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

CONTENTS

Annexes

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:

>>
Gochang solarpark 14.98MW photovoltaic power plant Project
Version 02
09,January, 2009

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

>>
Gochang PV power plant is a grid-connected photovoltaic power plant which located in Gochang-Gun, Jeollanbuk-Do, Republic of Korea.

The cpacitiy of this project is 15MW which is the highest capacity of electricity generation in Republic of Korea. The area of this project is about 390,885m_2 and annual amount of generated electricity will be 22,183MW. So through that generated electricity will reduce GHG emission about 13,523tCO2e/year and 135,225tCO2e in 10 years..
The project sites are divided 5 area and capacity of each area is 3MW(see figure A-2). The operation starting dates of each area are shown in <Table A-1>

<Table A-1>The starting date of operation each PV plant

Plant	#1	#2	#3	#4	#5
Starting Date	2008.5.31	2008.7.26	2008.8.21	2008.9.02	2008.9.21

The project is to transmit and spread the advanced foreign technologies and the main PV generation facilities used in the project were SW-175/SW-180 made by Solarworld Co., Ltd .

In Korea, they have a lot of concerns about the renewable energies including solar power energy and make efforts to reduce fossil fuel usage in various ways. As those fossil fuel based power plants take 63.25% of electricity generation in Korea based on 2007(KEPCO : Korea Electric Power Company)[1], the proposed project is expected to contribute to decrease the usage of fossil fuels and also serve to development and diffusion of renewable energy technologies in the country.

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

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

• Economical aspects

[1] Koera Electric Power Statistics("KEPCO in brief" : 12 June 2008 http://www.kepco.co.kr)

- The proposed project will supply the local area with the available electric power and contribute to national energy supply.
- The proposed project will create job opportunities directly and indirectly through construction and operation of the plant.
- The proposed project brings the support investment from government. In Korea, local of near the power plant can give support investment.

• Environmental and National aspects

- The photovoltaic power plant replaces coal-fired power plants and contributes to reduce GHG emissions of the nation.
- The plant will contribute toward improvement of air quality and better living conditions of the country by reducing the air pollution.

A.3. Project participants:

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<Table A-2>Project participants

Name of Party involved(*) ((host)indicates a host Party)	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant(Yes/No)
Republic of Korea(host)	Private participant: Gochang solarpara Co., Ltd.	No

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

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

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A.4.1.1. Host Party(ies):

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Republic of Korea

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

>>

Jeollabuk-Do

A.4.1.3. City/Town/Community etc:

>>

Heungdeuk-Myeun , Gochang-Gun

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

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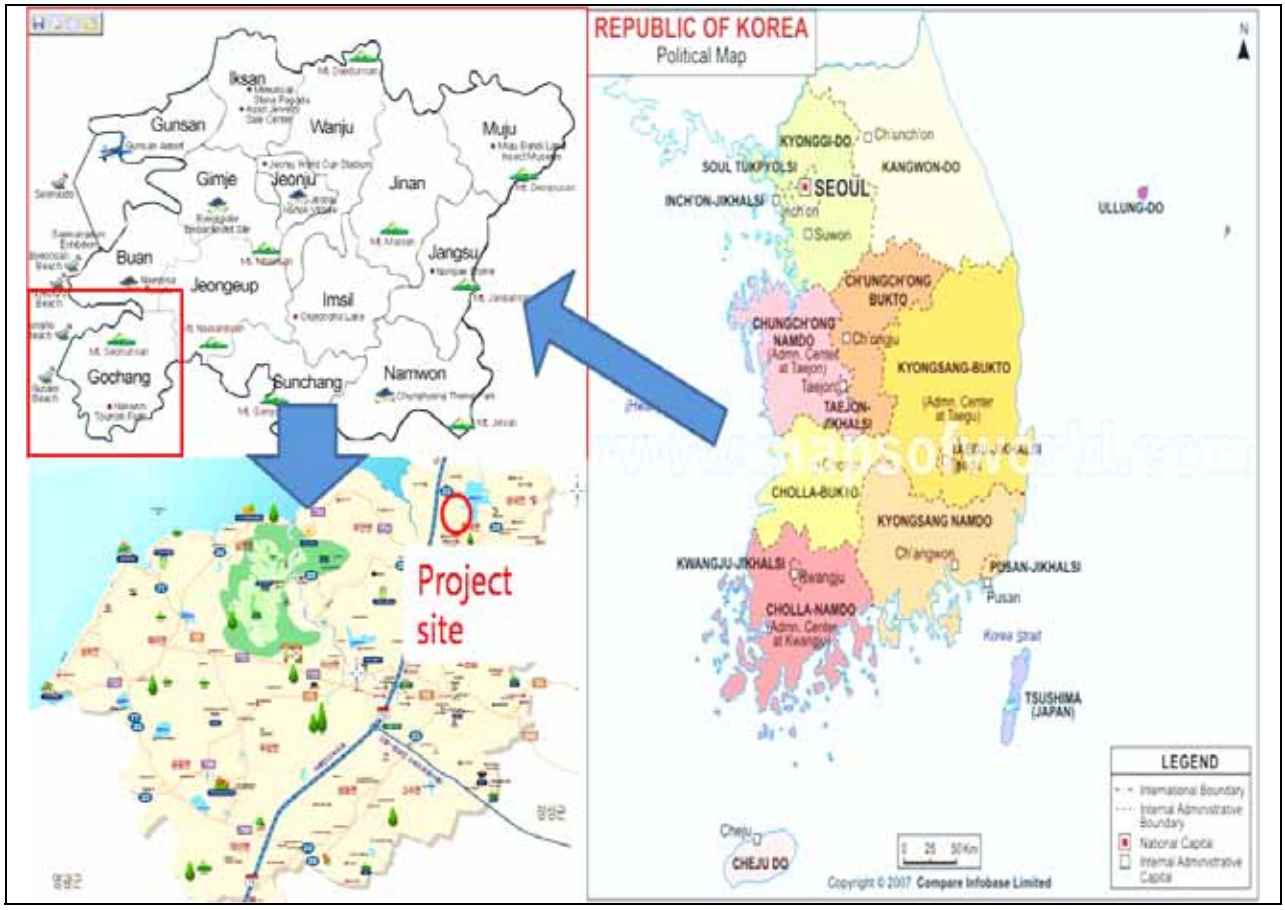
The project site is located in 100, Chiryong-Ri, Heungdeuk-Myeun, Gochang-Gun, Jellabuk-Do, South West of Korea and the site location's approximate coordinates are east longitude of 126.42^{O} and north latitude of 34.32 ^{O}.



<Figure A-1>The location of Gochang PV Power Plant

<Figure A-2>The site of Jangsan PV Power Plant

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

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This project is a small-scale CDM project activity and according to the Appendix B of "the simplified modalities and procedures for small-scale CDM project activities" of UNFCCC, type and category of the project can be confirmed as follows;

•Type : I – Renewable Energy Projects
•Category : I.D – Grid connected renewable electricity generation(Version 13)

Purpose of the project is to build up a photovoltaic power plant with 15 MW of installed capacity. And regarding the technology/measure of the project, Solarworld Co.Ltd's solar cells are chosen and utilized for the proposed project and total 175W*57,120, 180W*27,710 pieces of module are supplied 16.9% efficiency.

The solar cell module with 5 sections are connected to a junction boxes and linked to an inverter, and the fuses are installed by each series so string can be conducted for the series, which makes prompt action could be taken in disorder of the solar cells module. And there is equipped 3-phase watching system with current control to observe the important parameters such as voltage, frequency of the grid.
Also for unmanned operation of the plant, each facility is composed to be suitable for control and supervision in the same way from on-site main control room, switchboard of electric managing department and electric control center in *power plnat area.*

Those facilities consist monitoring and monitor screen-printing equipment, on site CCTV, UPS(Uninterrupted Power Supply). From Gochang PV Power plant to main control room, the network system is dual processed through a fiber-optic cable.
Efficiency of solar PV plant depends on insolations and other seasonal causes, usually the utilization rate of the proposed project is 16.9% and the output is about 22,183MWh/year. And the generated electricity from the plant is connected to the KEPCO(Korea Electric Power Co., Ltd.), electric poles on the ground which are located near the project site.

<Table A-3>Technology description

Item	Type	Technology standards
Solar cells	Type	Sw-175/sw-180
	Capacity	14,983.8kw
	Maximum output power	175w/180w
	Number of Module	175w : 57,120/ 180w : 27,710
	Efficiency	16.9%
Inverter	Type	Grid connected
	Rated voltage	DC 600v
	Output	500kw
	Control method	Current control (PWM)
	Node form	3-phase, 3-wire
	Number of units	30
	Efficiency	93%

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

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<Table A-4>Annual estimation of emission reductions

Year	Annual estimation of emission reductions In tonnes of CO_2 e
Year 1(2009.6 ~2009.12)	6,761
Year 1(2010.1 ~2010.12)	13,523
Year 1(2011.1 ~2011.12)	13,523
Year 1(2012.1 ~2012.12)	13,523
Year 1(2013.1 ~2013.12)	13,523
Year 1(2014.1 ~2014.12)	13,523
Year 1(2015.1 ~2015.12)	13,523
Year 1(2016.1 ~2016.12)	13,523
Year 1(2017.1 ~2017.12)	13,523
Year 1(2018.1 ~2018.12)	13,523
Year 1(2019.1 ~2019.12)	6,761
Total estimated reductions(tonnes of tCO_2 e)	135,225
Total number of crediting years	10
Annual average over the crediting period of Estimated reductions (tonnes of tCO_2 e)	13,523

The estimated emission reductions in the 10 years of crediting period are 13,523 tCO_2 e as presented in table A.3.

