CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

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24MW DONG YANG ENERGY PV(photovoltaic) power plant
Version: 10
Date: 10 Dec 2009

A.2. Description of the project activity:

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The purpose of the project activity

DONG YANG ENERGY PV Power Plant is a facility to produce electricity by solar energy inside of Jeollanamdo province in the Republic of Korea, and emits zero greenhouse gas (GHG) into the atmosphere.
The purpose of this project is to abate GHG emission through generating electricity by PV power without using fossil fuels. The project confirms to the government policy which promotes development of renewable energy technology and contributes to lowering dependence on electricity generated by fossil fuels which takes more takes 63.43% of electricity generation in Korea.(KPX,2007)

Description of the project activity

The project generates electricity from solar energy and supplies electricity to the grid.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 generated by thermal power plants using fossil fuel which takes 63.43% of electricity generation in Korea (KPX, 2007)[1].
The capacity of this project is 24MW which is the highest capacity of electricity generation in Asia. The area of this project is about 682,500m^2 and annual amount of generated electricity will be about 35,882MWh (efficiency of 17.1%). So, generated electricity will reduce GHG emission about 21,874tCO_2 e/year.

Contribution to sustainable development

The project contributes to sustainable development in the following ways:

- Generation by photovoltaic power plant decreases the use of fossil fuels.
- As one of renewable energy sources, generation by photovoltaic power plant does not emit any GHGs, as well as SOx, NOx and particulate etc.
- Photovoltaic power can be utilized as an energy source for future generations, because it substitutes fossil fuels and does not impact on natural resource exhaustion.
- Creating employment opportunity contributes to the local economy.

A.3. Project participants:

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity Project participants	Kindly indicate if the Party involved wishes to be considered a project participants (yes/no)

[1] KOREA POWER EXCHANGE (http://www.kpx.or.kr/)

Republic of Korea (host)	DONG YANG ENERGY Co., Ltd.	No

A.4. Technical description of the project activity:

A.4.1. Location of the 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.:

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Jeollanamdo

A.4.1.3. City/Town/Community etc.:

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Sinan-gun / Jido-eup / Taecheon-ri

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

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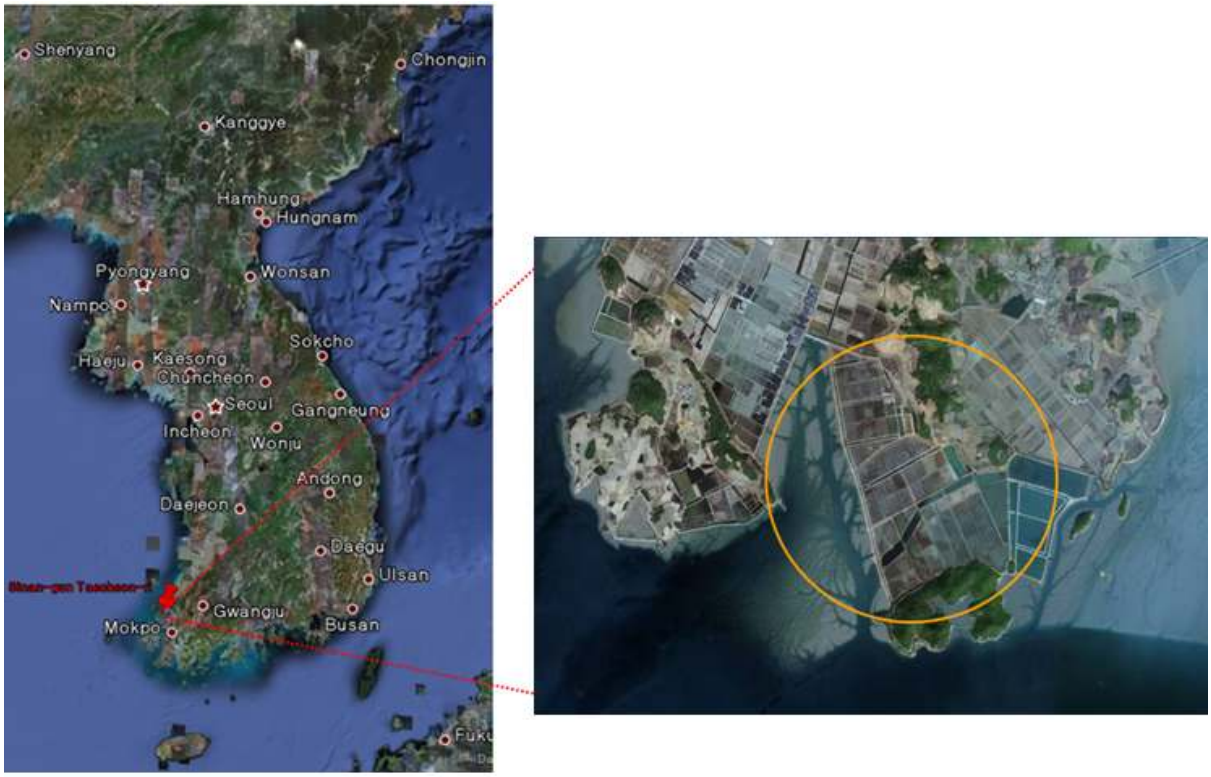
The location of the project activity is located at Taechon-ri in Jeollanamdo, the Republic of Korea. The geographical coordinates of the proposed project are longitude 126˚14' 20.82" East, latitude 35˚01' 40.84" North. Figure A-1 and A-2 show the location of the proposed project.



<Figure A-1> Location of DONG YANG PV power plant

<Figure A-2> Arial view of DONG YANG PV power plant

A.4.2. Category(ies) of project activity:

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Category: Renewable electricity in grid connected applications
Sectoral Scope 1: Energy Industry

A.4.3. Technology to be employed by the project activity:

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The project is a large-scale CDM project activity mentioned in "The project type, modalities and procedures for a clean development mechanism as defined in Article 12 of the Kyoto Protocol". The CDM project activity is Category: Renewable energy projects; Renewable electricity generation for a grid.

The purpose of the project is to build up the PV power plant with 24MW capacity. Regarding the technology/measure of the project, silicon solar cells are installed for the proposed project and two types of modules (180W and 200W) are used. The efficiency of the power plant is about 17.1%.

The entire solar cell module is consisted of 7 sections connected to junction boxes and linked to an inverter. The fuses are installed in series strong that it can be conducted for the series, which makes prompt action that 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 operations of the plant, each facility cab be supervised from on-site control room.

The remote control of tracker setting is possible and information on climatic condition from thermoscope, insolation and anemometer sensors are recorded. From these sensors, signals from these sensors and data from the inverter are sent to the main computer in the plant.

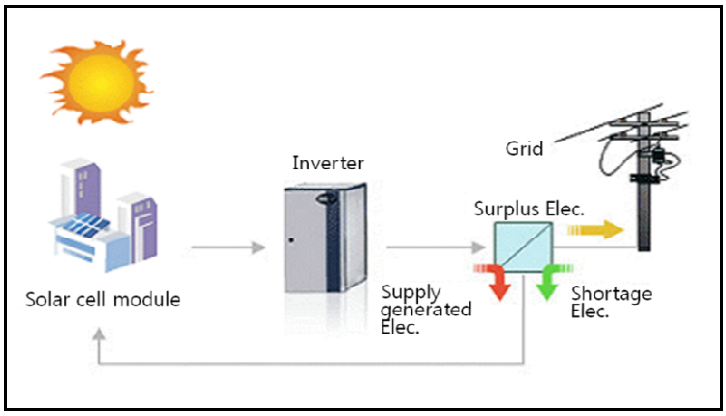
In the communication board of an inverter, by sending electric characteristics such as power generation, voltage, electric current and frequency of photovoltaic generation of electric power to the main computer, it is possible to audit and measure the data. It is also possible to audit and measure the data at a distant place by a LAN(Local Area Network) or a modem, and if part of the system would break down, it will be captured and managed quickly at a distant place, in case that there is something wrong with the equipment.

As the biggest advantage, the easy maintenance is on stand-by all the time against the unexpected breakdown.

<Table A-1> Technology description

Item	Type	Technology Standards
Solar Cell (PV1~PV6)	Type	STM 180F(CONERGY)
	Capacity	1959.520kW
	Module Maximum Output Power	180W
	Number of module	108,864 pieces
Inverter (PV1~PV6)	Type	STZ 300(SUNTECHNICS)
		Grid connected
	output	275.0 kW
	Max. input voltage	DC 965 V
	Control Method	PWM
	Node form	3-Phase 3-Wire
	Efficiency	More than 95%

Item	Type	Technology Standards
Solar Cell (PV7)	Type	SP200F P12 C1(CONERGY)
	Capacity	4358.400Kw
	Module Maximum Output Power	200W
	Number of module	21,792 pieces
Inverter (PV7)	Type	STZ 300(SUNTECHINCS)
		Grid connected
	Output	275.0 kW
	Max. input voltage	DC 965 V
	Control Method	PWM
	Node form	3-Phase 3-Wire
	Efficiency	More than 95%



<Figure A- 4> On-grid Photovoltaic distributed system diagram

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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The estimated emission reductions from the project activities is 218,740 tCO_2e during the crediting period.

