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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants bundling Project
Version 5.3
Date of Submission: Apr 6, 2010

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

"4.85 MW Korea Rural Community Corporation (KRC) PV Power Plants bundling Project" is a bundling CDM project with 6 different sites in various provinces in Republic of Korea. This project uses the land practically which had been left idle. The installed capacity and estimated power generation capacity of the proposed project are 4.85 MW and 5,826 MWh/yr for each, and the estimated emission reductions are about 3,753 tCO_2/yr. The electricity will be connected and sold to Korea Electric Power Corporation (KEPCO) Grid.
Table A-1 shows the generation capacities of each site.

Table A-1. The project sites of PV power project

Site Name	Province	Installed capacity (MW)	Estimated power generation (MWh/yr)
Yeongam 1st	Jeollanam-do	1.4916	1,723
Yeongam 2nd		1.4916	1,736
Jindo		0.9944	1,149
Hadong	Gyeongsangnam-do	0.1936	221
Hoengseong	Gangwon-do	0.1540	176
Goesan	Chungcheongbuk-do	0.5220	820
Total		4.8472 (≒4.85)	5,826

● Purpose of the project

- Participation to Korean national goal of new and renewable energy use policy of 5% (2.1%, 2008) by 2011.[1]
- Minimize environmental damage by using non-fossil alternative clean energy and savings in foreign currency use.

[1] '2nd the master plan of renewable energy for development technique and supply (2003~2012)'
< The supply rates of renewable energy will raise 5% of total energy supply amount until 2011.>

- CERs obtain from CDM project development.
- Profit generation by selling electricity generated on unused land space of KRC to grid.

● Emission reductions of Green House Gas (GHG)

The project activity generates 5,826 MWh/yr of electricity from 6 separate solar PV power plants with 4.85 MW capacities. This will replace use of fossil fuels resulting in about 3,753 tCO_2/yr GHG emission reductions.

● Contribution to sustainable development

This project contributes to sustainable development as the follow aspects;

'Social aspects'

- Contribute to sustainable development of Korea by participating 2nd national policy of new and renewable energy distribution goal
- Contribute to additional creating jobs in local society during construction period

'Environmental aspects'

- Generation of electricity without fossil fuel consumption
- No emission not only GHG, but also the other pollutants (SO_X, NO_X, PM, etc)
- Alternative energy of fossil fuel without any consumption of resources
- To be expected to reduce about 3,753 tCO_2/yr GHG emissions for this project period

'Economical aspects'

- Reducing foreign currency as replacing fossil fuel imports in national aspect
- Invigorating the rural economy by tax revenue of local government and construction activities in the project site as wages for labor, construction equipment and material
- Revenue for selling electricity in the land which had been left idle of KRC

A.3. Project participants:

Table A-2. Project participants

Name of Party involved(*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants(*) (as applicable)	Kindly indicate if the Party Involved wishes to be considered As project participant (Yes/No)
Republic of Korea (host)	Korea Rural Community Corporation (KRC)	No

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

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

A.4.1.1. Host Party(ies):

Republic of Korea

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

Yeongam 1st PV Power Plant: Jeollanam-do
Yeongam 2nd PV Power Plant: Jeollanam-do
Jindo PV Power Plant: Jeollanam-do
Hadong PV Power Plant: Gyeongsangnam-do
Hoengseong PV Power Plant: Gangwon-do
Goesan PV Power Plant: Chungcheongbuk-do

A.4.1.3. City/Town/Community etc:

Yeongam 1st PV Power Plant: Sanho-ri, Samho-eup, Yeongam-gun
Yeongam 2nd PV Power Plant: Sanho-ri, Samho-eup, Yeongam-gun
Jindo PV Power Plant: Sopo-ri, Jisan-myeon, Jindo-gun
Hadong PV Power Plant: Pyeongchon-ri, Cheongam-myeon, Hadong-gun
Hoengseong PV Power Plant: Beopju-ri, Ucheon-myeon, Hoengseong-gun
Goesan PV Power Plant: Banggok-ri, Jangyeon-myeon, Goesan-gun