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

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The investor of the Gochang PV power plant is Gochang Solar Pakr Co., Ltd. And there is no public funding for the project.

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

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According to paragraph 2 in "Appendix C" of the "simplified modalities and procedures for small-scale CDM project activities", if the small scale CDM project met following conditions is registered or submitted for the registration, the proposed project is deemed to be a fragmentation of a large project activity into smaller parts.

• With the same project participants
• In the same project category and technology/measure
• Registered within the previous 2 years.
• Whose project boundary is within 1

The project activity is a unilateral CDM project with 15MW of total capacity which generates electricity by use of the solar power energy and delivers the generated electricity to the grid. And those items below regard debundling don't be applied to the proposed p roject thus it is not a fragmentation of any large project.

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:

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•Type : I – Renewable Energy Projects
•Category : I.D – Grid connected renewable electricity generation(Version 13)
•reference : Appendix B of the simplified modalities and procedures for small-scale CDM project activities (UNFCCC)

Further information for the methodology can be found at
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

According to AMS I.D(version 13), baseline emission factor of the project is calculated by "Tool to calculate the emission factor for and electricity system(version 01). And the baseline emission factor is calculated by CM(Combined Margin), which is weighted average of OM(Operating Margin) and BM(Build Margin).

The additionality of the project activity shall be demonstrated and assessed using latest version of the "Tool for the demonstration and assessment of additionality, version 05(EB39) agreed by the CDM Executive Board, which is available on the UNFCCC CDM website.
http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

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

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The approved methodology for "Simplified modalities and procedures for small-scale CDM project activities"-AMS.I.D is applicable to renewable energy projects whose output capacity is up to 15MW and the produced electricity is delivered to the grid.

The Gochang PV power plant:

- generates 15MW of electricity by solar energy, and of renewable energies,
- supplies the grid with the electricity produced

The electric output of the project is 15MW, which is under 15MW and the generated electricity delivered to the grid. And also the proposed project corresponds to a renewable energy project as a solar power generation.

Therefore the methodology AMS.I.D is applicable to the proposed project.

B.3. Description of the project boundary:

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Based on AMS.I.D, project boundary encompasses the physical, geographical site of the renewable generation source.

The electricity produced by this project will be delivered to the grid system and replace the electricity generated by fossil fuel in the grid therefore, according to ACM0002(version 07), the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

In Korea, KEPCO(Korea Electric Power Corporation) represents the grid system, therefore, the boundary of the project could be identified as KEPCO and the proposed project.

B.4. Description of baseline and its development:

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According to the methodology AMS I.D. Version 13, the baseline of the project activity is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/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". Any of the four procedures to calculate the operating margin can be chosen, but the restriction to use the Simple OM and the Average OM calculations must be considered

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.

Between two choices above, (a) has been chosen. A combined margin (CM) has been calculated by referring "Tool to calculate the emission factor for an electricity system" and the calculation is as follows:

STEP 1. Identify the relevant electric power system

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 B-1> The transmission map of Korea

STEP 2. Select an Operating Margin (OM) Method

As described in "Tool to calculate the emission factor for an electricity system", 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.

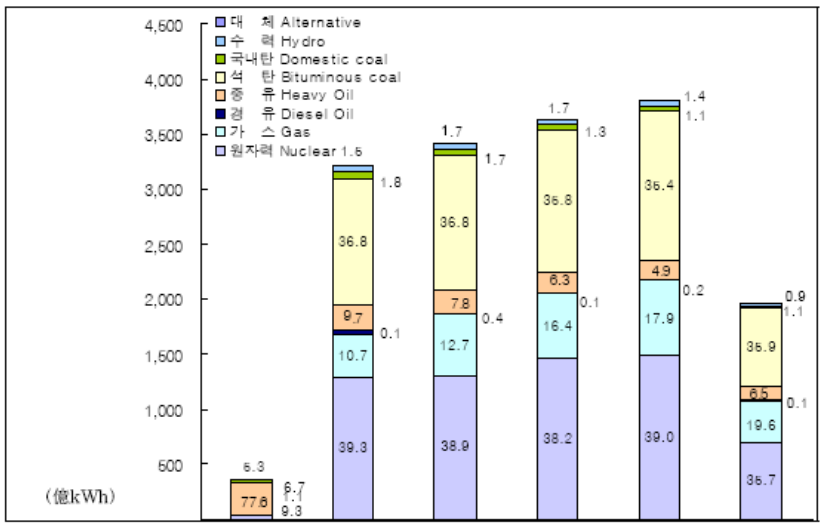
Operating Margin emission factor ($EF_{grid,OM,simple,y}$) shall be calculated basis on one of the four following methods:

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.

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 (2003~2007) average data shows that the rate of low cost/must run is 42.49%. (Source: KEPCO)
Therefore, for this project case, "Option (a) Simple OM" is available.

OM factor is calculated from



(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 B-2> Gross generation by Energy sources in June 2007

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

According to the "Tool to calculate the emission factor for an electricity system (Version 01)", the Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO2/MWh) of all generating power plants serving the system, not including low-operating cost and must-run power plants based on the three following options:

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

Based on data on fuel consumption and net electricity generation of each power plant/unit is available in Korea. So the proposed project can employ Option A.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type i consumed by power plant / 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 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

In the case of this project, the applied values of $EF_{CO2,i}$ are based on using conversion factor suggested in the 2006 IPCC Guidelines. and those of NCV_i and $EF_{CO2,i}$ are country-specific. Actually, the calorific values indicated in country-specific data 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 Annex 3.

As a result, the OM emission factor ($EF_{grid,OM,simple,y}$) is 0.6817 (tCO_2/MWh).

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

There are two options to choose in order to calculate the BM emission factor presented in "Tool to calculate the emission factor for an electricity system ".x`

Option 1. Calculate the Build Margin emission factor $EF_{grid,BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either.

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

Option 2. For the first crediting period, the Build Margin emission factor $EF_{grid,BM,y}$ must be updated annually *ex post* for the year in which actual project generation and associated emissions reductions occur.

For subsequent crediting periods, $EF_{grid,BM,y}$ should be calculated *ex-ante*, as described in *option 1* above. The sample group *m* consists of either

- The five power plants that have been built most recently, or
- The power plants 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 from these two options that sample group that comprises the larger annual generation.

For this project case, *Option* 1 is taken to calculate the Build Margin emission factor, $EF_{grid,BM,y}$ *ex-ante*, and it is estimated as <Table B-1> according with each regulation to compose proper sample group(*m*) that the electricity quantity of candidate sample groups and it ratio to total generation in Korea.

<Table B-1> Sample Plant group(*m*) for determining Build margin Emission factor

Sample group(m) Classification	"The five power plants that have been built most recently"	"The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently."	Comments
Electricity quantity	33 MWh	84,737 GWh	Total generation is 385,990 GWh in Korea (based on KEPCO's data of the year 2008)
Proportion (ratio to total generation in Korea)	0%	21.95%	

The annual generation of "the five power plants that have been built most recently" was 33 MWh (0% of total generation of the grid system), and the annual generation of "the power plants capacity additions in the electricity system that comprise 21.95% of the system generation and that have been built most recently" was 385,990 GWh. Therefore, the latter was chosen for this project as a lager figure than the other one. It is presented in Annex 3 that the sample group of plants used in the Build Margin emission factor ($EF_{grid,BM,y}$).

STEP 5. Calculate the build margin emission factor

According to the "Tool to calculate the emission factors for electricity system (Version 01)", 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, calculate 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 CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_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, $EF_{grid,BM,y}$ is 0.3933tCO_2 e/MWh

STEP 6. Calculate the combined emission factor

Based on the results derived from Steps, $EF_{grid,CM,y}$ has been calculated using the following formula:

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

$EF_{grid,BM,y}$	Build margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$	Operating margin CO2 emission factor in year y (tCO2/MWh)
w_{OM}	Weighting of operating margin emissions factor (75% for solar power project)
w_{BM}	Weighting of build margin emissions factor (25% for solar power project)

Therefore baseline emission factor ($EF_{grid,CM,y}$) for this project is = 0.6096 (tCO_2/MWh.) as follows :

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y}$$
$$= 0.75 \cdot 0.6817(tCO_2/MWh) + 0.25 \cdot 0.3933(tCO_2/MWh)$$
$$= 0.6096(tCO_2/MWh)$$

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:

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The determination of project scenario additionality is performed using the CDM consolidated 'Tool for demonstration of additionality Ver.5', which applies the following steps:

Step 1. Identification of alternatives to the project activity consistent with mandatory laws and regulations

Sub-step 1a. Define alternatives to the project activity:

In the absence of the project reasonable and credible alternatives that are in accordance with current laws and regulations include :

Alternative 1: Construction of a fossil fuel plant with equivalent amount of installed capacity or annual , electricity output;

Alternative 2: Supply of equivalent annual power output by the Grid where the proposed project is connected to.

Sub-step 1b. Consistency with mandatory laws regulations:
The sub-step 1a contains the confrontation of the alternatives with the applicable laws and regulations of the Korea government.
All alternatives comply with the laws and regulatory requirements for electricity generation in Korea. According to the EB 16th meeting Report, Annex 3, 1 page 'Clarifications on the treatment of national and/or Sectoral policies and regulations (paragraph 45 (e) of the CDM Modalities and Procedures) in determining a baseline scenario', which is *'"Type E-"national and/or Sectoral policies or regulations that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) may not be taken into account in developing a baseline scenario (i.e. the baseline scenario should refer to a hypothetical situation without the national and/or Sectoral policies or regulations being in place)'*, this analysis is performed based on this hypothetical situation without regarding the 'Alternative Energy Development Promotion Act amended on March, 2002[2].' (See more information at http://cdm.unfccc.int/EB/Meetings/016/eb16repan3.pdf) According to the above decision, purchase price of electricity which excludes subsidy through compensation for difference between generation costs by MOCIE was used for the investment analysis.