<Table A-2> Estimated Emissions Reductions from the Project

Years	Annual estimation of emission reductions (tonnes of CO_2 e)
Year1: 2010	21,874
Year2: 2011	21,874
Year3: 2012	21,874
Year4: 2013	21,874
Year5: 2014	21,874
Year6: 2015	21,874
Year7: 2016	21,874
Year8: 2017	21,874
Year9: 2018	21,874
Year10: 2019	21,874
Total estimated reductions (tonnes of CO_2e)	218,740
Total number of crediting years	10
Annual average reductions (tonnes of CO_2 e)	21,874

A.4.5. Public funding of the project activity:

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The project will not receive any public funding from parties included in Annex Ⅰ of the UNFCCC.

SECTION B. Application of a baseline and monitoring methodology

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

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1. Approved consolidated baseline and monitoring methodology : ACM0002(Version 10): "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

2. The tool for demonstration and assessment of additionality :

The approved methodology of "the tool to calculate the emission factor for an electricity system" (Version 2).
"The tool for the demonstration and assessment of additionality " (Version 05.2).

According to the ACM0002 (version 10), the baseline emission factor of the project is calculated by "Tool to calculate the emission factor for an electricity system (version 01.1). The baseline emission factor is calculated by CM (Combined Margin), which is the weighted average of OM (Operating Margin) and BM (Build Margin).

The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality, version 05.2(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 methodology and why it is applicable to the project activity:

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This type of renewable energy project falls within the specifications set out for electricity capacity additions, i.e., solar sources, and the methodology of ACM0002 is suitable for this project.

◦ This project is a project activity that involves switching from fossil fuels to renewable energy at the site of the project activity since in this case the baseline emission may be the use of fossil fuels at the site.

◦The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available and applies to the grid-connected electricity generation from solar power.

B.3. Description of the sources and gases included in the project boundary:

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Installation of Photovoltaic system according to ACM0002 and as referred to in Appendix B for large-scale project activities, the project boundary of photovoltaic system that provides electricity to a grid encompassed the physical, geographical site of the renewable generation source.
The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system of Korea Electricity Power Corporation (KEPCO).

<Table B-1> The sources and gases included in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline Emission	Grid electricity production	CO_2	Included	According to ACM0002 only CO_2 emissions from electricity generation should be accounted for.
		CH_4	Excluded	According to ACM0002
		N_2O	Excluded	According to ACM0002
Project Emission	Electricity Generation from solar power	CO_2	Excluded	Zero-emission grid-connected electricity generation from renewable energy
		CH_4	Excluded	Zero-emission grid-connected electricity generation from renewable energy
		N_2O	Excluded	Zero-emission grid-connected electricity generation from renewable energy

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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According to ACM0002, Version 10, 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"(version 01.1). 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

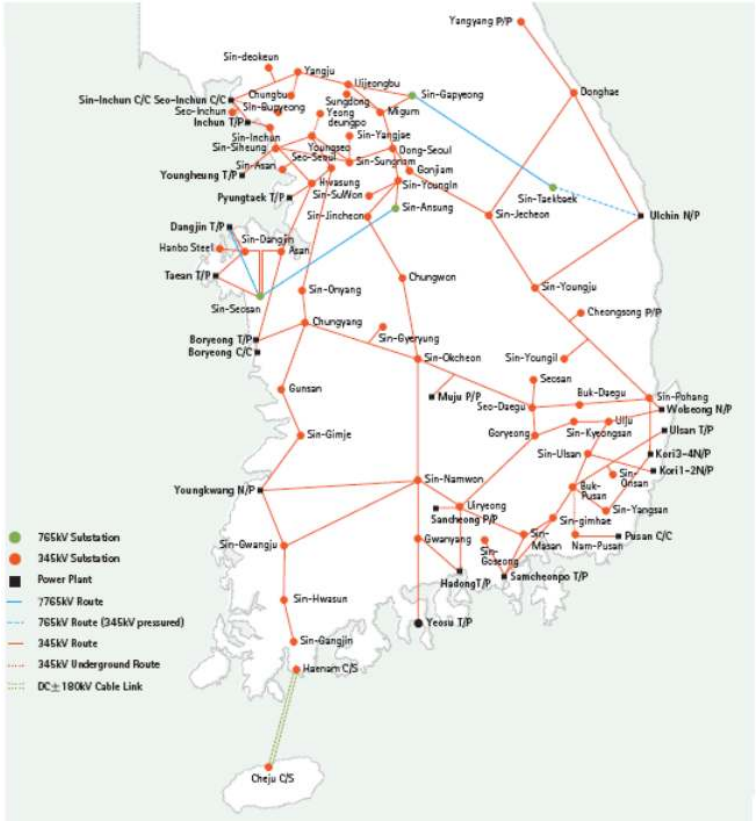
(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

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"(version 01.1) and the calculation is as follows:

Step 1. Identify the relevant electric power system

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

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



<Figure B-1> Electric Power Grid Nationwide in Republic of Korea
(Source: 2008 Annual Report, Korea Electric Power Corporation)

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

According to 'Tool to calculate the emission factor for an electricity system' (Version 02), there are two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are include in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The project will select Option I.

Step 3. Select a method to determine the operation margin(OM)

As described in "Tool to calculate the emission factor for an electricity system"(version 01.1), 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

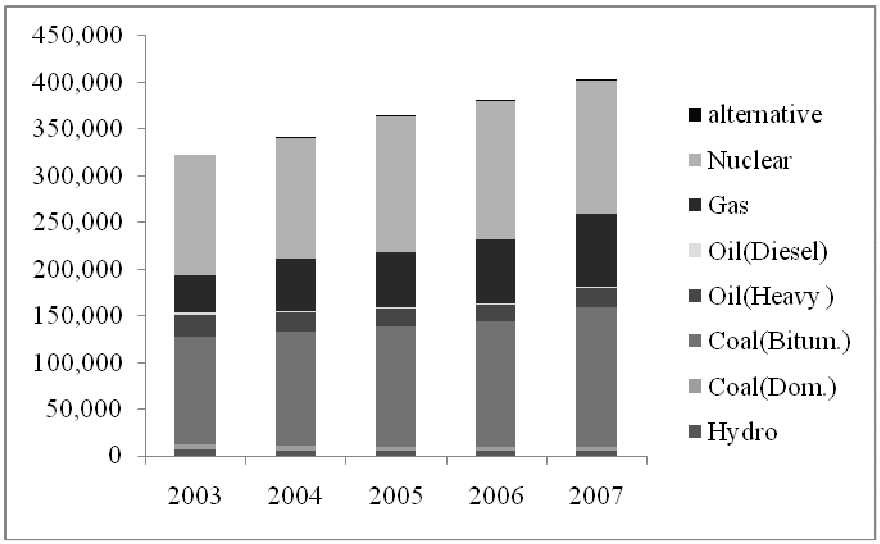
Simple OM method can be used where low-cost/must run resources constitute less than 50% of the grid generation in the average of the five most recent years. ACM0002 further specifies that hydro, geothermal,

wind, low-cost biomass, nuclear and solar generation are included in must-run sources. In addition, domestic coal is supported by governmental fund as a must-run generation.
For this case, the most recent (2003-2007) average data shows that the rate of low-cost/must run is 41.49%, as can be seen in the figure below. Therefore, option (a) (Simple OM) has been chosen to calculate the Operation Margin emission factor.

<Table B-2> Gross generation by energy sources (Unit : million kWh)

	2003	2004	2005	2006	2007
Hydro	6,887	5,861	5,189	5,219	5,042
Coal (Dom.)	5,398	4,603	4,484	4,312	4,470
Coal (Bitum.)	114,878	122,556	129,174	134,894	150,204
Oil(Heavy)	23,656	21,591	20,079	18,596	20,769
Oil (Diesel)	2,870	474	412	599	446
Gas	39,091	55,999	58,118	68,302	78,427
Nuclear*	129,672	130,715	146,779	148,749	142,937
Alternative*	-	350	404	511	829
Total	322,452	342,148	364,638	381,181	403,124
The rate of low cost/must run power generation (%)	41.49				

Source: Electricity statistics on Electricity quantity from Korea Electric Power Corporation, 2008
(*low-operating cost and must-run power plants)



<Figure B-2> Gross generation by Energy sources in 2007

Step 4. 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 2)", the Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/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:

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

$EF_{grid,OMsimple,y}$	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. 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 5. Identify the group of power units to be included in the Build Margin (BM)

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"(version 2).

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-3> 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-3> 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	48MWh	84,736,759 MWh	Total generation is 385,990,619 MWh in Korea (based on KEPCO's data of the year 2007)
Proportion (ratio to total generation in Korea)	0.00001%	21.953%	
Selected Group		O	

The annual generation of "the five power plants that have been built most recently" was 48MWh (0.00001% of total generation of the grid system). "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." was 84,736,759 MWh(21.953% of total generation of the grid system). Total generation(except CDM registered power plant generation and Net generation) is 385,990,619MWh in Korea (based on KEPCO's data of the year 2007).
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 6. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/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 0.3933(tCO_2 e/MWh)

Step 7. Calculate the combined margin (CM) 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 CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/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 :

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

Calculation of the baseline emission (BE*y*)

Depending on ACM0002 (version 10), baseline emissions should be obtained by the below equation

$$\boldsymbol{BE_y = EG_{pj,y} \cdot EF_{grid,CM,y}}$$

Where:

BE_y	*B*aseline emissions (in tCO_2)
$\boldsymbol{EG_{pj,y}}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y(MWh/yr)
$\boldsymbol{EF_{grid,CM,y}}$	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the " Tool to calculate the emission factor for an electricity system" (tCO_2/ MWh)

The calculation of is $EG_{pj,y}$ different for (a) Greenfield plants, (b) retrofits and replacements, and (c) capacity additions. This case is Option (a).

