	9,260	8,501	11,573
	#4	-	9,208	8,501	11,667
Namjeju	#1	-	9,413	8,525	-
	#2	-	9,412	8,504	-
	#3	-	9,403	8,491	-
Jeju	#1	-	9,454	8,524	-
	#2	-	9,455	8,524	-
	#3	-	-	8,617	11,716
Seoul	#4	-	-	8,617	11,716
	#5	-	-	8,617	11,594
Incheon	#1	-	-	-	11,733
	#2	-	-	-	11,725
	#3	-	-	8,533	11,716
	#4	-	-	8,532	11,722
Namjeju	D/P	-	9,734	8,462	-
Jeju	G/T	-	-	8,352	-
Jeju	D/P	-	9,136	-	-
Pyongtaek	C/C	-	-	8,503	11,727
Ilsan	C/C	-	-	8,540	11,715
Bundang	C/C	-	-	-	11,723
Ulsan	C/C	-	-	-	11,381
Seoincheon	C/C	-	-	8,740	11,723
Shinincheon	C/C	-	-	-	11,723
		Caloric Value			
		bituminous coal	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)

		(kcal/kg)			
Boryeong	C/C	-	-	-	11,730
Incheon	C/C	-	-	-	11,698
Busan	C/C	-	-	-	11,716
Hallim	C/C	-	-	8,506	-
* Anyang C/C	(Other co.)	-	-	-	11,726
* Bucheon C/C	(")	-	-	10,381	11,711
* POSCO POWER	(")	-	-	-	11,728
* G S Bugog	(")	-	-	-	11,727
Yulchon	(")	-	-	-	12,039

-2007-

		Caloric Value			
		bituminous coal (kcal/kg)	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)
Honam	#1	5,186	9,311	8,497	-
	#2	5,190	9,311	8,493	-
Samchonpo	#1	5,545	-	8,373	-
	#2	5,537	-	8,373	-
	#3	5,525	-	8,349	-
	#4	5,540	-	8,349	-
	#5	4,865	-	8,550	-
	#6	4,864	-	8,550	-
Yonghung	#1	5,745	-	8,391	-
	#2	5,739	-	8,457	-
	#3	5,822	-	7,878	-
Boryeong	#1	5,519	-	8,496	-
	#2	5,515	-	8,496	-
	#3	5,518	-	8,655	-
	#4	5,513	-	8,944	-
	#5	5,520	-	8,655	-
	#6	5,518	-	8,655	-
Taean	#1	5,733	-	8,174	-
	#2	5,733	-	8,387	-
	#3	5,734	-	8,388	-
	#4	5,727	-	7,963	-
	#5	5,686	-	8,361	-
		Caloric Value			
		bituminous coal	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)

		(kcal/kg)			
	#6	5,695	-	8,347	-
	#7	5,717	-	8,044	-
	#8	5,722	-	7,256	-
Hadong	#1	5,647	-	8,492	-
	#2	5,645	-	8,456	-
	#3	5,627	-	8,469	-
	#4	5,639	-	8,519	-
	#5	5,652	-	8,492	-
	#6	5,640	-	8,495	-
Dangjin	#1	5,660	-	8,610	-
	#2	5,663	-	8,606	-
	#3	5,657	-	8,617	-
	#4	5,659	-	8,635	-
	#5	5,713	-	8,620	-
	#6	5,737	-	8,613	-
	#7	5,725	-	8,621	-
	#8	5,742	-	8,596	-
Ulsan	#1	-	9,413	8,664	-
	#2	-	9,420	8,664	-
	#3	-	9,360	8,664	-
	#4	-	9,508	8,664	-
	#5	-	9,511	8,664	-
	#6	-	9,502	8,664	-
Youngnam	#1	-	9,643	8,402	-
	#2	-	9,643	8,403	-
Yosu	#1	-	9,464	8,368	-
	#2	-	9,462	8,370	-
Pyongtaek	#1	-	9,445	8,534	11,650
	#2	-	9,448	8,530	11,653
	#3	-	9,447	8,518	11,650
	#4	-	9,460	8,517	11,651
Namjeju	#1	-	-	-	-
	#2	-	-	-	-
	#3	-	9,411	8,201	-
	#4	-	9,410	8,515	-
Jeju	#1	-	9,412	8,458	-
	#2	-	9,420	7,906	-
	#3	-	9,419	8,490	-
Seoul	#4	-	-	7,411	11,727
	#5	-	-	8,617	11,727
		Caloric Value			
		bituminous coal	heavy oil (kcal/l)	diesel oil (kcal/l)	LNG (kcal/kg)