Step 2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method
The CDM project contains income other than CERs. Therefore, Option I (Apply simple cost analysis) can not be selected, so it is necessary to choose from either Option II (Apply Investment comparison analysis) or Option III (Apply benchmark analysis). According to the methodology for determination of additionality, if the alternative to the CDM project activity does not include investments of comparable scale to the project, then Option III must be used. Option III will be applied for this project.

Sub-step 2b: Option III- Apply benchmarking analysis
IRR (Internal Rate of Return) is selected for the economic analysis indicator. IRR is the discount rate which makes that present value of income and present value of outcome are same. IRR can be compared to government bond rates increased by risk premium, required rate of return (IRR) on equity etc. to decides the possibility of project. In this project, separately specific discount rate of benchmark is determined as 3 year-terms government bond yield rates[3]

Sub-step 2c: Calculation and comparison of financial indicators

[2] 'Alternative Energy Development Promotion Act amended on March, 2002.' : Alternative Energy Development Promotion Act amended in March, 2002, the Ministry of Commerce, Industry and Energy (MOCIE) of Korean Government issued the Public Notice N0.2003-61 on October 9, 2003 and its amendment No. 2004-104 on October 19, 2004 which compensates the renewable energy electricity generation projects for the difference between the standard price applicable for the electricity generated using the alternative energy and the system marginal price of the grid promote such kinds of electricity generation.

[3] Korean Central Bank economic statistics(http://ecos.bok.or.kr)

<Table B-2> Basic parameters for calculation of financial indicators

Gochang POWER PV power plant	Total cost of Construction (million won)	Operation & Maintenance cost (million won/year)	Save cost of electricity (won)	NPV (million won)
	95,000	313	85.92	-74,622

<Table B-3>Economic Analysis of Gochang PV power plant

Period			Cost	Benefit	Present Value Factor	C	B	Cash Flow
0	2009	0	95,313	1,906	1.0000	95,313	1,906	(93,407)
1	2010	1	313	1,906	0.9464	296	1,804	1,593
2	2011	2	313	1,906	0.8957	280	1,707	1,593
3	2012	3	313	1,906	0.8478	265	1,616	1,593
4	2013	4	313	1,906	0.8023	251	1,529	1,593
5	2014	5	313	1,906	0.7594	238	1,447	1,593
6	2015	6	313	1,906	0.7187	225	1,370	1,593
7	2016	7	313	1,906	0.6802	213	1,296	1,593
8	2017	8	313	1,906	0.6437	201	1,227	1,593
9	2018	9	313	1,906	0.6093	191	1,161	1,593
10	2019	10	313	1,906	0.5766	180	1,099	1,593
11	2020	11	313	1,906	0.5457	171	1,040	1,593
12	2021	12	313	1,906	0.5165	162	984	1,593
13	2022	13	313	1,906	0.4888	153	932	1,593
14	2023	14	313	1,906	0.4626	145	882	1,593
15	2024	15	313	1,906	0.4379	137	835	1,593
16	2025	16	313	1,906	0.4144	130	790	1,593
17	2026	17	313	1,906	0.3922	123	747	1,593
18	2027	18	313	1,906	0.3712	116	707	1,593
19	2028	19	313	1,906	0.3513	110	670	1,593
20	2029	20	313	1,906	0.3325	104	634	1,593
						99,004	24,382	

NPV	(74,622)
B/C	0.246
IRR	negative

Sensitivity Analysis

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

<Table B-4> Result of sensitivity analysis

1.the result of increase of SMP and unit price of solar photovoltaic

increase of benefit rate(%)	SMP (won/KW)	NPV(million won)
-	85.92	-74,622
10	94.51	- 72,184
20	103.1	- 69,746

2. the result of decrease of investment costs

decrease of investment costs rate(%)	investment costs (million won)	NPV (million won)
-	95,000	-74,622
10	85,500	- 65,122
20	76,000	- 55,622

3. the result of decrease of operation costs

decrease of operation costs rate(%)	operation costs (million won)	NPV(million won)
-	313	-74,622
10	282	- 74,222
20	250	- 73,821

As a result of analysis, the result is lower than '0'. Therefore, this project is not available for commercial purpose. The purpose of this project is only for CDM which prevent global warming.

Also, in feasibility study report, they referred this project is not for the economic reason, but for eco-friendly and for protecting environment.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Calculation of Baseline Emission

Depending on ACM0002 (Version07), baseline emissions should be obtained by the below equation

$BE_y = (EG_y - EG_{baseline}) \cdot EF_y$

Where,
BE_y : Baseline emissions (in tCO_2)
EG_y : Electricity supplied by the project activity to the grid (in MWh)
$EG_{baseline}$: Baseline electricity supplied to the grid in the case of modified or retrofit facilities (in MWh)
EF_y : Baseline emissions factor (in tCO_2/MWh)
y : Refers to a given year

However $EG_{baseline}$ is zero because there are no modified or retrofit facilities in this project. Therefore the baseline emissions (BE_y) can be calculated as follows;

$$BE_y = EG_y \cdot EF_y$$

The baseline emission factor (EF_y) calculations will be based on "Tool to calculate the emission factor for an electricity system".

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

Where,

EF_y	Baseline emission factor (tCO_2/ MWh)
w_{OM}	Operation Margin weight, which is 0.75 by default
w_{BM}	Build Margin weight, which is 0.25 by default
$EF_{grid,OM,y}$	Operational Margin emission factor (tCO_2 / MWh)
$EF_{grid,BM,y}$	Build Margin emission factor (tCO_2 / MWh)
y	Refers to a given year

Operational Margin emission factor ($EF_{grid,OM\,y}$) is obtained based on 'Simple OM method'. Build Margin emission factor ($EF_{grid,BM,y}$) is estimated as *Option* 1 ($EF_{BM,y}$ *ex-ante*).

The OM emission factors is calculated as follows,

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

The emission factor ($EF_{BM,y}$) of Build margin is calculated using the following equation:

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

As a result, the baseline emission (BE_y) is 13,523 (tCO_2 /yr)

<Table B-6> Annual electricity generation and baseline emission of Photovoltaic system

<Table B-5>Parameter of Emission Factor & Baseline emission

Category	Annual electricity generation
Operational Margin emission factor ($EF_{grid,OM,y}$)	0.6817 (tCO_2/MWh)
Build Margin emission factor ($EF_{grid,BM,y}$)	0.3933 (tCO_2/MWh)
Baseline emission factor(EF_y)	0.6096 (tCO_2/MWh)
Project electricity generation(EG_y)	22,183(MWh/yr)
Baseline emission(BE_y)	13,523(tCO_2 /yr)

Project emission

The project activity generates electricity by utilizing solar power and it means that no greenhouse gas is emitted by performing this project activity. Therefore, the project emission is zero.

Leakage

GHGs emissions due to leakage are not estimated at this point of time from photovoltaic system.

Estimation of Emission reduction

Project emission reduction can be estimated by following equation

$$ER_y = BE_y - PE_y - L_y$$

Where
ER_y The emission reductions by the project activity during a given year *y*
BE_y Baseline emissions
PE_y Project emissions
L_y Emissions due to leakage

Here, both of the project emission and the leakage in this project activity are zero.

$$PE_y + L_y = 0$$

Therefore the emission reduction by the project activity are equal to baseline emissions, that is 13,523 (tCO_2 /yr).

$$ER_y = BE_y - (PE_y + L_y)$$

$$= 13,523 \ (tCO_2 /yr)$$

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

Data / Parameter:	$F_{i,j,y}$
Data unit:	Mass or volume unit
Description:	Fuel consumption i : bituminous, heavy oil, diesel, LNG j : power source delivering electricity to the grid (excluding low-operating cost and must-run power plants) y: 2005, 2006, 2007
Source of data used:	2007 STATISTICS OF ELECTRIC POWER IN KOREA 2006 STATISTICS OF ELECTRIC POWER IN KOREA 2005 STATISTICS OF ELECTRIC POWER IN KOREA
Value applied:	See ANNEX 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate OM emission factor.
Any comment:	

Data / Parameter:	NCV_i
Data unit:	kcal/ mass or volume unit
Description:	Net calorific value of fuel i : bituminous, heavy oil, diesel oil, LNG
Source of data used:	2007 STATISTICS OF ELECTRIC POWER IN KOREA 2006 STATISTICS OF ELECTRIC POWER IN KOREA 2005 STATISTICS OF ELECTRIC POWER IN KOREA
Value applied:	See ANNEX 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate OM emission factor.
Any comment:	According to "Tool to calculate the emission factor for an electricity system", the GCV(Gross Calorific Value) of the fuel can be used, if gross calorific values are provided by the data sources used. Thus, as the GCV of fuel can be provided, GCV of fuel was used in this project.