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{pj,y} = EG_{facility}$$

Where,

$EG_{pj,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y(MWh/yr)

$EG_{facility}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

The electricity supplied by the project activity to the grid ($EG_{facility}$) is expected to be 35,882MWh/yr as described at section A.

As a result, the baseline emission (BE_y) is 21,874 (tCO_2 /yr)

Project emission

The project activity uses wind power to generation electricity and hence the emissions from the project activity are taken as nil.

$PE_y = 0$

Leakage

Leakage emissions on account of the project activity is considered as zero as neither the wind energy generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.

$L_y=0$

Therefore the above equation no.1 is simplified to

$ER_y = BE_y$

The key information and data used for calculation of baseline emission by this project activity have been taken from following sources.

<Table B-4> Key information and data used to determine the Baseline scenario for photovoltaic system.

Parameter	Value	Source
$EG_{pj,y}$ **(*MWh/yr*)** is the electricity delivered to The grid by source *m*.	Refer to (Table Annex-3)	Statistics of Electric Power in KOREA (2006,2007,2008) (KEPCO)
$FC_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *m* in year(s) y, *m* refers to the power sources delivering low-operating cost and must-run power plants, and including imports to the grid	Refer to (Table Annex-1)	Statistics of Electric Power in KOREA (2006,2007,2008) (KEPCO)

Net Calorific Values by Power Plant	Refer to (Table Annex-2)	Caloric value sourced from Statistics of Electric Power in KOREA (2006,2007,2008) (KEPCO)
Net Calorific Values Conversion Factor	Solid/liquid fuel : 0.95 Gaseous fuel : 0.90 (IPCC 2006)	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Fuels CO_2 Emission Factor ($EF_{co2,i,i}$)	Refer to (Table Annex-5)	2006 IPCC Guidelines for National Greenhouse Gas Inventories 1.23
$EF_{grid,OM}$: Operating Margin Emissions Factor	0.6817 tCO_2/MWh	Calculated
$EF_{grid,BM}$: Build Margin Emissions Factor	0.3933 tCO_2/MWh	Calculated
EF_{CM} : Combined Margin Emissions Factor	0.6096 tCO_2/MWh	Calculated
$EG_{facility}$:Generation of the project in year y	35,882 MWh	System scale data as excel file

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 CDM project activity (assessment and demonstration of additionality):

The <Table B-5> below is the timeline of this project.

<Table B-5> Timeline schedule

date	Description of a step	Facts relevant to CDM
15/05/2006	Sinan PV Plant Project CDM report	CDM income consideration of Sinan PV Plant Project.
18/05/2006	Sinan PV Power Project Plan	The project participant ordered that amount of GHG emission reduction.
23/11/2006	Board meeting	CDM income consideration DONG YANG ENERGY. Co., Ltd
29/03/2007	Construction agreement date	Construction agreement with DONG YANG ENERGY. Co., Ltd and CORNERGY
02/04/2007	Residents presentation date	Residents briefing held
01/05/2007	Approval of construction work	A date of construction work approval
10/05/2007	Start of construction work	Contract for execution design of solar power project
21/05/2007	Initial payment date	Initial PV module purchase date
16/11/2007	Initial Grid connection	The first grid connection date
22/11/2007	CDM consulting agreement	Send a draft agreement to EPURON
22/11/2007~	Commercial operation start	Starting operation
26/12/2007	1st Drafting date	CDM consulting consideration (EPURON Ltd & DONG YANG ENERGY. Co., Ltd)
10/03/2008	2nd Drafting date	CDM consulting consideration (EPURON Ltd & DONG YANG ENERGY. Co., Ltd)
10/03/2008	Internal consultation	Contact for sales of CERs
30/11/2008	Finalization CDM consulting agreement date	Contract with a CDM consultant corporation, Ecoeye Co., Ltd.
24/12/2008	DOE agreement date	DOE agreement with DONG YANG ENERGY. Co., Ltd and KFQ (Korea Foundation for

		Quality).

The starting date of the project is 29th of March, 2007 that is the date of construction agreement between DONG YANG ENERGY Co., Ltd. and CORNERGY. Before the agreement of the construction of this project, DONG YANG ENERGY. Co., Ltd. considered CDM as follows: 15th of May , 2006, DONG YANG ENERGY considered the CER income which is possible to gain from this project. On the 23th of November, 2006, DONG YANG ENERGY considered the CER income again in their board of directors meeting.

The determination of project scenario additionality is performed using the CDM consolidated "Tool for the demonstration and assessment of additionality" (Version.05.2), 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. The proposed project not taken as CDM project activity;
This project does not execute as CDM project activity. Therefore, this alternative may be part of the baseline. However, as shown in the investment analysis (*Step 2* of section B.5), the proposed project not undertaken as a CDM project activity and without CER income, if is not financially attractive for the potential investors.

Alternative 2. : : Construction of a fossil fuel plant with equivalent amount of installed capacity or annual electricity output;
The Korea government established "Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy"(revised in 27/09/2006. No 7998) to encourage use and develop the renewable energy sources in Korea in 2002.
This law is intended to improve the profitability and promote investment on renewable energy projects through preferential treatments for the electricity prices because in Korea, investing on those renewable energy projects is not much activated due to the high cost and low returns of those projects.
The law first established in 2002 to promote diffusion of renewable energy. And according to decision of 22nd CDM EB meeting, it need not be taken into account in developing a baseline scenario. Therefore the law is not considered in this baseline calculation.

Alternative 3. Construction of a power plant using other sources of renewable energy with equivalent amount of annual electricity output;
The company's business objective is to generate renewable electricity. The alternative of using hydro power (could be similar scale) is unrealistic due to the lack of exploitable hydro resources. The proposed project site is the small island and there is no river for hydro power[2] and for topographical reason, tidal source is impossible. Also, the project site is mostly foreshore. So, drive a wind power pile into the ground is impossible.

Alternative 4. Supply of equivalent annual power output by the Grid where the proposed project is connected to;
The installed capacity of the Korea Electric Power Cooperation keeps increasing every year. The total installed capacity increased with new power plants installed and capacity additions from existing power plants. Therefore, alternative 4 is available. As a result, Power Grid from KEPCO is selected as the

[2] Sinan-Gun Website(http://www.shinan.go.kr/)

baseline for the proposed project.

In conclusion, practical and feasible baseline scenarios are alternative 1 and 4.

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[3].' (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

Benchmark rate of this project has applied average government bond rate 4.83% for 3 years (2006~2008) from Economic Statistics System provide by Korea Bank.
DONG YANG ENERGY, the company did not have its own discount rate. So we decided to consider the other discount rate. The project received a loan from a bank. Interest Rate is 8.15 percent at the time. However, this value is not a reasonable discount rate. Because this value is too high to use for the most appropriate financial indicator for making decision, and we have adopted the government bond rates.

The additionality tool, version 05.2 states that discount rates and benchmarks shall be derived from one of the five alternatives listed in the tool. So, we have chosen following alternative;
"Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent(financial) expert of documented by official public available financial data".

The PV power generation project require great amount of capital investments but expectation of return is very low. Due to these reasons, the PV generation project is not a very attractive option for power

[3] '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.

generation. The main reason that the PV generation project is unprofitable is because the average price of the system margin price (SMP) for the PV generation is very low, 85.92KRW/kWh (average of 2007 of KPX[4].)

In case of this project, we calculate Net Present Value for this category considering the amount of expected annual generation and the average price of the system marginal price 85.92KRW /kWh (2007) for PV generation. In calculating the amount of expected annual generation, we used 17.1% as PV generation utilization rate.

<Table B-6> The project's Net Present Value (Unit : million won)

	DONG YANG project	
	Without CERs benefit	With CERs benefit
The project's Net Present Value	-153,745	-150,163

We calculated NPV with using expected benefits from electricity and CERs sales and costs from construction and operation for PV power facility. As seen on Table B-6, NPV of this project is very poor regardless of CERs benefit.

The purpose of this part is to determine whether the proposed project is economically attractive or not through appropriate analysis method.
If the NPV (Net Present Value) of the project is lower than "0", the project is not an economically attractive course of action and fulfils the requirement of additionality.