		(kcal/kg)			
Incheon	#1	-	-	-	11,727
	#2	-	-	-	11,730
	#3	-	-	8,514	11,730
	#4	-	-	8,483	11,730
Bundang fuel cell		-	-	-	11,673
Namjeju	D/P	-	9,419	8,323	-
Jeju	G/T	-	-	8,447	-
Jeju	D/P	-	9,396	-	-
Pyongtaek C/C		-	-	8,503	11,739
Ilsan	C/C	-	-	-	11,725
Bundang	C/C	-	-	8,716	11,728
Ulsan	C/C	-	-	-	11,610
Seoincheon	C/C	-	-	-	11,739
Shinincheon	C/C	-	-	-	11,735
Boryeong	C/C	-	-	-	11,735
Incheon	C/C	-	-	-	11,726
Busan	C/C	-	-	-	11,727
Hallim	C/C	-	-	8,533	-
Anyang	C/C	-	-	-	11,741
Bucheon	C/C	-	-	-	11,898
POSCO POWER	C/C	-	-	-	11,756
G S Bugog	C/C	-	-	-	11,734
Yulchon	C/C	-	-	-	11,732

<Table Annex 3-3> Generation, CO2 emissions and CEF
-Generation, CO2 emissions and CEF (2005)-

		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)
Honam	#1	1,787,715	1,768,690	0.0091
	#2	1,875,790	1,847,027	0.0095
Samchonpo	#1	3,810,079	3,416,094	0.0175
	#2	4,323,618	3,859,975	0.0198
	#3	4,343,666	3,823,597	0.0196
	#4	4,112,297	3,624,518	0.0186
	#5	3,542,728	3,054,087	0.0157
	#6	3,643,969	3,130,664	0.0161
Yongheng	#1	5,623,299	4,813,807	0.0247
	#2	4,658,862	4,018,578	0.0206
Boryeong	#1	3,547,140	3,160,997	0.0162
	#2	3,433,608	3,039,497	0.0156
	#3	4,124,745	3,516,677	0.0180
	#4	3,698,705	3,150,957	0.0162
	#5	4,121,314	3,514,301	0.0180
	#6	3,283,477	2,799,407	0.0144
Taean	#1	3,992,112	3,406,485	0.0175
	#2	3,484,251	2,991,878	0.0153
	#3	3,957,054	3,378,302	0.0173
	#4	3,653,534	3,122,808	0.0160
	#5	3,744,413	3,204,604	0.0164
	#6	3,999,847	3,407,801	0.0175
Hadong	#1	3,997,914	3,419,755	0.0175
	#2	3,732,583	3,183,287	0.0163
	#3	3,769,077	3,210,219	0.0165
	#4	3,989,315	3,411,574	0.0175
	#5	3,553,901	3,036,500	0.0156
	#6	4,037,763	3,430,574	0.0176
Dangjin	#1	3,797,307	3,228,383	0.0166
	#2	3,798,078	3,225,871	0.0165
	#3	4,081,017	3,458,955	0.0177
	#4	4,079,557	3,451,293	0.0177
	#5	1,318,670	1,164,506	0.0060
	#6	96,365	96,315	0.0005
Ulsan	#1	262,393	215,866	0.0011
	#2	255,812	206,692	0.0011