Data / Parameter:	EF_{CO2i}
Data unit:	kg C/GJ
Description:	CO_2 emission factor of fuel i i : bituminous, heavy oil, diesel oil, LNG

Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Bituminous = 25.80, heavy oil = 21.10, diesel oil =20.20, LNG=15.30
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC world-wide default value
Any comment:	

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	Electricity delivered to the grid by source j j : power source delivering electricity to the grid (excluding low-operating cost and must-run power plants) y: 2005, 2006, 2007
Source of data used:	2007 STATISTICS OF ELECTRIC POWER IN KOREA 2006 STATISTICS OF ELECTRIC POWER IN KOREA 2005 STATISTICS OF ELECTRIC POWER IN KOREA
Value applied:	See ANNEX 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate OM emission factor.
Any comment:	

Data / Parameter:	$F_{i,m,y}$
Data unit:	Mass or volume unit
Description:	Fuel consumption i : bituminous, heavy oil, diesel, LNG m: sample group consisting of power plant capacity additions that comprises 20% of system generation and that have been built most recently. y: 2007
Source of data used:	2007 STATISTICS OF ELECTRIC POWER IN KOREA
Value applied:	See ANNEX 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate BM emission factor.
Any comment:	

Data / Parameter:	$GEN_{m,y}$
Data unit:	MWh
Description:	Electricity delivered to the grid by sample group m power plants m: sample group consisting of power plant capacity additions that comprises 20% of system generation and that have been built most recently. y: 2007
Source of data used:	2007 STATISTICS OF ELECTRIC POWER IN KOREA
Value applied:	See ANNEX 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate BM emission factor.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

As mentioned above, since project emissions(PE_y) and leakage (L_y) are "zero", emission reductions(ER_y) are same with the baseline emissions(BE_y), as follows:

The project is expected to generate around 22,183MWh per year, as shown in the below.

- Installed Capacity : 14.984 MW
- Annual hour : 8,760 hr/year
- Utilization rate : 16.9%(in feasibility study report)
- Electricity Generation : 22,183MWh/year

As mentioned above, the emission factor of the grid is determined by using the methodology ACM0002(version 07) as a CM emission factor, consisting of the combination of the OM and the BM factors. As shown in Annex 3, the OM emission factor results to be 0.6817 tCO_2/MWh and the BM emission factor 0.3933 tCO_2/MWh. Thus, emission factor of the grid (EF_{grid}) is: 0.6096

Thus, the annual emission reduction results to be :

Baseline emission

The capacity of the project is 22,183 MW .Therefore, expected electricity produced by the project is 22,183 MWh per year.
Emission factor (EF_y) is 0.6096(tCO_2/MWh) and for detail calculation method, refer to Annex 3.

Baseline emission = electricity produced by the project emission factor (EF_y)
= 22,183 MWh/yr × 0.6096 tCO_2/MWh
= 13,523 tonCO_2/yr

Project emission

Project emission is zero

Leakage

Emission due to leakage is zero

Ex-ante emission reduction

Emission reduction = Baseline emission - Project emission - Leakage
= 13,523 tonCO_2/yr

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

>>

<Table B-6>Estimation of emission reduction

Year	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of leakage (tCO_2 e)	Estimation of overall emission reductions (tCO_2 e)
Year 1(2009.6 ~2009.12)	0	6,761	0	6,761
Year 1(2010.1 ~2010.12)	0	13,523	0	13,523
Year 1(2011.1 ~2011.12)	0	13,523	0	13,523
Year 1(2012.1 ~2012.12)	0	13,523	0	13,523
Year 1(2013.1 ~2013.12)	0	13,523	0	13,523
Year 1(2014.1 ~2014.12)	0	13,523	0	13,523
Year 1(2015.1 ~2015.12)	0	13,523	0	13,523
Year 1(2016.1 ~2016.12)	0	13,523	0	13,523
Year 1(2017.1 ~2017.12)	0	13,523	0	13,523
Year 1(2018.1 ~2018.12)		13,523		13,523
Year 1(2019.1 ~2019.12)	0	6,761	0	6,761
Total (tCO2e)	0	135,225	0	135,225

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**Electricity Quantity, EG_y**
Data unit:	MWh
Description:	Net Electricity supplied to the grid by renewable technology in the year y
Source of data to be used:	Measured by meters
Value of data	- Date will be measured by electricity meter connected to the grid - Data will be measured each hourly and recorded monthly
Description of measurement methods and procedures to be applied:	• Simple OM : As each crediting period using the most recent 3 historical years for which data is available, Simple OM factor during 3 years (2005~2007) is fixed along the credit period. (please refer to above STEP 4) • Dispatch data OM: Hourly • BM: In accordance with option 1 for BM emission factor, for the first crediting period ex-ante calculation will be applied and update of the emission factor doesn't be required during the first crediting period. (please refer to above STEP
QA/QC procedures to be applied:	- QA/QC procedure is prepared - The allowable error of the data : within ±0.5% The Measurement will be in compliance with the National Guidelines and requirement of the KPX(Korea Power Exchange) for accuracy and reliability. The calibration will be carried out according to relevant national standards and regulations by authorized organization. Double checked by receipt of sales.
Any comment:	The electricity generation will be checked every 5 minutes, and the data will be kept for two years after CERs are issued. * The amount of electricity consumed in the plant and electricity transmission to a grid will be measured by bidirectional meter. Also the received electricity as a driving force for starting the operation and in emergencies will be measured by electric power meter. * EG_y means a net amount of electricity transmitted to the grid excluding electricity consumed in the plant and received from grid. And the amount of electricity consumed in the plant and received from the gird will be deducted from the emission reduction of the proposed project according to the monitoring

B.7.2 Description of the monitoring plan:

>>

All data have to be transmitted to electricity chamber of electric power station. It will be kept for 10 years as electronic document.

All variables, except one related to off-site transportation, used to calculate project and baseline emissions are directly measured or are publicly available official data. To check the amount of generated electricity, two electricity measuring meters will be installed. One is sealed meter managed by Korea Power Exchange and will be installed inside of the site. The data measured by this meter is the base of monitoring. The other is the meter installed inside of the generating facility and the data measured by this meter is for internal monitoring.

1. Monitoring equipment

1-1. Electricity measuring meters shall be set up transparently in accordance with "Law regarding measurement" and "Act on operation of electricity market" and shall be sealed after affirmation of Korea Power Exchange.

1-2. The meters shall be calibrated when they are installed, since then re-calibration should be made when necessary by point of abnormal condition

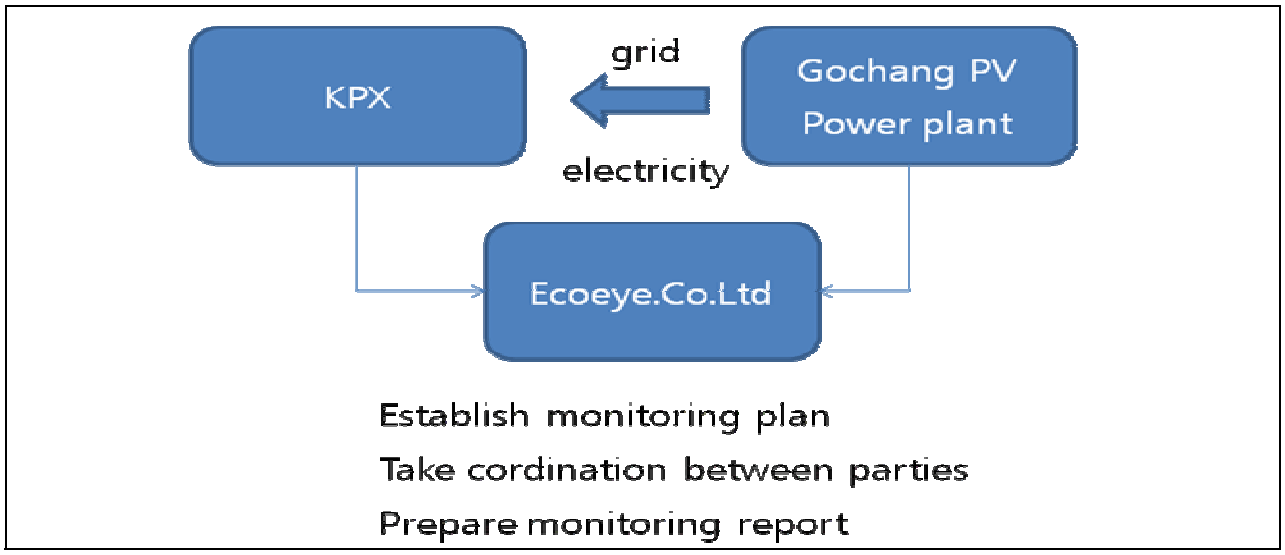
2. The amount of electricity monitoring

2-1. The amount of electricity transmitted to the grid shall be measured automatically by established meter. The measured data are simultaneously transferred to central control system of Korea Power Exchange.
2-2. The measured amount of electricity in the field shall be collected daily, weekly, and monthly and shall be archived in electronic way.
2-3. The collected data in article 2-2. shall be compared with those of Korea Power Exchange.
2-4. If the two data compared in article 2-3. are different with expectation value, the operation condition of electricity meters and other equipments shall be examined. In case meters are improperly operated equipments, internal investigation and correction procedure shall be followed and be certified by the final decision-maker and Korea Power Exchange.

3. Manager of monitoring and electricity safety

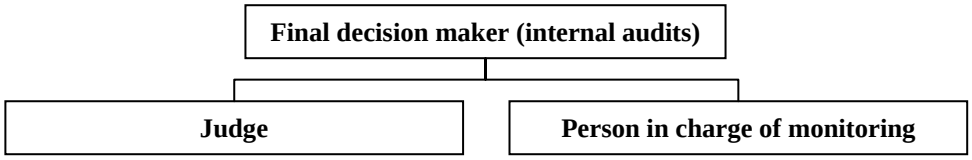
3-1. The person in charge of monitoring and electricity safety shall attend the following courses once a year.
- Course on 'Law regarding measurement'
- Course on 'Act on operation of electricity market
- Course on Electricity safety

3-2. In case of absence of the responsible person, the second responsible person shall be selected.
3-3. If the responsibility for monitoring and electricity safety is transferred to another person, it is needed to be approved by the final decision-maker.