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

	Total cost of Investment (million won)	Operation & Maintenance cost (million won/year)	system margin price(SMP) (won/KW)	NPV (million won)	electricity generation amount (MWh/yr)	Amount of electricity Capacity (MW)
DONG YANG ENERGY PV power plant	183,529	900	85.92	-153,745	35,882	24

<Table B-7> Basic parameters for calculation of financial indicators

Estimated cost of investment at the time of the initial consideration was 130,000 million won that is the capacity of 17MW. However, increase in capacity to 24MW investment cost was also increased. Investment costs will be organized as follows. Mechanical device cost is 46,500million won, construction cost is 116,200million won, land cost is 5,600million won and other cost (labor and foundation work, etc.) is 15,229millon won. O&M cost is consists of as follows; Outsourcing cost (Operation cost, Maintenance cost, repair cost), labor cost, insurance, supervision cost and other cost.

Sensitivity Analysis
In order to check how this project's NPV is affected by changing discount rate. Sensitivity analysis was performed using discount rate, PV generation utilization rate and the average price of the system marginal price(SMP) is the parameters.

[4] http://www.kpx.or.kr/

Sensitivity analysis is performed for economic analysis of this project. For this analysis, 4 variables are applied and they are investment cost, O&M cost, unit cost of electricity sales(SMP), electricity generation and interest rate. The result of the analysis is shown in the table below.

<Table B-8> Sensitively analysis (Unit : million won)

	Investment cost	SMP	O&M cost	Electricity generation
-20%	-117,039	-162,158	-151,289	-162,158
-10%	-135,392	-157,951	-152,517	-157,951
standard	-153,745	-153,745	-153,745	-153,745
10%	-172,098	-149,538	-154,973	-149,538
20%	-190,451	-145,332	-156,201	-145,332

Investment cost & O&M cost
We changed the parameter values from -20% to +20% at 10% intervals. This rate of price fluctuations is large enough to their predictions. Because the average inflation rate between 2003 and 2007 is 2.9% (2003: 3.5%, 2004: 3.6%, 2005: 2.8%, 2006: 2.2%, 2007: 2.5%) in Korea. The inflation rate[5] and economic growth rate in Korea is very stable. Therefore, a range of ± 20% is enough to figure out the risk of variation.

SMP cost
We analyzed trend of past 3 years (2004~2006) in order to analyze SMP. For the past three years an average annual growth rate was approximately 15.1% and an average growth rate between 2007 and 2009 was 16.6%. Based on the previous result, SMP does not give its big variation. We changed the variation range of parameter from -20% to +20% at 10% intervals. This rate of price fluctuations is large enough to their predictions.

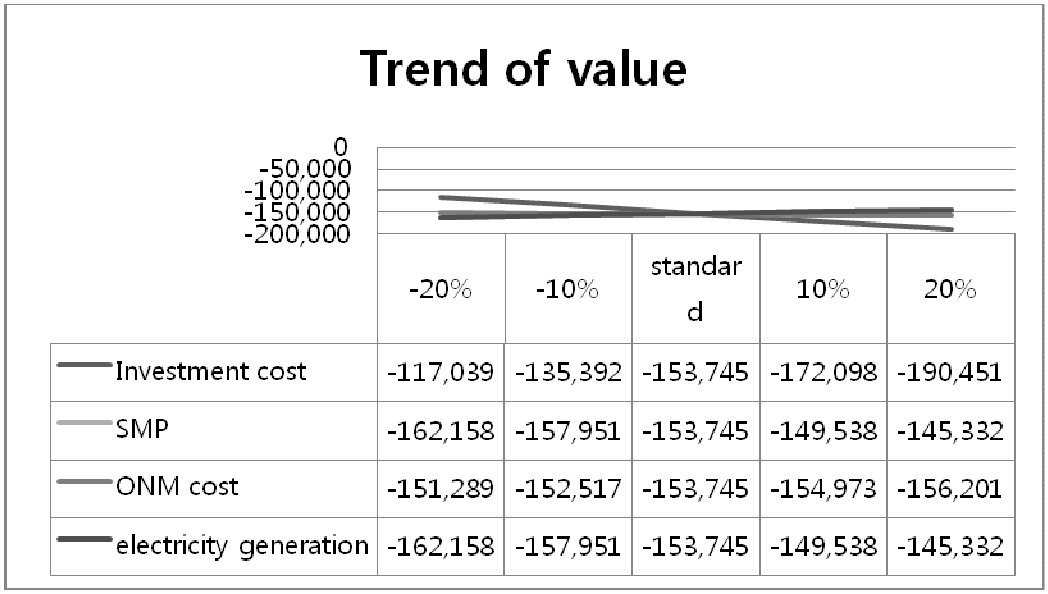
Electricity generation
In case of electricity generation variation range, 3-year average annual sunshine amount is 2,304hr. Sunshine amount the average on the season in the spring, summer, autumn and winter are 610.9hr, 555hr, 558hr, 439.8 hr respectively in Korea[6]. Seasonal average sunlight amount is small. Therefore the range of ± 20% is enough to figure out the risk of variation.[7]

Table B-8 shows that this project is not financially attractive again and it confirms that the project participant promoted this project for GHG emission reduction and clean environment not for financial benefit.
The result of economic analysis with NPV method 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 warmming.

[5] http://www.bok.or.kr/ (The bank of Korea)

[6] http://www.kma.go.kr/sfc/sfc_03_05.jpg (Weather forecaster)

[7] http://www.kma.go.kr/index.html (The Meterological office)



	-20%	-10%	standard	10%	20%
Investment cost	-117,039	-135,392	-153,745	-172,098	-190,451
SMP	-162,158	-157,951	-153,745	-149,538	-145,332
ONM cost	-151,289	-152,517	-153,745	-154,973	-156,201
electricity generation	-162,158	-157,951	-153,745	-149,538	-145,332

<Table B-9>Trend of NPV value
*SMP and electricity generation are same value. So, two graphs are overlap.

Step 3. Barrier Analysis
Barrier analysis does not consider .

Step 4. Common Practice
Sub-step 4a: Analyze other activities similar to the proposed project activity.
Due to the implementation of government policies to promote the renewable energy and the development of renewable energy technology, at the end of 2003 several renewable PV generation plant started to be installed and operated in Korea. According to this policy, Table B-10 shows that the renewable power generation in Korea.

<Table B-10> 2003~2007, Amount and rates of renewable power generation

Year		**Solar power**	Bio	Wind	Hydro	Fuel cell	Waste	Landfill	Total	Rate of supply
2003	MWh	**7,752**	100,193	24,865	0	4,902,346	0	0	5,035,156	1.56
	%	**0.15**	1.98	0.49	0.00	97.36	0.00	0.00	100.00	
2004	MWh	**9,872**	146,927	47,442	0	4,329,362	0	0	4,533,603	1.33
	%	**0.21**	3.24	1.04	0.00	95.49	0.00	0.00	100.00	
2005	MWh	**14,399**	129,595	129,888	2,103	3,674,015	0	0	3,950,000	1.08
	%	**0.36**	3.28	3.28	0.05	93.01	0.00	0.00	100.00	
2006	MWh	**31,022**	154,521	238,911	6,681	3,468,233	0	0	3,899,369	1.02
	%	**0.79**	3.96	6.12	0.17	88.94	0.00	0.00	100.00	
2007	MWh	**71,279**	307,299	375,641	8,522	3,632,089	0	0	4,394,830	1.03
	%	**1.62**	6.99	8.54	0.19	82.64	0.00	0.00	100.00	

*The Korea New & Renewable Energy Statistical Information System (KONESIS);
http://konesis.kemco.or.kr/

In Republic of Korea, electricity production by new renewable energy power generation dominates 1.56% in 2003, 1.08% in 2005, 1.02% in 2006 and 1.03% in 2007 of total electricity production. So, it's share is less than 2%.
In 2007, solar power production occupied small part of new renewable energy power generation as 1.62% of the total power production by new renewable energy.

<Table B-11> Similar project located

Project title	Installed capacity	date	Note
LG Solar Energy Taean Photovoltaic Power Plant Project	14MW	2008	Validation
Gochang solarpark 14.98MW photovoltaic power plant Project	14.98MW	2008	Validation

Sub-step 4b. Discuss any similar options that are occurring

The following methodology is applied to the description for definition of similar plants to the project activity.

Analysis of common practice can be performed in a range of a comparable size to the project activity defined as the range from 50% to 150% of the rated capacity of the project plant. (ACM0013, Version 02.1)

Half of the capacity of this project is 12MW and 150% of the capacity of this project is 36MW.
Two of solar power plants have the capacity of between 12MW and 36MW in Korea. LG Solar Energy Taean Photovoltaic Power Plant Project(14MW) and Gochang solar park photovoltaic power plant Project(14.98MW) are in the CDM progress. Therefore, the information is not in common practice. This project is the largest solar power plant in Asia and there are no projects to compare with it.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Calculation of Baseline Emission

Depending on ACM0002 (Version 10), baseline emissions should be obtained by the below equation

$$BE_y = EG_{pj,y} \cdot EF_{grid,CM,y}$$

Where:

BE_y *B*aseline emissions (in tCO_2)

$EG_{pj,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y(MWh/yr)

$EF_{grid,CM,y}$ Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the " Tool to calculate the emission factor for an electricity system" (tCO_2/ MWh)

$$EG_{pj,y} = EG_{facility}$$

Where,

$EG_{pj,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y(MWh/yr)

$EG_{facility}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

The electricity supplied by the project activity to the grid ($EG_{facility}$) is expected to be 35,882MWh/yr as described at section A.