		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)
	#3	200,518	163,677	0.0008
	#4	1,549,091	1,160,880	0.0060
	#5	1,500,935	1,124,118	0.0058
	#6	1,454,644	1,088,172	0.0056
Youngnam	#1	1,022,470	831,109	0.0043
	#2	531,006	453,729	0.0023
Yosu	#1	430,310	328,925	0.0017
	#2	904,597	669,247	0.0034
Pyongtaek	#1	1,258,662	903,713	0.0046
	#2	1,376,342	986,739	0.0051
	#3	1,321,167	944,590	0.0048
	#4	1,338,204	955,217	0.0049
Namjeju	#1	44,602	44,518	0.0002
	#2	44,654	45,739	0.0002
Jeju	#1	36,266	38,440	0.0002
	#2	532,700	395,815	0.0020
	#3	502,189	375,467	0.0019
Seoul	#4	207,498	135,044	0.0007
	#5	444,324	299,014	0.0015
Incheon	#1	16,450	12,023	0.0001
	#2	37,727	23,413	0.0001
	#4	29,202	19,281	0.0001
Namjeju	D/P	268,073	172,557	0.0009
Jeju	G/T	5,069	7,540	0.0000
Jeju	D/P	151,759	190	0.0000
Pyongtaek	C/C	659,932	305,558	0.0016
Ilsan	C/C	2,873,958	1,466,244	0.0075
Bundang	C/C	3,742,073	1,849,777	0.0095
Ulsan	C/C	3,131,075	1,266,878	0.0065
Seoincheon	C/C	7,001,031	2,722,000	0.0140
Shinincheon	C/C	10,543,280	4,012,197	0.0206
Boryeong	C/C	8,221,926	3,198,689	0.0164
Incheon	C/C	2,055,016	775,014	0.0040
Busan	C/C	9,076,327	3,327,622	0.0171
Hallim	C/C	100,346	78,490	0.0004
* Anyang C/C	(Other co.)	1,433,978	719,056	0.0037
* Bucheon C/C	(")	1,404,160	719,198	0.0037
* POSCO POWER	(")	2,571,095	1,225,595	0.0063
		Net generation	CO2 emissions	CEF per MWh

		(MWh)	(tonCO2)	(weighted) (tonCO2/MWh)
* G S Bugog	(")	2,189,808	866,330	0.0044
Yulchon	(")	1,300,627	535,945	0.0027

-Generation, CO2 emissions and CEF (2006)-

		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)
Honam	#1	1,622,639	1,601,416	0.0078
	#2	1,782,016	1,753,632	0.0085
Samchonpo	#1	4,161,219	3,790,595	0.0183
	#2	3,703,880	3,374,884	0.0163
	#3	3,779,585	3,349,734	0.0162
	#4	3,816,997	3,359,140	0.0163
	#5	3,761,205	3,282,862	0.0159
	#6	4,065,091	3,501,200	0.0169
Yongheng	#1	5,337,432	4,584,698	0.0222
	#2	5,727,937	4,881,558	0.0236
Boryeong	#1	3,988,848	3,555,212	0.0172
	#2	3,423,101	3,017,055	0.0146
	#3	3,409,486	2,911,937	0.0141
	#4	4,133,946	3,529,729	0.0171
	#5	3,364,148	2,851,932	0.0138
	#6	3,987,488	3,410,097	0.0165
Taean	#1	3,556,797	3,050,487	0.0148
	#2	4,035,753	3,446,320	0.0167
	#3	3,528,613	3,015,099	0.0146
	#4	4,069,820	3,484,311	0.0169
	#5	4,013,235	3,445,656	0.0167
	#6	3,381,867	2,905,661	0.0141
	#7	159,677	151,029	0.0007
Hadong	#1	3,607,063	3,084,403	0.0149
	#2	4,068,036	3,460,238	0.0167
	#3	4,079,158	3,472,606	0.0168
	#4	3,631,374	3,093,345	0.0150
	#5	4,092,625	3,488,098	0.0169
	#6	3,610,222	3,081,320	0.0149
Dangjin	#1	3,598,820	3,057,562	0.0148
	#2	4,115,891	3,488,944	0.0169
	#3	3,666,490	3,107,540	0.0150
		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted)