<**Figure B-3**> Operational and management structure

The monitored data will be archived for 20 (operational lifetime) + 2 years.



position	duties
Final decision maker	- General management of the PV power plant
Judge	- Separate from final decision maker, supervision of proper implementation of the monitoring.
Person in charge of monitoring	- recording of electricity imported and exported - inspection & correction of the meters - kept for documents

2. Internal audits

2.1 Internal audits

Internal audits mean as inspected internally whether planned decision and requirement of monitoring are properly operated or not.

	frequency
Regular Inspector	Regular inspector implement once in every two years.
Occasional Inspector	Occasional inspector implement in case of the Final decision maker's decision.

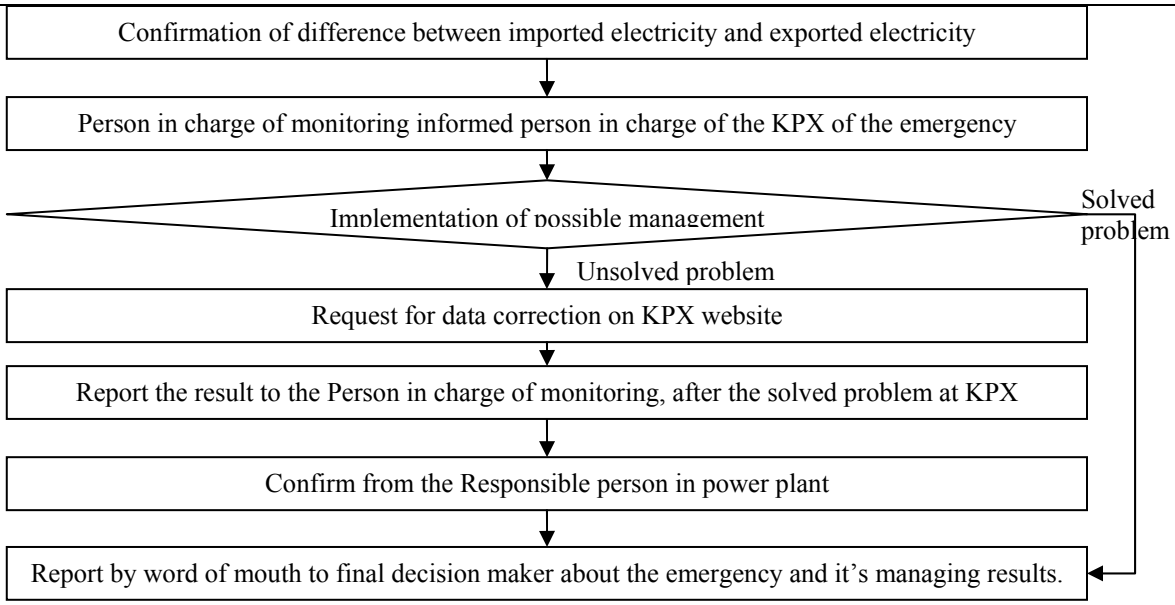
2.2 Data of internal audits

- Comparison with internal electricity exported records and receipts
- Comparison with internal electricity imported records and receipts
- Conformation observance of preserved condition and record periods
- Observance of periods of measuring equipment Inspection & correction.
- Conformation of Management register of measuring equipment

3. Emergency

-Electricity comparison with meter and receipt

In case the error occurred in meters follow next process.



4. Inspection & correction of the measuring equipments

4.1 Inspection of the measuring equipments
Inspects once in 3years in conformity with the reliable law

4.2 Allowable error
Allowable error between the meters and record meters is ±0.5%.

4.3 Management register of measuring equipment
Record the management diary about result of Inspection & correction and it's managing, considering measuring equipment respectively.
And it is kept for two years after the end of crediting period.

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

>>
This monitoring methodology is determined and planned by Ecoeye Co., Ltd. in 15/08/2008
The person involved in baseline study are listed as follows

- Mr. Jang, Sung-Wook General manager of Gochang solarpark Co., Ltd.
  E-mail : sungwook@solarpark.kr
  Tel : 82-61-271-9922
- Mr. Jung, Jae-Soo, CEO of Ecoeye Co., Ltd.
  E-mail : civilenvi@ecoeye.com
  Tel : 82-31-710-7300

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:

>>

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:

>>
01/01/2009 or from the date of registration of the project, which ever is later.

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/06/2009 or from the date of registration of the project, which ever is later.

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

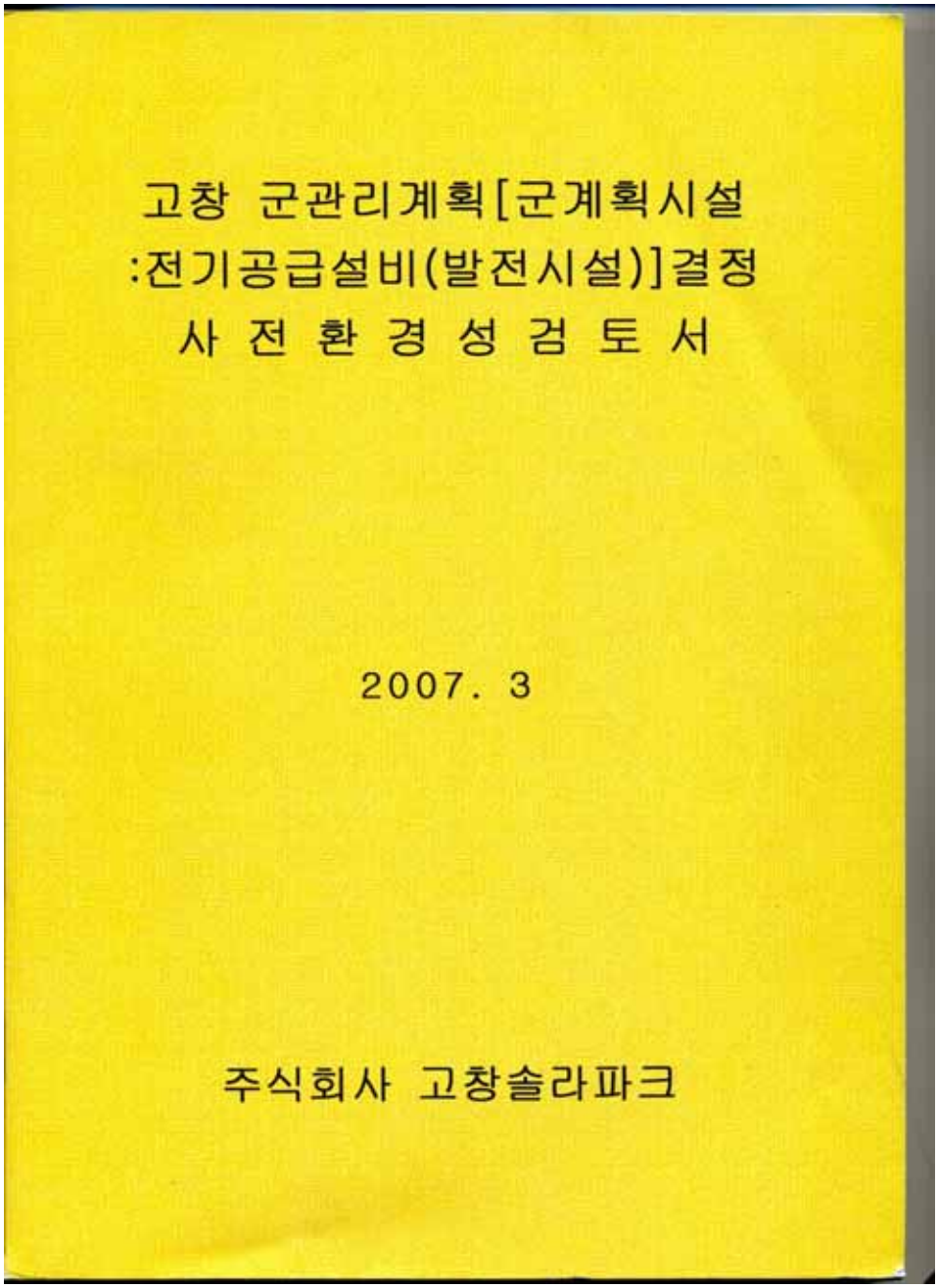
>>

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

>>
This project related to land developments. the facilities will being equipped in each-district.

Before this project implementation, PERS(**Pre Environmental Review System)** was performed for Land developments include introduction of this project in this district.

And before the project actioned, Gochang-Gun held a conference about environmental impact of this project.



<Figure D-1 >PRE of Gochang PV power plant

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:

>>

Not applicable

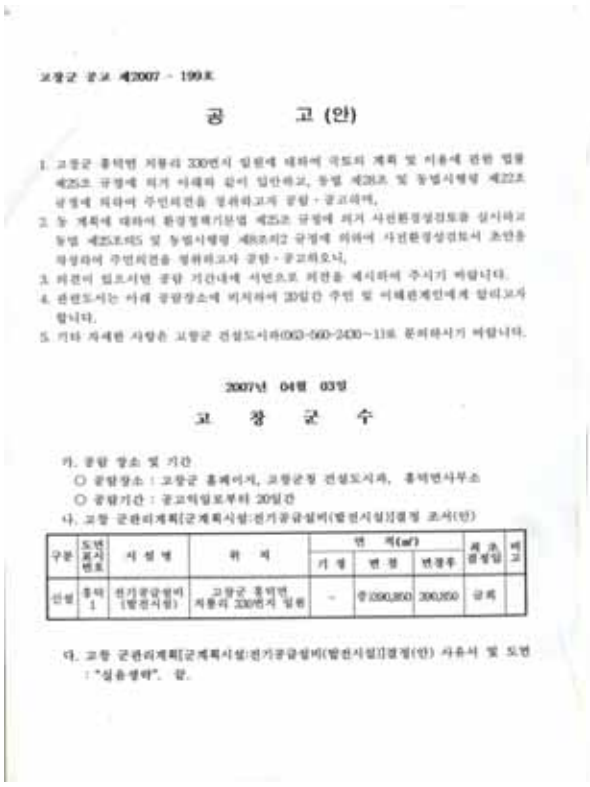
SECTION E. Stakeholders' comments

>>

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

>>

The project participant held the conference about environmental impact of this project. So, they inform the date of conference and substance of the project by the local newspaper at April 5, 20 07.
The conference held at Heungduk-Myun office in Gochang April 25, 2007. The member of this conference is residents of near the project site, the Chair and vice-Chair of Gochang-Gun assembl y, staff of Gochang solarpark Co. Ltd, professional of the public works and environmental. Figure E.1 and E.2 are public announcement about the meeting. Figure E.3 and E.4 are substances of the meeting and Figure E.5 and E.6 are list of attendants.