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

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 21,874 (tCO_2 /yr)

<Table B-12> Annual electricity generation and baseline emission of Photovoltaic system

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)	35,882 (MWh /yr)
Baseline emission(BE_y)	21.874 (tCO_2 /yr)

Project emission

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

Leakage

GHGs emissions from 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

$$ER_y = BE_y - PE_y$$

Where
ER_y Emission reductions in year y (tCO2e/yr)
BE_y Baseline emissions in year y (tCO2e/yr)
PE_y Project emissions in year y (tCO2e/yr)

No leakage emissions are considered.

Therefore the emission reduction by the project activity are equal to baseline emissions, that is **21,874** (tCO_2 /yr).

$ER_y = BE_y - PE_y$

= 21,874 (tCO_2 /yr)

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

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emissions intensity of the electricity displaced
Source of data used:	Calculated
Value applied:	$0.6096tCO_2/MWh$
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 2)." Applied value was calculated by referring Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).
Any comment:	-The same value will be applied during the first certification period without updating.

Data / Parameter:	$EF_{grid,OM}$
Data unit:	tCO_2/MWh
Description:	Operating Margin emission factor
Source of data used:	Calculated
Value applied:	0.6817 tCO_2/MWh
Justification of the choice of data or	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 2)." Applied value was calculated by referring

description of measurement methods and procedures actually applied :	Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).
Any comment:	-This data will be calculated at the time of PDD submission and will not be changed during the first certification period - This value is ex-ante value which is calculated at the time of PDD submission and will be applied during the crediting period without update.

Data / Parameter:	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year y
Source of data used:	Calculated
Value of data	0.6096 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 2)." Applied value was calculated by referring Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).
Any comment:	- The same value will be applied during the first certification period without updating.

Data / Parameter:	$NCV_{i,v}$
Data unit:	mass or volume unit
Description:	Amount of fossil fuel type i consumed by power plant / unit m in year y
Source of data used:	Statistics of electric power in KOREA (KEMCO)
Value of data	See the <Table Annex-2>
Justification of the choice of data or description of measurement methods and procedures actually applied :	Applied value was referred Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).
Any comment:	- $NCV_{i,v}$ is the $GCV_{i,v}$ multiplied the Net caloric values conversion factor. - $GCV_{i,v}$ value was referred Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO) and Net caloric values conversion factor was referred 2006 IPCC Guidelines for National Greenhouse Gas Inventories. - The same value will be applied during the first certification period without updating.

Data / Parameter:	$FC_{i,m,y}$
Data unit:	mass or volume unit
Description:	Amount of fossil fuel type i consumed by power plant / unit m in year y
Source of data used:	Statistics of electric power in KOREA (KEMCO)
Value of data	See the < Annex 3>
Justification of the choice of data or description of measurement methods	Applied value was referred Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).

and procedures actually applied :	
Any comment:	- The same value will be applied during the first certification period without updating.

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build Margin emission factor
Source of data used:	Calculated
Value of data	0.3933 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 2)." Applied value was calculated by referring Statistics of Electric Power in KOREA (2005, 2006, 2007) (KEPCO).
Any comment:	-This data will be calculated at the time of PDD submission and will not be changed during the first certification period. - This value is ex-ante value which is calculated at the time of PDD submission and will be applied during the crediting period without update.

B.6.3. Ex-ante calculation of emission reductions:

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As mentioned above, 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 35,882MWh per year, as shown in the below.

- Installed Capacity : 24 MW
- Annual hour : 2,304hr/year
  Utilization rate : 17.1% (Project Plan Document)
- Electricity Generation : 35,882 MWh/year

As mentioned above, the emission factor of the grid is determined by using the methodology ACM0002 (version 10) 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 24MW. Therefore, expected electricity produced by the project is 35,882 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)
= 35,882 MWh/yr × 0.6096 tCO_2/MWh

= 21,874 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
= 21,874 tonCO_2/y

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

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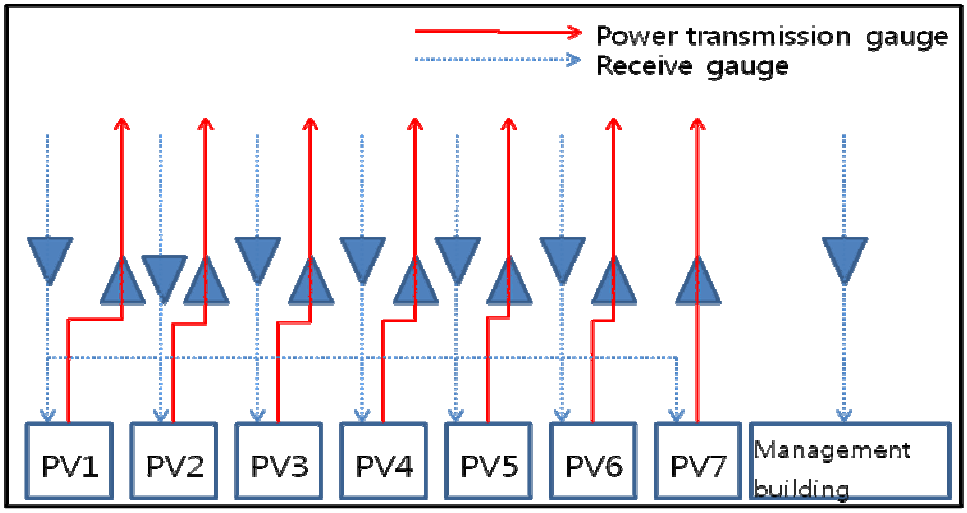
Years	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of leakage (tCO_2 e)	Estimation of overall emission reductions (tCO_2 e)
Year1: 2010	0	21,874	0	21,874
Year2: 2011	0	21,874	0	21,874
Year3: 2012	0	21,874	0	21,874
Year4: 2013	0	21,874	0	21,874
Year5: 2014	0	21,874	0	21,874
Year6: 2015	0	21,874	0	21,874
Year7: 2016	0	21,874	0	21,874
Year8: 2017	0	21,874	0	21,874
Year9: 2018	0	21,874	0	21,874
Year10: 2019	0	21,874	0	21,874
Total (tonnes of CO_2 e)	**0**	**218,740**	**0**	**218,740**

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	$EG_{facility}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used:	Metering equipment and bills of electricity sales.
Value of data applied	35,882 MWh

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Electricity exported to grid by DONG YANG PV Power plant is measured and recorded automatically by established meter hourly and sent to KEPCO (Korea Electric Power Coporation). The net value is the value of the difference between the incoming power and outgoing power.
QA/QC procedures to be applied:	Electricity meter belongs to KEPCO. The meter was set up transparently in accordance with 'Law regarding measurement' and 'Act on operation of electricity market' and sealed after affirmation of KEPCO. Additionally, to domestic electricity market rule, we will check the gauge every 3 years. The allowable transmission gauge is ± 0.5% and receive gauge is ± 1%.
Any comment:	The collected data is archived for 3 years on the PC. After 3 years, the data is burned to DVD for archive.



<Figure B-3> installed gauge point

B.7.2. Description of the monitoring plan:

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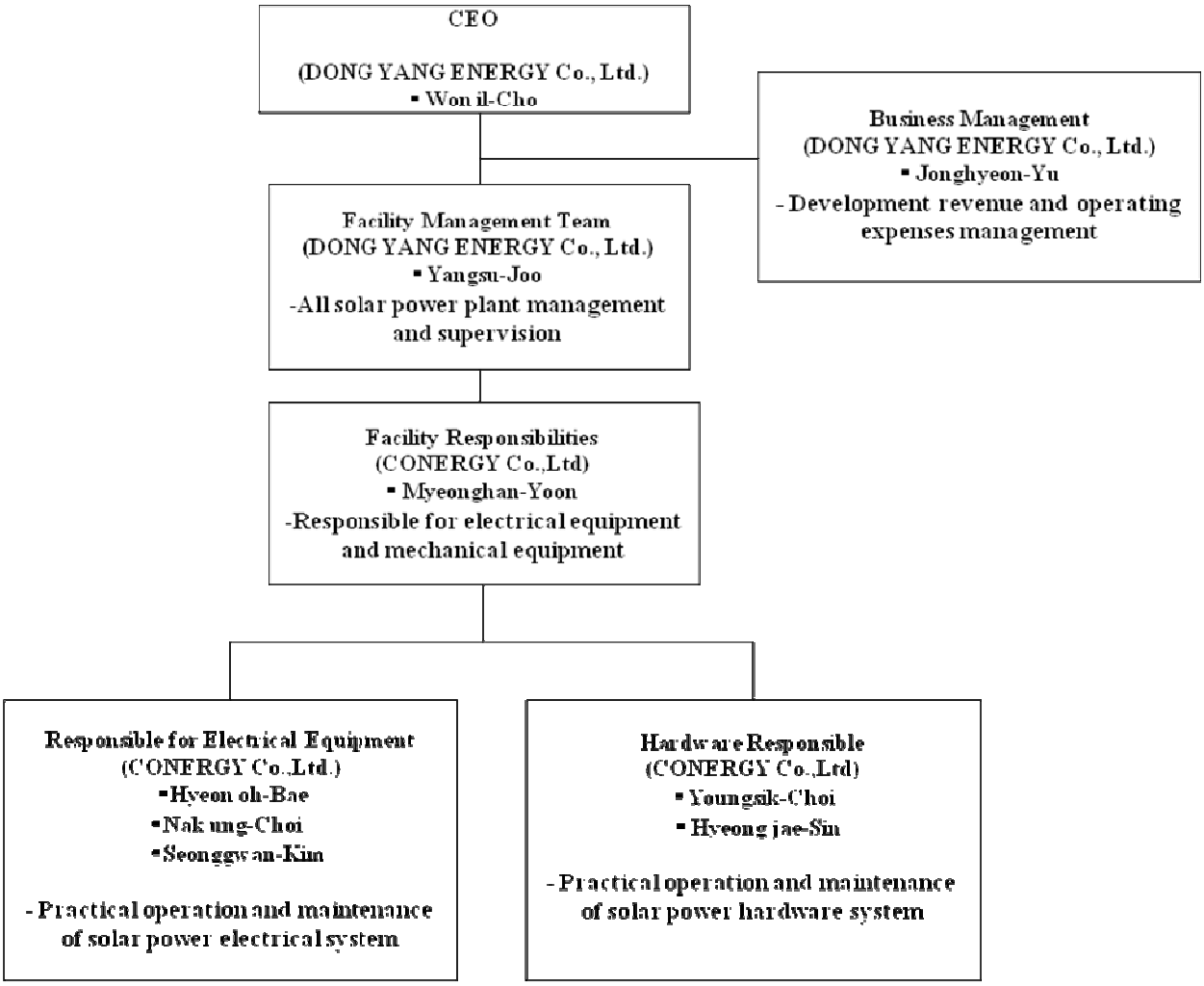
The operational and management structure for monitoring