				(tonCO2/MWh)
	#4	3,610,984	3,068,127	0.0149
	#5	3,946,931	3,314,522	0.0160
	#6	3,392,395	2,808,758	0.0136
	#7	1,474	3,543	0.0000
Ulsan	#1	275,016	222,092	0.0011
	#2	306,668	246,165	0.0012
	#3	376,132	295,886	0.0014
	#4	1,511,557	1,124,280	0.0054
	#5	1,583,846	1,170,978	0.0057
	#6	1,589,838	1,178,458	0.0057
Youngnam	#1	359,205	336,817	0.0016
	#2	323,595	299,919	0.0015
Yosu	#1	403,547	304,715	0.0015
	#2	906,849	662,381	0.0032
Pyongtaek	#1	1,123,948	792,508	0.0038
	#2	1,198,620	844,732	0.0041
	#3	1,304,568	922,534	0.0045
	#4	1,052,228	742,537	0.0036
Namjeju	#1	34,448	34,828	0.0002
	#2	28,686	29,837	0.0001
	#3	179,033	148,285	0.0007
Jeju	#1	24,748	348,389	0.0017
	#2	462,023	360,014	0.0017
	#3	479,676	190,897	0.0009
Seoul	#4	306,558	190,897	0.0009
	#5	685,011	416,281	0.0020
Incheon	#1	32,932	19,134	0.0001
	#2	24,366	14,381	0.0001
	#3	78,669	43,264	0.0002
	#4	62,414	35,103	0.0002
Namjeju	D/P	239,690	162,221	0.0008
Jeju	G/T	15,986	21,408	0.0001
Jeju	D/P	252,764	156,613	0.0008
Pyongtaek	C/C	497,441	231,586	0.0011
Ilsan	C/C	3,038,165	1,534,663	0.0074
Bundang	C/C	4,059,300	1,983,128	0.0096
Ulsan	C/C	3,608,435	1,433,103	0.0069
Seoincheon	C/C	8,726,521	3,304,189	0.0160
Shinincheon	C/C	11,797,500	4,517,605	0.0219
Boryeong	C/C	7,089,662	2,751,077	0.0133
Incheon	C/C	3,648,288	1,331,295	0.0064
		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted)

				(tonCO2/MWh)
Busan	C/C	10,455,401	3,841,886	0.0186
Hallim	C/C	175,356	127,895	0.0006
* Anyang C/C	(Other co.)	1,286,480	635,987	0.0031
* Bucheon C/C	(")	1,241,795	621,463	0.0030
* POSCO POWER	(")	2,338,128	1,123,697	0.0054
* G S Bugog	(")	2,911,683	1,073,491	0.0052
Yulchon	(")	2,276,276	890,901	0.0043

-Generation, CO2 emissions and CEF (2007)-

		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)
Honam	#1	1,806,765	1,783,791	0.0076
	#2	1,773,852	1,743,815	0.0074
Samchonpo	#1	3,903,591	3,583,575	0.0153
	#2	4,398,382	3,957,863	0.0169
	#3	4,311,704	3,841,782	0.0164
	#4	3,840,729	3,386,909	0.0144
	#5	4,074,103	3,566,682	0.0152
	#6	3,823,174	3,303,785	0.0141
Yonghung	#1	5,020,901	4,336,965	0.0185
	#2	6,081,490	5,223,534	0.0223
	#3	320,502	286,091	0.0012
Boryeong	#1	3,604,642	3,207,732	0.0137
	#2	4,120,511	3,615,598	0.0154
	#3	4,214,892	3,601,842	0.0154
	#4	3,438,773	2,943,311	0.0126
	#5	4,162,530	3,563,490	0.0152
	#6	3,817,024	3,258,360	0.0139
Taean	#1	4,055,394	3,462,069	0.0148
	#2	3,796,670	3,257,132	0.0139
	#3	4,039,811	3,455,454	0.0147
	#4	3,504,214	2,995,390	0.0128
	#5	3,523,988	3,024,257	0.0129
	#6	4,036,733	3,465,319	0.0148
	#7	3,868,817	3,243,576	0.0138
	#8	2,528,587	2,090,512	0.0089
Hadong	#1	4,140,667	3,539,680	0.0151
	#2	3,681,670	3,124,028	0.0133
		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)