공 고 (안)

2007년 04월 03일

고 창 군 수

<Figure E- 1>

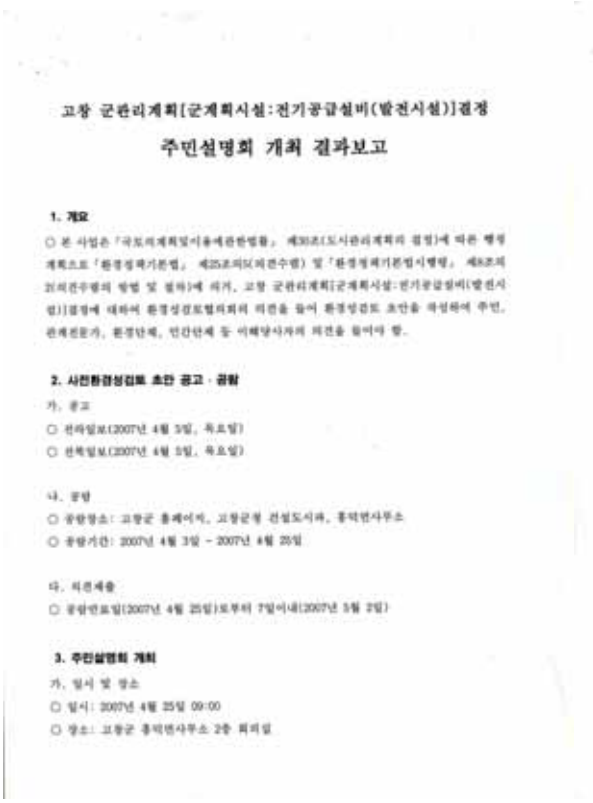
全北日報

www.jjan.co.kr

공 고

고 창 군 수

<Figure E- 2>



고창 군관리계획[군계획시설:전기공급설비(발전시설)]결정

주민설명회 개최 결과보고

1. 개요

○ 본 사업은 「국토의계획및이용에관한법률」 제30조(도시관리계획의 결정)에 따른 행정계획으로 「환경정책기본법」 제25조(의견수렴) 및 「환경정책기본법시행령」 제8조(의견수렴의 방법 및 절차)에 의거, 고창 군관리계획[군계획시설:전기공급설비(발전시설)]결정에 대하여 환경성검토협의회의 의견을 들어 환경성검토 초안을 작성하여 주민, 관계전문가, 환경단체, 민간단체 등 이해당사자의 의견을 들어야 함.

2. 사전환경성검토 초안 공고 · 공람

가. 공고

○ 전라일보(2007년 4월 3일, 목요일)

○ 전북일보(2007년 4월 3일, 목요일)

나. 공람

○ 공람장소 : 고창군 홈페이지, 고창군청 건설도시과, 풍덕면사무소

○ 공람기간 : 2007년 4월 3일 ~ 2007년 4월 20일

다. 의견제출

○ 공람만료일(2007년 4월 20일)로부터 7일이내(2007년 5월 2일)

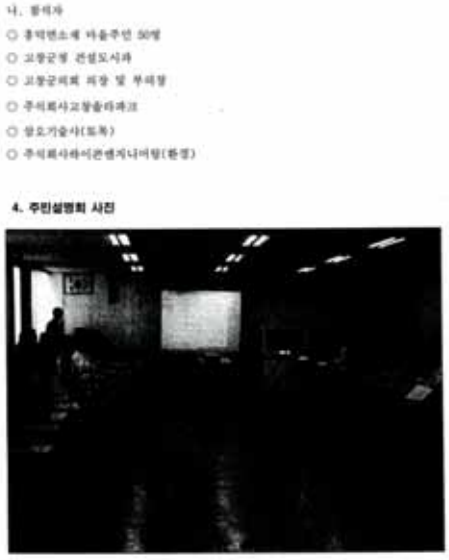
3. 주민설명회 개최

가. 일시 및 장소

○ 일시 : 2007년 4월 25일 09:00

○ 장소 : 고창군 풍덕면사무소 2층 회의실

<Figure E-3>



나. 참석자

○ 풍덕면소재 마을주민 50명

○ 고창군청 건설도시과

○ 고창군의회 의장 및 부의장

○ 주식회사고창솔라파크

○ 삼오기술사(도목)

○ 주식회사하이콘엔지니어링(환경)

4. 주민설명회 사진

<Figure E-4>

<Figure E-5>

5. 주민설명회 참석자명부

<Figure E-6>

E.2. Summary of the comments received:

>>

No adverse comments were given by the involved stakeholders.

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

>>

As there are no adverse comments, hence no action taken in this regard.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	GOCHANG SOLARPARK. Co., Ltd.
Street/P.O.Box:	100
Building:	
City:	Gochang gun heungdeok myun chi ryung-Ri
State/Region:	Jeolla buk do
Postfix/ZIP:	
Country:	The Republic of Korea
Telephone:	+82-63-564-6607
FAX:	+82-63-564-6608
E-Mail:	
URL:	
Represented by:	Park Hyun Woo
Title:	CEO
Salutation:	Mr.
Last Name:	Park
Middle Name:	
First Name:	Hyun Woo
Department:	
Mobile:	+
Direct FAX:	+
Direct tel:	+
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding in this project.

Annex 3

BASELINE INFORMATION

<Table Annex 3 - 1> Data on fuel consumption for plants in the Operating Margin

Year	Plant		Coal(t)	Heavy oil(kl)	Diesel oil(kl)	L.N.G.(t)
2005	Honam	#1	866,853	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	-
	Yonghung	#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	-
		#4	1,383,297	-	365	-
		#5	1,411,398	-	742	-
		#5	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
		#5	-	-	1	108,761
	Incheon	#1	-	-	-	4,365
		#2	-	-	-	8,505
		#3	-	-	372	746

		#4	-	-	400	6,620
	Pyongtaek C/C	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	C/C	-	-	-	445,253
	G S Bugog	C/C	-	-	-	297,976
	Yulchon	C/C	-	-	159	194,534
	Namjeju	D/P	-	56,727	37	-
	Jeju	G/T	-	-	2,869	-
	Jeju	D/P	-	31,808	72	-
2006	Honam	#1	866,853	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	
		#5	1,665,339		977	
		#6	1,770,348		428	
	Yonghung	#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	
		#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
	Pyongtaek C/C	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	
	Anyang	C/C				230,969
	Bucheon	C/C			215	225,713
	POSCO POWER	C/C				408,018
	G S Bugog	C/C				389,811
	Yulchon	C/C				315,132
	Namjeju	D/P		51,347	111	
	Jeju	G/T			8,264	
	Jeju	D/P		52,907		
2007	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	
		#4				
	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	
		#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	
		#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
	Pyongtaek C/C	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
	Kwangyang	C/C				
	Namjeju	D/P		35,297	238	
	Jeju	G/T			850	
	Jeju	D/P		49,613		

*Source : Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO)

<Table Annex 3 - 2> Gloss Caloric Value

Year	Plant		Coal (kcal/kg)	Heavy oil (kcal/l)	Diesel oil (kcal/l)	L.N.G. (kcal/kg)
2005	Honam	#1	5,142	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	
	Yonghung	#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	
		#5	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	
		#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
		#3			8,516	11,727
		#4			8,506	11,723
	Pyongtaek C/C	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				11,723
	Bucheon	C/C				11,702
	POSCO POWER	C/C				11,721
	G S Bugog	C/C				12,381
	Yulchon	C/C			10,384	11,721
	Namjeju	D/P		9,383	8,526	
	Jeju	G/T			8,473	
	Jeju	D/P		9,435	8,506	
2006	Honam	#1	4,653	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	
	Yonghung	#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	
		#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		9,377	8,429	
		#2		9,454	8,524	
		#3		9,455	8,524	
	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
	Pyongtaek C/C	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
	Boryeong	C/C				11,730
	Incheon	C/C				11,698
	Busan	C/C				11,716
	Hallim	C/C			8,506	
	Anyang	C/C				11,726
	Bucheon	C/C			10,381	11,711
	POSCO POWER	C/C				11,728
	G S Bugog	C/C				11,727
	Yulchon	C/C				12,039
	Namjeju	D/P		9,734	8,462	
	Jeju	G/T			8,352	
	Jeju	D/P		9,136		
2007	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	
		#4				
	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	
		#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
	Incheon	#1				11,727
		#2				11,730
		#3			8,514	11,730
		#4			8,483	11,730
	Bundang	fuel cell				11,673
	Pyongtaek C/C	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
	Kwangyang	C/C				
	Namjeju	D/P		9,419	8,323	
	Jeju	G/T			8,447	
	Jeju	D/P		9,396		