The remote operation monitoring system of the PV Power Plant makes if possible to audit and measure the data by sending electric characteristics such as power generation, voltage, electric current and frequency of photovoltaic generation of electric power to the main computer. It is also possible to audit and measure the data at a distant place by a LAN.

All variables used to calculate project and baseline emissions are directly measured and available. To check the amount of generated electricity, two kinds of electricity measuring meters are installed. One is power transmission gauge and the other one is the receive gauge. Power transmission gauges are installed 7 and receive gauges are too. One receive gauge is used in the management building. Calculate the internal usage and will be excluded from power generation.



<Figure B-4> Operational and management structure

Although the equipment and the technical work is CONERGY Co., Ltd, but DONG YANG ENERGY Co., Ltd. has the responsibility and authority for all of monitoring.

Data collection and archiving

The amount of electricity supplied to the grid is measured by the gauge. The measured electricity amount is collected and recorded hourly, also these are managed as reports. The data is saved on PV management system PC. The collected data is archived for 3 years on the PC. After 3 years, the data is burned to DVD for archive. PP(DONG YANG EVERGY Co., Ltd.) and CONERGY will keep permanently.

Manager of monitoring and electricity safety

The person in charge of monitoring and electricity safety shall attend the following courses once a year.
- Course on 'Electricity market operating rules'

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

- Management of monitoring and electricity safety

1. Initial training for employees in site will be provided by the equipment supplier. If there are additional employees or changes of operating manual, DONG YANG EVERGY Co., Ltd. will be responsible for training them. DONG YANG EVERGY Co., Ltd. will undergo training for operation of monitoring system, emergency preparedness and management of data following operating manual. Training will include an organized course of theoretical and practical components.
2. In case of absence of the responsible person, the second responsible person shall be selected.
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.

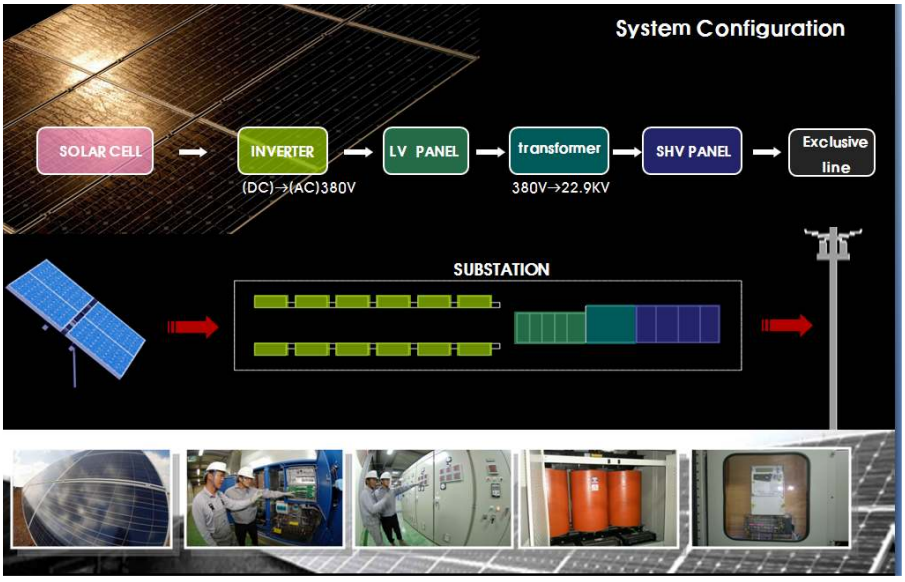
-Training

In accordance with specification for purchase and installation the project developers and manager will perform the training and maintenance over the equipment of DONG YANG ENERGY PV **(photovoltaic) power plant**. The training will be performed more than two months and the contents will include the overall operation of the plant, such as plant O&M and generation and monitoring manual.

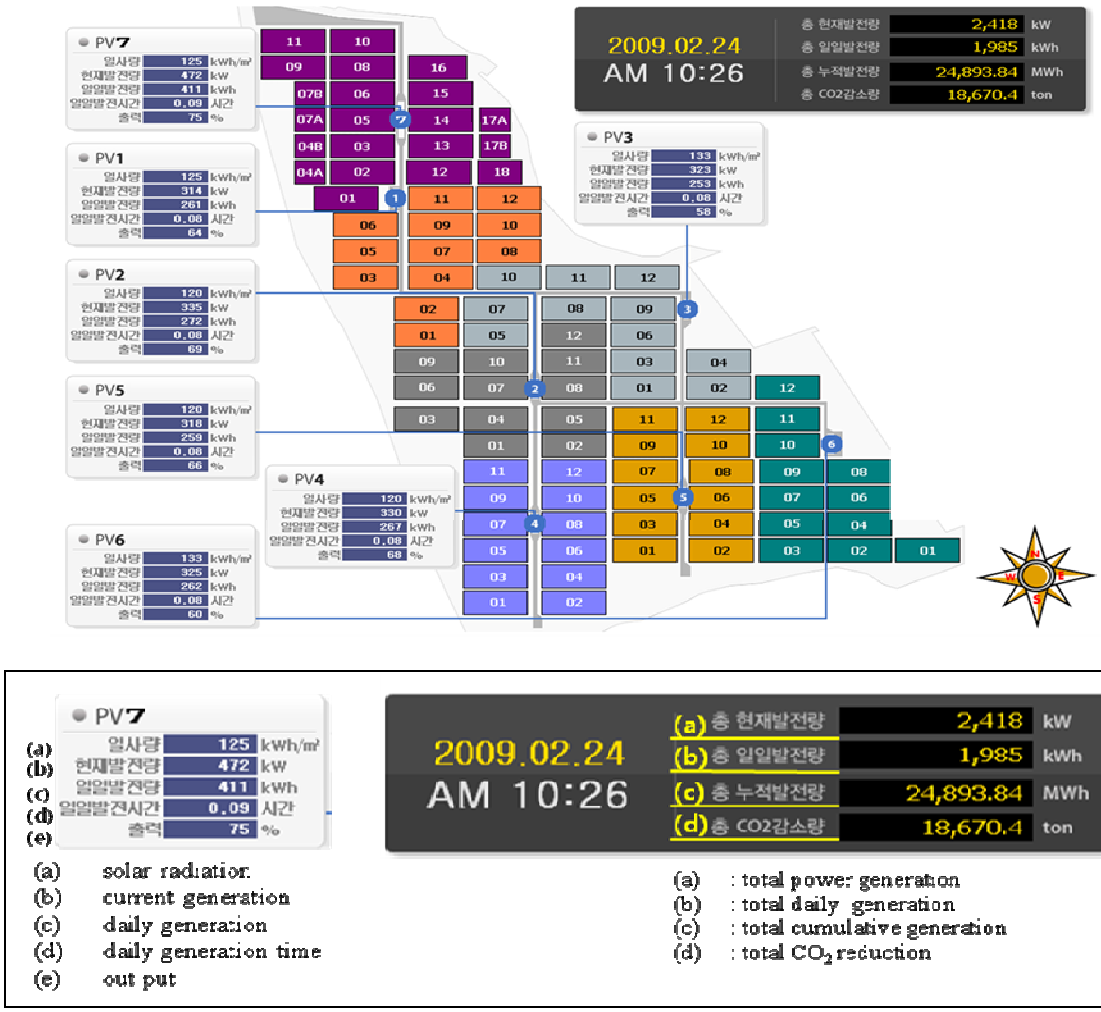
Inspection & Quality Assurance (QA) and Quality Control (QC)

Inspection of the measuring equipments
: Exceeds the capacity of this equipment is 1mW.To domestic electricity market rule, we will check the gauge every 3 years.
Domestic according to the regulations, we will check the gauge before the end of expiration the available period. (verification available period : 7 years).