	#3	3,727,907	3,173,886	0.0135
	#4	4,115,014	3,511,688	0.0150
	#5	3,905,190	3,328,955	0.0142
	#6	4,158,792	3,541,059	0.0151
Dangjin	#1	3,968,103	3,391,534	0.0145
	#2	3,595,927	3,047,324	0.0130
	#3	4,010,715	3,396,528	0.0145
	#4	4,009,178	3,405,203	0.0145
	#5	3,443,482	2,898,247	0.0124
	#6	3,497,359	2,913,217	0.0124
	#7	2,904,680	2,420,144	0.0103
	#8	1,297,925	1,076,606	0.0046
Ulsan	#1	406,685	329,982	0.0014
	#2	407,321	332,088	0.0014
	#3	458,584	367,190	0.0016
	#4	1,418,034	1,060,461	0.0045
	#5	1,540,400	1,154,991	0.0049
	#6	899,604	674,351	0.0029
Youngnam	#1	688,935	547,081	0.0023
	#2	474,475	384,009	0.0016
Yosu	#1	497,053	373,634	0.0016
	#2	1,071,405	790,087	0.0034
Pyongtaek	#1	1,147,515	833,425	0.0036
	#2	1,553,162	1,119,363	0.0048
	#3	1,502,099	1,083,460	0.0046
	#4	1,095,986	794,302	0.0034
Namjeju	#1	-	-	-
	#2	-	-	-
	#3	484,459	380,390	0.0016
	#4	500,222	390,829	0.0017
Jeju	#1	3,019	3,211	0.0000
	#2	280,454	214,294	0.0009
	#3	396,186	301,731	0.0013
Seoul	#4	357,572	206,771	0.0009
	#5	962,861	569,794	0.0024
Incheon	#1	148,821	83,725	0.0004
	#2	157,042	86,848	0.0004
	#3	205,530	114,620	0.0005
	#4	95,143	52,571	0.0002
Bundang fuel cell		1,959	859	0.0000
Namjeju	D/P	164,390	108,335	0.0005
		Net generation (MWh)	CO2 emissions (tonCO2)	CEF per MWh (weighted) (tonCO2/MWh)

Jeju	G/T	1,294	2,226	0.0000
Jeju	D/P	235,626	151,033	0.0006
Pyongtaek C/C		909,449	417,590	0.0018
Ilsan	C/C	3,506,350	1,749,219	0.0075
Bundang	C/C	3,741,296	1,820,164	0.0078
Ulsan	C/C	4,383,453	1,770,736	0.0076
Seoincheon	C/C	10,895,505	4,123,110	0.0176
Shinincheon	C/C	12,533,994	4,852,849	0.0207
Boryeong	C/C	7,839,371	3,089,914	0.0132
Incheon	C/C	3,696,784	1,362,268	0.0058
Busan	C/C	11,616,221	4,276,818	0.0182
Hallim	C/C	61,752	46,988	0.0002
Anyang	C/C	1,615,090	797,914	0.0034
Bucheon	C/C	1,523,068	753,428	0.0032
POSCO POWER	C/C	3,788,598	1,823,348	0.0078
G S Bugog	C/C	2,767,811	1,023,947	0.0044
Yulchon	C/C	2,083,451	805,441	0.0034

(2) Calculating BM

Sample group m	Annual generation (MWh)	Rate (%)
(a) The set of five power units that have been built most recently	1,297,958	0.34%
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently	77,239,700	20.19%

Group (b) has been chosen as sample group m, because annual generation of (b) is larger than one of (a).
From the selected group (b), BM has been calculated as below.