*Source : Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO)

<Table Annex3-3> Electricity delivered to the grid by power plant(*EG)* and *EF*

Year	Plant		Electricity generation (MWh)	*EF* ($tonCO_2$/MWh)
2005	Honam	#1	1,787,715	0.9363
		#2	1,875,790	0.9318
	Samchonpo	#1	3,810,079	0.8484
		#2	4,323,618	0.8448
		#3	4,343,666	0.8330
		#4	4,112,297	0.8341
		#5	3,542,728	0.8158
		#6	3,643,969	0.8130
	Yonghung	#1	5,623,299	0.8101
		#2	4,658,862	0.8163
	Boryeong	#1	3,547,140	0.8433
		#2	3,433,608	0.8377
		#3	4,124,745	0.8068
		#4	3,698,705	0.8061
		#5	4,121,314	0.8069
		#6	3,283,477	0.8068
	Taean	#1	3,992,112	0.8075
		#2	3,484,251	0.8126
		#3	3,957,054	0.8079
		#4	3,653,534	0.8088
		#5	3,744,413	0.8099
		#5	3,999,847	0.8062
	Hadong	#1	3,997,914	0.8094
		#2	3,732,583	0.8070
		#3	3,769,077	0.8060
		#4	3,989,315	0.8092
		#5	3,553,901	0.8085
		#6	4,037,763	0.8040
	Dangjin	#1	3,797,307	0.8045
		#2	3,798,078	0.8037
		#3	4,081,017	0.8020
		#4	4,079,557	0.8005
		#5	1,318,670	0.8360
		#6	96,365	0.9478
	Ulsan	#1	262,393	0.8027
		#2	255,812	0.7883
		#3	200,518	0.7964
		#4	1,549,091	0.7312
		#5	1,500,935	0.7307
		#6	1,454,644	0.7299
	Youngnam	#1	1,022,470	0.7931
		#2	531,006	0.8337
	Yosu	#1	430,310	0.7458
		#2	904,597	0.7218
	Pyongtaek	#1	1,258,662	0.7004
		#2	1,376,342	0.6994
		#3	1,321,167	0.6975
		#4	1,338,204	0.6964
	Namjeju	#1	44,602	0.9738
		#2	44,654	0.9994
	Jeju	#1	36,266	1.0341
		#2	532,700	0.7249
		#3	502,189	0.7294
	Seoul	#4	207,498	0.6301
		#5	444,324	0.6515
	Incheon	#1	16,450	0.7075
		#2	37,727	0.6008

		#3	-	-
		#4	29,202	0.6396
	Pyongtaek C/C	C/C	659,932	0.4482
	Ilsan	C/C	2,873,958	0.4939
	Bundang	C/C	3,742,073	0.4785
	Ulsan	C/C	3,131,075	0.3917
	Seoincheon	C/C	7,001,031	0.3764
	Shinincheon	C/C	10,543,280	0.3684
	Boryeong	C/C	8,221,926	0.3766
	Incheon	C/C	2,055,016	0.3651
	Busan	C/C	9,076,327	0.3549
	Hallim	C/C	100,346	0.7665
	Anyang	C/C	1,433,978	0.4854
	Bucheon	C/C	1,404,160	0.4959
	POSCO POWER	C/C	2,571,095	0.4615
	G S Bugog	C/C	2,189,808	0.3830
	Yulchon	C/C	1,300,627	0.3989
	Namjeju	D/P	268,073	0.6280
	Jeju	G/T	5,069	1.4577
	Jeju	D/P	679,659	-
2006	Honam	#1	1,622,639	0.9340
		#2	1,782,016	0.9313
	Samchonpo	#1	4,161,219	0.8620
		#2	3,703,880	0.8622
		#3	3,779,585	0.8387
		#4	3,816,997	0.8328
		#5	3,761,205	0.8259
		#6	4,065,091	0.8150
	Yonghung	#1	5,337,432	0.8129
		#2	5,727,937	0.8065
	Boryeong	#1	3,988,848	0.8434
		#2	3,423,101	0.8341
		#3	3,409,486	0.8082
		#4	4,133,946	0.8080
		#5	3,364,148	0.8022
		#6	3,987,488	0.8093
	Taean	#1	3,556,797	0.8116
		#2	4,035,753	0.8081
		#3	3,528,613	0.8086
		#4	4,069,820	0.8101
		#5	4,013,235	0.8125
		#6	3,381,867	0.8131
		#7	159,677	0.8976
	Hadong	#1	3,607,063	0.8092
		#2	4,068,036	0.8049
		#3	4,079,158	0.8056
		#4	3,631,374	0.8061
		#5	4,092,625	0.8065
		#6	3,610,222	0.8077
	Dangjin	#1	3,598,820	0.8040
		#2	4,115,891	0.8021
		#3	3,666,490	0.8020
		#4	3,610,984	0.8041
		#5	3,946,931	0.7947
		#6	3,392,395	0.7836
		#7	1,474	2.3058
	Ulsan	#1	275,016	0.7879
		#2	306,668	0.7832
		#3	376,132	0.7675

		#4	1,511,557	0.7257
		#5	1,583,846	0.7213
		#6	1,589,838	0.7232
	Youngnam	#1	359,205	0.9149
		#2	323,595	0.9043
	Yosu	#1	403,547	0.7367
		#2	906,849	0.7126
	Pyongtaek	#1	1,123,948	0.6879
		#2	1,198,620	0.6875
		#3	1,304,568	0.6899
		#4	1,052,228	0.6884
	Namjeju	#1	34,448	0.9864
		#2	28,686	1.0148
		#3	179,033	0.8082
	Jeju	#1	24,748	1.0328
		#2	462,023	0.7357
		#3	479,676	0.7323
	Seoul	#4	306,558	0.6028
		#5	685,011	0.5883
	Incheon	#1	32,932	0.5625
		#2	24,366	0.5714
		#3	78,669	0.5325
		#4	62,414	0.5446
	Pyongtaek C/C	C/C	497,441	0.4507
	Ilsan	C/C	3,038,165	0.4890
	Bundang	C/C	4,059,300	0.4730
	Ulsan	C/C	3,608,435	0.3845
	Seoincheon	C/C	8,726,521	0.3666
	Shinincheon	C/C	11,797,500	0.3707
	Boryeong	C/C	7,089,662	0.3757
	Incheon	C/C	3,648,288	0.3533
	Busan	C/C	10,455,401	0.3557
	Hallim	C/C	175,356	0.7147
	Anyang	C/C	1,286,480	0.4786
	Bucheon	C/C	1,241,795	0.4845
	POSCO POWER	C/C	2,338,128	0.4653
	G S Bugog	C/C	2,911,683	0.3569
	Yulchon	C/C	2,276,276	-
	Namjeju	D/P	239,690	0.6603
	Jeju	G/T	15,986	1.3123
	Jeju	D/P	252,764	0.6045
2007	Honam	#1	1,806,765	0.9343
		#2	1,773,852	0.9303
	Samchonpo	#1	3,903,591	0.8687
		#2	4,398,382	0.8515
		#3	4,311,704	0.8431
		#4	3,840,729	0.8345
		#5	4,074,103	0.8284
		#6	3,823,174	0.8177
	Yonghung	#1	5,020,901	0.8174
		#2	6,081,490	0.8128
		#3	320,502	0.8457
		#4		#DIV/0!
	Boryeong	#1	3,604,642	0.8421
		#2	4,120,511	0.8303
		#3	4,214,892	0.8086
		#4	3,438,773	0.8099
		#5	4,162,530	0.8101
		#6	3,817,024	0.8078

	Taean	#1	4,055,394	0.8078
		#2	3,796,670	0.8118
		#3	4,039,811	0.8094
		#4	3,504,214	0.8089
		#5	3,523,988	0.8121
		#6	4,036,733	0.8123
		#7	3,868,817	0.7934
		#8	2,528,587	0.7824
	Hadong	#1	4,140,667	0.8089
		#2	3,681,670	0.8030
		#3	3,727,907	0.8056
		#4	4,115,014	0.8075
		#5	3,905,190	0.8067
		#6	4,158,792	0.8057
	Dangjin	#1	3,968,103	0.8088
		#2	3,595,927	0.8019
		#3	4,010,715	0.8014
		#4	4,009,178	0.8037
		#5	3,443,482	0.7965
		#6	3,497,359	0.7882
		#7	2,904,680	0.7886
		#8	1,297,925	0.7853
	Ulsan	#1	406,685	0.7916
		#2	407,321	0.7955
		#3	458,584	0.7812
		#4	1,418,034	0.7296
		#5	1,540,400	0.7316
		#6	899,604	0.7314
	Youngnam	#1	688,935	0.7748
		#2	474,475	0.7896
	Yosu	#1	497,053	0.7334
		#2	1,071,405	0.7195
	Pyongtaek	#1	1,147,515	0.7085
		#2	1,553,162	0.7031
		#3	1,502,099	0.7037
		#4	1,095,986	0.7070
	Namjeju	#1	-	#DIV/0!
		#2	-	#DIV/0!
		#3	484,459	0.7661
		#4	500,222	0.7623
	Jeju	#1	3,019	1.0379
		#2	280,454	0.7455
		#3	396,186	0.7430
	Seoul	#4	357,572	0.5598
		#5	962,861	0.5729
	Incheon	#1	148,821	0.5446
		#2	157,042	0.5354
		#3	205,530	0.5399
		#4	95,143	0.5350
	Bundang	fuel cell	1,959	0.4243
	Pyongtaek C/C	C/C	909,449	0.4445
	Ilsan	C/C	3,506,350	0.4830
	Bundang	C/C	3,741,296	0.4710
	Ulsan	C/C	4,383,453	0.3911
	Seoincheon	C/C	10,895,505	0.3664
	Shinincheon	C/C	12,533,994	0.3748
	Boryeong	C/C	7,839,371	0.3816
	Incheon	C/C	3,696,784	0.3567
	Busan	C/C	11,616,221	0.3564
	Hallim	C/C	61,752	0.7457