Allowable error
: Allowable transmission gauge is ± 0.5% and receive gauge is ± 1%.



<Figure B-4>DONG YANG ENERGY PV power plant system configuration



<Figure B-5>DONG YANG ENERGY PV power plant Monitoring Schematic
; Sites were split into seven parts and the measuring meter was installed at each site.

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

>>

Date of completion of the application of the methodology
: 19/01/2009

Responsible monitoring department:
: Cho, Won Il / DONG YANG ENERGY Co., Ltd. (Facility business Div.)

Person of the application of the baseline study and monitoring methodology:
: Dr. Jung, Jae-Soo / Ecoeye Co., Ltd.

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:

>>

29/March/2007

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:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
March l 2010 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. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>
In accordance with environmental laws and regulations,
Prior Environmental Review (PER) was completed for the proposed project. And the PER was written on February ,2006.

The PER covers the sectors of natural environment, living environment, and social/economical environment as follows,
Location and Area

- Location : Sinan-gun , Taecheon-ri,Jido-eup , Jeollanamdo
- Area : 682,500m^3

Content and scope

- Natural environment : Weather· climate and energy, topography, soil and land, green space and animals·plants, scene
- Living environment: Land use, air, water, waste, noise and vibration, Recreation and leisure space
- Social/economical environment: Traffics , Cultural assets

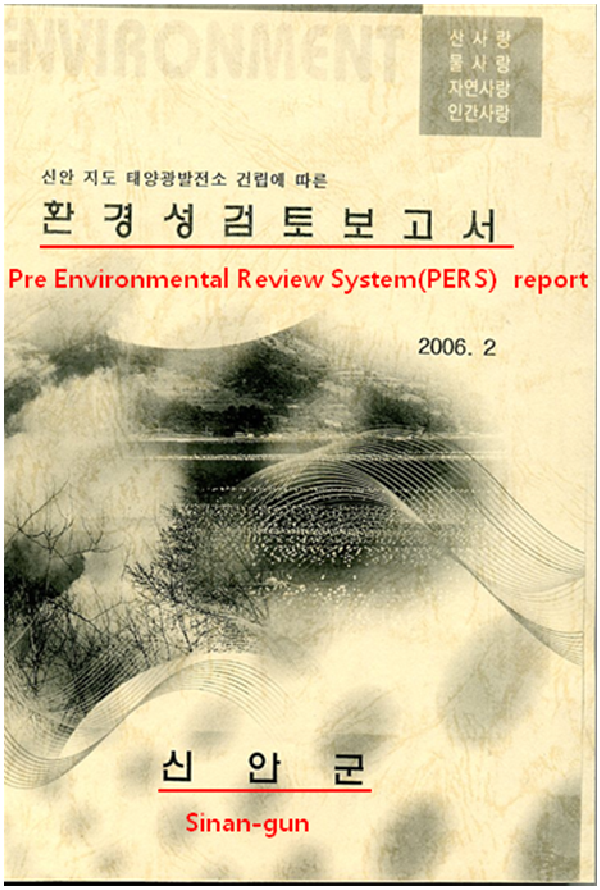
The assessment result of conducted PER are as follows:

	Contents	Assessment Results
Natural environment	Weather· climate and energy	Average temperature : 140 ° Atmospheric pressure : 1,013.3hPa Rainfall : 1,227.7mm Sunshine duration : 2,819.1hr Relative humidity : 70.0% Average wind velocity : 3.9m/s After the construction of the 132,013KWh PV plant, the renewable energy supply and use will more increase and the energy condition of the Shinan province will be better.
	topography	Total cutting and fill the ground : 31,950m3 Some flow out of the earth and sand may occur with the land work for plant construction when rain fall. The topographical change is considered and will plan to match up with adjacent area. The nature friendly method will be applied to the land slope. The measure to flow out of the earth and sand is described in "water quality" section and the impact will be minimized.
	soil and land	The soil pollution with the plant construction will be weak and after the construction of the plant, all the energy will be supplied with solar power, except the living waste, no pollution emission to soil will happen. To prevent soil and ground pollution, oil change of the construction machine will be limited in the construction field. Some living waste which is possible to reuse will collected separately and others will be processed with the Shinan province waste treatment plan.
	green space and animals·plants	Land plants : most part of the project site is farmland and farm for sea products and the geographical distribution of plants is poor enough. Some influence may occur with the scattered dust in construction period. To prevent the dust flying, washer for the machine and sprinkler vehicle will be operated. Land animals : rambling animals already moved to other area. Red bat habitat is about 7.5km away from the construction field and direct influence may be weak. To reduce the influence, top cover with the truck and periodic sprinkle vehicle will be operated and low vibration and noise equipment will be adapted. The field workers must be well-known not to catch the wild animals. Sea animals and plants : planktons, bentos, fish eggs, intertidal organism and marine fishes that could exterminate with the construction and special protection is needed are not found. To suspended solids and sewage treatment will be operated.
	Landscape	With the construction of the solar power plant, the land use change is the main cause of the landscape change. The location of the plant area is the end of the land, the height of the solar plant is not so much that the change of the continuity of the landscape may little. Planting and cover woods will made and color of the facility

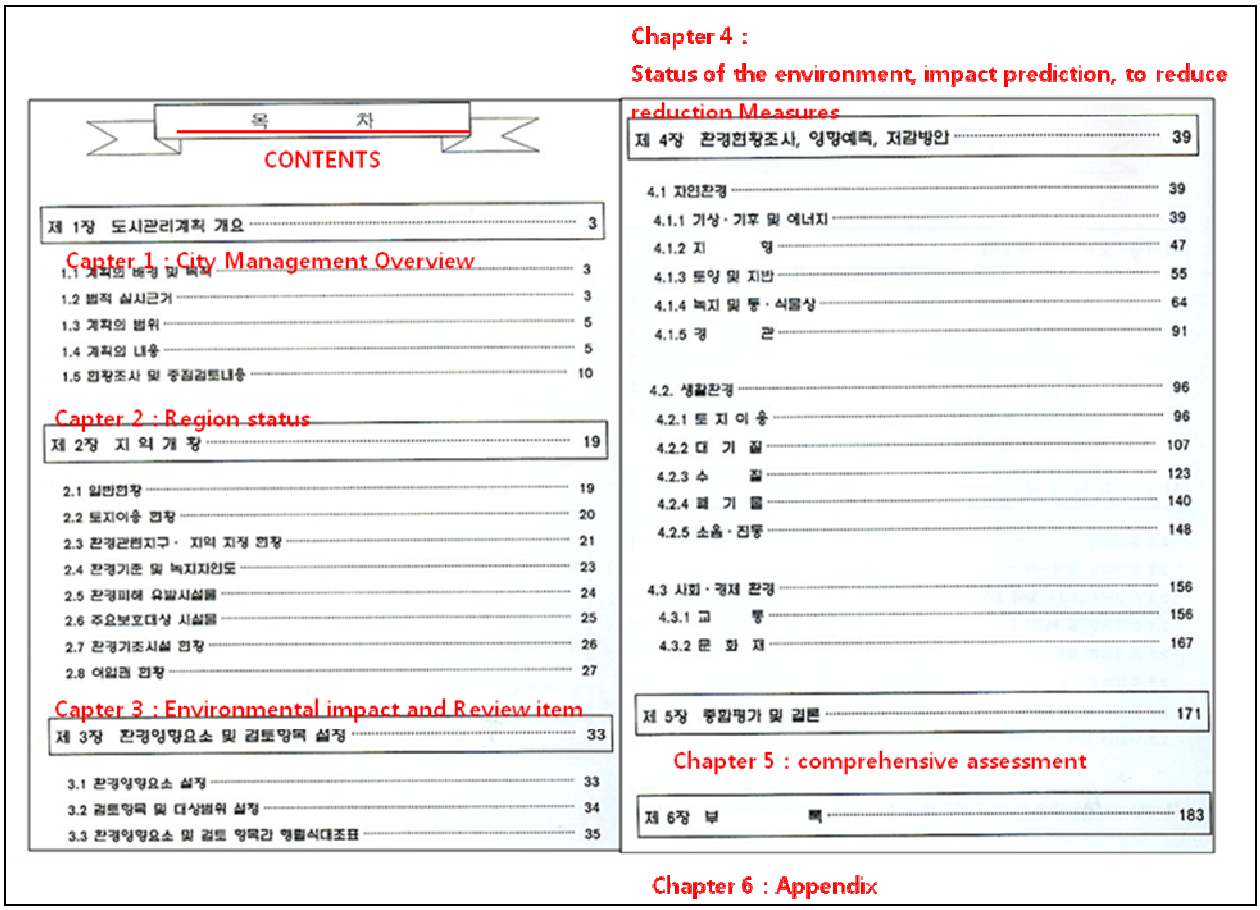
		will be considered to harmony with the surroundings and minimize sense of difference.
Living environment	Air	Air pollutants that occur during the construction will meet the threshold (threshold: PM-10 42.9μg/m^3, NO_2 0.00186ppm). To prevent the occurrence of air pollutants to, the construction company will do as follows. - Periodically sprinkle water. - Transport vehicles to install the cover.
	Water	Public works expected to occur by a landslide leakage. Therefore, the installation of a drainage ditch. For the management, 127m3/d of water would be need for cleaning the house tenth petal and 43m3/d will be need for daily-use. And about 43m3/d of sewage will be generated. During construction, 7 sediment and temporary-drainage will be installed and during operation, daily-life usage water will be supplied through local water service. Sewage will be treated at sewage treat facility and discharge it.
	Waste	No significant waste will be created during the operational phase of the project. However, minimal expected quantities of these waste during the construction phase, and disposed through licensed waste disposal and recycling companies. Waste oil deposit facility should be installed and treat it by the commit company. For the daily waste, just recycle it. And for the excreta, install the handy toilet to treat.
	Noise & Vibration	The average noise value during construction period is 52.15dB. This is very low level at the Resident Noise Regulation standard of 70.0dB . The average noise value during construction period is 38.95dB. This is very low level at the Resident Noise Regulation Standard of 65.0dB .
Social/ economical environment	Traffics	-Safety signs installed during construction - Conduct safety driving education -For the safety of the people, pedestrian crossing made
	Cultural	-There is no cultural around the plant. If cultural property is found, the Cultural Property Act will follow.