Annual generation (MWh)	CO2 emissions (tonCO2)	$EF_{grid,BM,2008}$ (tonCO2/MWh)
77,239,700	25,165,544	0.3258

<Table Annex 3-4> Data for calculating BM

Plant name	Starting date	Fuel type	Net generation (MWh)	CO2 emissions (tonCO2)	CEF (tonCO2/MWh)
Dangjin #8	Dec-07	Bituminous coal	1,297,925	1,076,606	0.0139
Hanbit Sungsan the second solar	Dec-07	photovoltaic	-	-	-
Taein gangjin solar	Dec-07	photovoltaic	6	-	-
Suni gangjin solar	Dec-07	photovoltaic	11	-	-
Korea yeongcheon solar	Dec-07	photovoltaic	17	-	-
Solar yungam solar	Dec-07	photovoltaic	-	-	-
Changwhan yeongduk solar	Dec-07	photovoltaic	5	-	-
Samsung jindo solar	Dec-07	photovoltaic	9	-	-
SP solar yonggwang	Nov-07	photovoltaic	38	-	-
Dongyang energy sinan	Nov-07	photovoltaic	268	-	-
Ef yungam solar	Nov-07	photovoltaic	40	-	-
Dongwon gangjin solar	Nov-07	photovoltaic	214	-	-
Solec yonggwang solar	Nov-07	photovoltaic	120	-	-
Solar jungeub solar	Nov-07	photovoltaic	92	-	-
Sinbuk yungam solar	Nov-07	photovoltaic	178	-	-
Hyein haenam solar	Nov-07	photovoltaic	364	-	-
Samlangjin solar	Nov-07	photovoltaic	646	-	-
Plant name	Starting	Fuel type	Net	CO2	CEF

	date		generation (MWh)	emissions (tonCO2)	(tonCO2/MWh)
Gomun	Aug-07	Small hydro	2,996	-	-
Wuriyungam solar	Aug-07	Photovoltaic	267	-	-
Hwasung solar	Aug-07	Photovoltaic	309	-	-
Yeongju the first solar	Aug-07	Photovoltaic	230	-	-
Muan solar	Aug-07	Photovoltaic	622	-	-
Jangheung solar	Aug-07	Photovoltaic	125	-	-
Dangjin #7	Jun-07	Bituminous coal	2,904,680	2,420,144	0.0313
Yonnggwang solar park	Jun-07	Photovoltaic	853	-	-
Munkyung solar	Jun-07	Photovoltaic	2,563	-	-
Damyangho	May-07	Small hydro	1,771	-	-
Baekgok	May-07	Small hydro	1,001	-	-
Wonjungsu	May-07	Small hydro	1,321	-	-
Eco energy	Mar-07	LFG	231,029	-	-
Hapcheon	Feb-07	Small hydro	6,777	-	-
Jeonju-resource recovery facility	Feb-07	LFG	13,059	-	-
Seoul Marin(suncheon)	Feb-07	Photovoltaic	1,223	-	-
Cheongsong pumping #2	Dec-06	Hydro(pumping)	145,042	-	-
Namhae Solar	Oct-06	photovoltaic	1,462	-	-
S&P Solar	Oct-06	Photovoltaic	995	-	-
Cheongsong pumping #1	Sep-06	Hydro(pumping)	164,069	-	-
Namjeju #3	Sep-06	B-C	484,459	380,390	0.0049
HanlaJeunggong Solar	Sep-06	photovoltaic	1,292	-	-
Yongheng solar	Sep-06	Photovoltaic	1,214	-	-
Yungam Solar	Sep-06	Photovoltaic	770	-	-
Yangyang pumping #4	Aug-06	Hydro(pumping)	91,270	-	-
Enepark	Aug-06	Photovoltaic	416	-	-
Yangyang pumping #3	Jun-06	Hydro(pumping)	56,495	-	-
Hadongho	Jun-06	Small hydro	1,832	-	-
Goheung Solar	Jun-06	Photovoltaic	1,233	-	-
Jangseong	May-06	Small hydro	648	-	-
Maebongsan-wind power	May-06	Wind	11,058	-	-
Yangyang pumping #2	Apr-06	Hydro(pumping)	103,698	-	-
Plant name	Starting	Fuel type	Net	CO2	CEF