	Anyang	C/C	1,615,090	0.4783
	Bucheon	C/C	1,523,068	0.4789
	POSCO POWER	C/C	3,788,598	0.4659
	G S Bugog	C/C	2,767,811	0.3581
	Yulchon	C/C	2,083,451	0.3743
	Kwangyang	C/C		
	Namjeju	D/P	164,390	0.6430
	Jeju	G/T	1,294	1.6864
	Jeju	D/P	235,626	0.6254

Source: Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO)

<Table Annex3-4> Sample group plants used in the Build Margin calculation and CO_2 Emission Factor of the Build Margin

Plant name		Technology	Fuel	Year operation	MWh in 2007	COEF	Result
Hanbit Sungsan the second solar		solar		2007.12	0		
Taein gangjin solar		solar		2007.12	6		
Suni gangjin solar		solar		2007.12	11		
Korea yeongcheon solar		solar		2007.12	17		
Solar yungam solar		solar		2007.12	0		
Changwhan yeongduk solar		solar		2007.12	5		
Samsung jindo		solar		2007.12	9		
Hwaseong heat & power		combined		2007.12			
Dangjin	#8	steam power	Bituminous coal	2007.12	1,297,925	0.7853	0.0120
SP solar yonggwang		solar		2007.11	38		
Dongyang energy sinan		solar		2007.11	268		
Ef yungam solar		solar		2007.11	40		
Dongwon gangjin solar		solar		2007.11	214		
Solec yonggwang solar		solar		2007.11	120		
Solar jungeub solar		solar		2007.11	92		
Sinbuk yungam solar		solar		2007.11	178		
Hyein haenam solar		solar		2007.11	364		
Samlangjin solar		solar		2007.11	646		
Hyosung daegi-wind power		wind		2007.11	42		
Nonhyun heat & power		combined		2007.10			
Wuriyungam solar		solar		2007.08	267		
Hwasung solar		solar		2007.08	309		
Yeongju the first solar		solar		2007.08	230		

Muan solar		solar		2007.08	622		
Jangheung solar		solar		2007.08	125		
Gomun		small hydro power		2007.08	2,996		
Taean	#8	steam power	Bituminous coal	2007.08	2,528,587	0.7824	0.0233
Dangjin	#7	steam power	Bituminous coal	2007.06	2,904,680	0.7886	0.0270
Munkyung solar		solar		2007.06	2,563		
Younggwang solar park		solar		2007.06	853		
Yungam Solar		solar		2007.06	770		
Wonjungsu		small hydro power		2007.05			
baegok		small hydro power		2007.05	1,001		
damyangho		small hydro power		2007.05	1,771		
Juam		small hydro power		2007.05			
Namjeju	#4	thermal	heavy oil	2007.03	500,222	0.7623	0.0045
Eco energy		solar		2007.03	231,029		
hapcheon		small hydro power		2007.02	6,777		
Jeonju-resource recovery facility				2007.02	13,059		
Seoul Marin(suncheon)		solar		2007.02	1,223		
Mirae energy		solar		2007.02	165		
Seomjingang		small hydro power		2007.02			
samcheonpo		small hydro power		2007.02			
dalbang		small hydro power		2007.02			
Taean	#7	steam power	Bituminous coal	2007.02	3,868,817	0.7934	0.0362
Yeongju the second solar		solar		2007.01	646		
Hyundaedaesan		combined		2007.01			
Cheongsong pumping	#2	pumping		2006.12	145,042		
S&P Solar		solar		2006.10	995		

Bundang fuel cell		fuel cell	LNG	2006.10	1,959	0.4243	0.0000
Yonnggwang Solar park		solar		2006.10	853		
Namhae Solar		solar		2006.10	1,462		
HanlaJeunggong Solar		solar		2006.10	1,292		
Yungam Solar		solar		2006.09	770		
Enepark		solar		2006.09	416		
Yongheng solar		solar		2006.09	1,214		
Cheongsong pumping	#1	pumping		2006.09	164,069		
Namjeju	#3	thermal	heavy oil	2006.09	484,459	0.7661	0.0044
yangyang(pumping)	#4	pumping		2006.08	91,270		
Donghae solar		solar		2006.08	1,118		
Kangwon-wind power		wind		2006.07			
yangyang pump windpower		wind		2006.06			
Hadongho		small hydro power		2006.06	1,832		
yangyang (pumping)	#3	pumping		2006.06	56,495		
Goheung Solar		solar		2006.06	1,233		
Jangseong		small hydro power		2006.05	648		
yangyang (pumping)	#2	pumping		2006.04	103,698		
Dangjin	#6	thermal	Bituminous coal	2006.04	3,497,359	0.7882	0.0325
Sinchang-wind power		wind		2006.03	3,572		
yangyang (pumping)	#1	pumping		2006.02	106,973		
Janghengdam		small hydro power		2005.12			
Suncheon Solar		solar		2005.12	1,259		
Samcheonpo solar energy		solar		2005.12	131		
Dangjin	#5	steam power	Bituminous coal	2005.10	3,443,482	0.7965	0.0324
yangyang pump small hydro		small hydro power		2005.10			

Taean solar energy		solar		2005.10	118		
Jeju DP		internal combustion	heavy oil	2005.07	235,626	0.6254	0.0017
WunjeongLFG		internal combustion	LFG	2005.07	11,415		
Yulchon		combined	LNG	2005.07	2,083,451	0.3743	0.0092
Incheon		combined	LNG	2005.07	3,696,784	0.3567	0.0156
Daegok		small hydro power		2005.07	1,278		
Donghwa		small hydro power		2005.07	2,481		
Ulchin	#6	nuclear		2005.04	7,911,305		
Hanrye		LFG	LFG	2005.04	5,102		
Busan Bio-gas		internal combustion	LFG	2005.03	1,551		
Sungnam		small hydro power		2004.12			
Yungduk-wind power		wind		2004.12			
Yongdam		small hydro power		2004.12	24,928		
Maebongsan-wind power		wind		2004.12	11,058		
Daegwanryung-wind power		wind		2004.12	4,288		
Yongheng	#2	steam power	Bituminous coal	2004.11	6,081,490	0.8128	0.0583
new solar energy		solar		2004.11	224		
Yongheng	#1	steam power	Bituminous coal	2004.07	5,020,901	0.8174	0.0484
Ulchin	#5	nuclear		2004.07	8,025,928		
Busan		combined combustion	LNG	2003.05 2004.03	11,616,221	0.3564	0.0489
Chunsang		small hydro power		2004.02	240		
Cheongju LFG		internal combustion		2004.02	5,808		
Daejon Geumgodong		internal combustion		2003.06	9,160		
Hoicheon ENC		internal combustion		2003.05	2,826		
Andong		small hydro power		2003.09			

Gunsan-wind power		wind		2002.11 2003.09	7,958		
Sangwon ENC		internal combustion		2001.12 2003.03 2003.06			
Muju		small hydro power		2003.04	637		
Yonggwang	#6	nuclear		2002.12	7,859,224		
Taean	#6	steam power	Bituminous coal	2002.05	4,036,733	0.8123	0.0387
Yonggwang	#5	nuclear		2002.05	8,601,736		
Total					84,736,759	BM Factor	0.3933

Source: Statistics of Electric Power in KOREA (2008) (KEPCO), Current status of power generating facility (2008, Korea power exchange)

<Table Annex3-5> Default Values of Carbon content

Fuel	Default carbon content (kg/GJ)	Fuel	Default carbon content (kg/GJ)
Crude oil	20	Oil shale and Tar sands	29.1
Orimulsion	21	Brown Coal Briquettes	26.6
Natural gas liquids	17.2	Patent Fuel	26.6
Motor Gasoline	18.9	Coke Oven Coke and Lignite Coke	29.2
Aviation Gasoline	19.1	Gas Coke	29.2
Jet Gasoline	19.1	Coal Tar	22.0
Jet kerosene	19.5	Gas Works Gas	12.1
Other Kerosene	19.6	Coke Oven Gas	12.1
Shale oil	20	Blast Furnace Gas	70.8
Gas/Diesel oil	20.2	Oxygen Steel Furnace Gas	49.6
Residual fuel oil	21.1	Natural Gas	15.3
LPG	17.2	Municipal Wastes (non-biomass fraction)	25.0
Ethane	16.8	Industrial Wastes	39.0
Naphtha	20.0	Waste Oils	20.0
Bitumen	22.0	Peat	28.9
Lubricants	20.0	Wood/Wood Waste	30.5
Petroleum coke	26.6	Sulphite lyes (black liquor)	26.0
Refinery Feedstocks	20.0	Other Primary Solid Biomass	27.3
Refinery gas	15.7	Charcoal	30.5
Paraffin Waxes	20.0	BioGasoline	19.3
White Spirit & SBP	20.0	Biodiesels	19.3
Other Petroleum Products	20.0	Other Liquid Biofuels	21.7
Anthracite	26.8	Land fill Gas	14.9
Coking coal	25.8	Sludge Gas	14.9
Other bituminous coal	25.8	Other Biogas	14.9
sub-bituminous coal	26.2	Municipal Wastes (biomass fraction)	27.3
Lignite	27.6		

Source: IPCC Guidelines for national greenhouse gas inventories, 2006

Annex 4

MONITORING INFORMATION

Refer to section B. 5

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