Summary
The operation of the proposed project will not discharge wastewater, nor emit air pollutants to the local environment. Noise from the construction will have little impact on the neighbourhood. Because, the project area distant 600-1000m away from village. The soil extracted will be refilled, which will not damage the vegetation, nor will it cause water and soil degradation.

Therefore we conclude that the environmental impact of the proposed project is minor, and the proposed project is definitely an environment friendly way of providing power.



<Figure D-1 > PRES of DONG YANG PV power plant



<Figure D-2 > PRE contents of DONG YANG 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:

>>

No significant negative environmental impact is expected from this project activity.

SECTION E. Stakeholders' comments

>>

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

>>

To receive stakeholders's comments related with the Sinan DONG YANG solar power project, project executor held several times of presentations to the stakeholders and newspaper report.
The meeting was as follows:

- Local residents meeting on the 2 April 2007 nearby community hall in a Taecheon-ri. Solar PV Power background, purpose , principal, introduce of construction operation , effect of construction operation and resident assistance.

: Sinan, Goheng – Rich Sunlight amount and sea breeze amount

한국일보

2007년 05월 04일 a06면

:Korea daily Newspaper

서남해안엔 태양광 발전단지 건립

:To build solar power plant

신안·고흥에… 일조량·해풍 유리

전남 신안과 고흥 등 서남해안에 태양광 발전소가 들어설 전망이다. 이 지역은 일조량이 풍부해 태양광 발전 적지로 손꼽히며 국내외 사업자들의 투자가 잇따르고 있다.

신안군은 3일 ㈜LG CNS와 10㎿ 규모의 태양광 발전소 산업단지 조성을 위한 투자양해각서(MOU)를 체결했다고 밝혔다. 총 사업비 835억원이 투입되는 신안 태양광 발전단지는 우선 지도읍 태천리 일대 2만6,559평 부지에 2㎿급 태양광 발전소가 내년 6월까지 들어서게 된다. 또 2008년까지 안좌도나 장산도에 8㎿급 태양광 발전소가 추가로 건설될 예정이다.

태양광 단지가 완공되면 연간 총 1만5,000㎿의 전력을 생산하게 되며, 매년 102억원의 매출을 올릴 것으로 기대된다.

앞서 3월 말 동양건설산업은 지도읍 태천리 일대 20만평에 20㎿급 초대형 태양광 발전단지를 조성키로 하고 본격적인 공사에 들어갔다. 이 태양광 발전소가 예정대로 2008년 말 들어서게 되면 신안은 메가급 태양광 발전소를 보유하게 된다. 현재 태양광 발전소는 독일에 있는 1.1㎿급 발전소가 세계 최대 규모로 알려져 있다.

고흥군 거금도에도 세계 최대 규모인 40㎿급 태양광 발전소가 들어설 예정이다. 약 1만3,000가구가 이용할 수 있는 용량이다. 군은 최근 독일의 태양광 발전회사인 IBC솔라사로부터 사업비(3,200억원) 전액을 외자로 유치, 금산면 매석산지구 4만평에 9.7㎿급 태양광 발전시설을 설치한 뒤 2010년까지 3단계로 나눠 건립할 계획이다.

이 일대는 연평균 일조량이 전국 평균보다 10%이상 높다. 게다가 해풍까지 적당히 불면서 태양광 발전장치의 과열을 막아 발전효율을 높일 수 있다. 또 섬 지역 땅값도 평당 2만~3만원대로 저렴해 초기 투자비가 적게 든다는 이점도 투자자들을 끌어들였다.

전남도 관계자는 "전국 태양광 발전시설의 87%가 전남지역에 자리잡을 것으로 본다"며 "서남해안 지역을 태양광 에너지의 메카로 육성하기 위해 연료전지 부품 및 소재공장 등을 적극 유치할 계획"이라고 밝혔다.

신안=안경호기자 khan@hk.co.kr

<Figure E-2>On 4 May, 2007 ,Korea Daily newspaper

Summary: Southwest coast, 10% higher than average sunshine the other areas and sea breeze amount also rich. DONG YANG ENERGY started to the construction of 24MW scale solar power plants in this area.

朝鮮日報

Joseon Daily newspaper

2007년 05월 04일 h12면

신안에 세계최대 태양광단지 조성

Construction of solar power plant of the world's largest in Sinan

20MW급 10일 기공

전남 신안에 세계 최대규모의 태양광 발전단지가 조성된다.

신안군은 3일 "㈜LG CNS와 10MW 규모의 태양광 발전단지 건설 투자양해각서(MOU)를 교환했다"고 밝혔다.

㈜LG CNS는 840억 원을 들여 태천리 2만6000여 평 부지에 내년까지 4000여 가구가 불편 없이 전력을 사용 할 수 있는 전력생산시설을 갖출 예정이다. 태양광 단지가 완공되면 연간 1만5000MW의 전력을 생산하게 되며, 투자사는 매년 102억 원의 매출을 올릴 것으로 기대하고 있다.

이곳 태천리에서는 또 오는 10일 세계 최대규모인 20MW급 태양광 발전단지 기공식이 열린다. 동양건설산업은 1500억 원을 들여 20만평에 내년 9월까지 발전단지를 완공할 예정이다.

박우량 군수는 "국가 차원의 에너지자급 요구가 증가하고 있는 현실에서 신안은 태양광에너지 사업의 적지로 평가되고 있다"며 "2개의 대규모 태양광 발전단지가 건설되면, 신안군은 세계적인 신재생에너지 중심지로 거듭날 것"이라고 말했다.

신안군은 이와 함께 이날 율도개발㈜와 지도읍 율도(69만평)에 600억 원을 투자해 수목원과 회귀식물 종자연구소 등 대규모 관광휴양타운을 조성하는 투자협약을 맺었다.

정용기 기자 jungwk@chosun.com

<Figure E-3> On 4 May, 2007 , Joseon Daily newspaper

Summary: construction of solar power plant of the world's largest in Sinan.

E.2.	Summary of the comments received:

>>

Most stakeholders know well about solar power. Also, the stakeholders consider construction and operation of the project which would mitigate air pollution, increase employment opportunities.

Before the initiation of the project, the expected environment impacts and the measurements to be taken to minimize which would occur by the project and it was impact were sufficiently explained to the people. Also, the PER was conducted to assess the impacts on environment.

Therefore, specific comments related to the DONG YANG PV power project are:

1. Local residents inquired as to the benefits of the project to the region.
2. Two local residents wanted to a new entrance to the solar power plant. Because, farm road is busy in farming season.

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

>>

The stakeholders have no negative comments on the proposed project, the proposed project is also supported by local government.

Comments of the solution

1. The construction of the town hall will benefit the region.
2. When the plant construction, we will reduce noise of project site and reduce emissions of pollutants.
3. Change the location of the entrance to the plant and will eliminate damage to the farm road.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	DONG YANG ENERGY. Co.,Ltd
Street/P.O.Box:	1524-102 Gidoeup Taechun-Ri
Building:	
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Postcode/ZIP:	
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Telephone:	+82-10-3236-9776
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Represented by:	
Title:	CEO
Salutation:	Mr.
Last name:	Cho
Middle name:	
First name:	Won il
Department:	
Mobile:	+82-10-6427-3530
Direct FAX:	+82-2-553-1051
Direct tel:	+82-2-3420-8245
Personal e-mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

THERE IS NO PUBLIC FUNDING IN THE SINAN PV POWER PLANT.

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	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	-
	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	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	
		#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		

<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		

< Table Annex3-6> $EF_{CO2,I,y}$ value of fuel type

Fuel Type	$EF_{CO2,I,y}$ (tCO_2/TJ)
Gasoline	67.5
Diesel oil	72.6
residual fuel oil	75.5
LNG	54.3
bituminous coal	89.5
Anthracite	94.6

Annex 4

MONITORING INFORMATION

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