	date		generation (MWh)	emissions (tonCO2)	(tonCO2/MWh)
Dangjin #6	Apr-06	Bituminous coal	3,497,359	2,913,217	0.0377
Sinchang-wind power	Mar-06	Wind	3,572	-	-
Bundang fuel cell	Mar-06	Fuel cell	1,959	859	0.0000
Yangyang pumping #1	Feb-06	Hydro(pumping)	106,973	-	-
Suncheon Solar	Dec-05	photovoltaic	1,259	-	-
Samcheonpo solar	Oct-05	Photovoltaic	131	-	-
Taean solar	Aug-05	Photovoltaic	118	-	-
Yulchon C/C	Jul-05	LNG	2,083,451	805,441	0.0104
WunjeongLFG	Jul-05	LFG	11,415	-	-
Incheon C/C	Jun-05	LNG	3,696,784	1,362,268	0.0176
Jeju D/P	Jun-05	Diesel oil	235,626	151,033	0.0020
Daegok	Jun-05	Small hydro	1,278	-	-
Donghwa	May-05	Small hydro	2,481	-	-
Ulchin #6	Apr-05	Nuclear	7,911,305	-	-
Busan Bio-gas	Jan-05	Biogas	1,551	-	-
Sungnam	Dec-04	Small hydro	1,794	-	-
Yongheng #2	Nov-04	Bituminous coal	6,081,490	5,223,534	0.0676
new solar energy	Sep-04	Photovoltaic	224	-	-
Daegwanryung-wind power	Aug-04	Wind	4,288	-	-
Ulchin #5	Jul-04	Nuclear	8,025,928	-	-
Busan C/C	Mar-04	LNG	11,616,221	4,276,818	0.0553
Chunsang	Jan-04	Small hydro	240	-	-
Cheongju LFG	Jan-04	LFG	5,808	-	-
Gunsan-wind power	Sep-03	wind	7,958	-	-
Sangwon ENC	Jun-03	LFG	2,752	-	-
Daejon Geumgodong	Jun-03	LFG	9,160	-	-
Hoicheon ENC	May-03	LFG	2,826	-	-
Muju	Apr-03	Small hydro	637	-	-
Seohee- ENC	Apr-03	LFG	25,341	-	-
Hangwon-wind power	Apr-03	Wind	13,402	-	-
Ducksong	Jan-03	Small hydro	8,826	-	-
Yonggwang #6	Dec-02	Nuclear	7,859,224	-	-
Boryeong C/C	Aug-02	LNG	7,839,371	3,089,914	0.0400
Taean #6	May-02	Bituminous coal	4,036,733	3,465,319	0.0448
Plant name	Starting	Fuel type	Net	CO2	CEF

	date		generation (MWh)	emissions (tonCO2)	(tonCO2/MWh)
Yonggwang #5	May-02	nuclear	8,601,736	-	-
Pohang-hodong	May-02	LFG	7,559	-	-

(3) Calculating EF

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

= 0.7117tonCO2/MWh x 0.75 + 0.3258 tonCO2/MWh x 0.25

= 0.6152 tonCO2/MWh

$EF_{OM,2008}$	0.7117 tonCO2/MWh
$EF_{BM,2008}$	0.3258 tonCO2/MWh
EF_{2008}	0.6152 tonCO2/MWh

Annex 4

MONITORING INFORMATION

Please refer to Section B.7.