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

The project sites are located in 6 areas, and each project site has geographic coordinates as follows;

Table A-3. The geographic coordinates of each project site

	latitude	longitude
Yeongam 1st	34°43′29″N	126°28′34″E
Yeongam 2nd	34°44′05″N	126°28′52″E
Jindo	34°29′18″N	126°11′33″E
Hadong	35°09′14″N	127°47′34″E
Hoengseong	37°27′06″N	128°02′60″E
Goesan	36°51′15″N	127°55′13″E

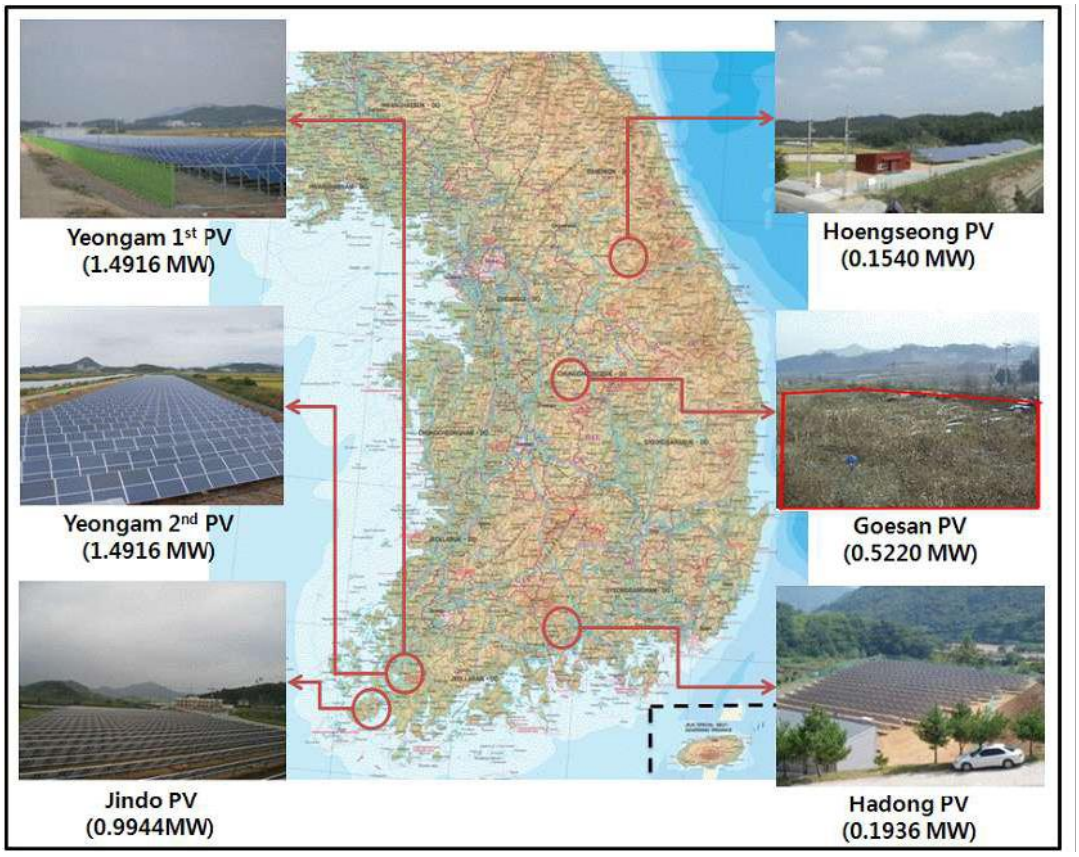


Figure A-1. Korea Rural Community Corporation (KRC) PV Power Plant sites

Figure A-2. A bird's-eye view of Yeongam 1st, 2nd PV Power Plant

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

1. Project Type and Category

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

Project Type: I - Renewable energy project
Project Category: D - Renewable electricity generation for a grid

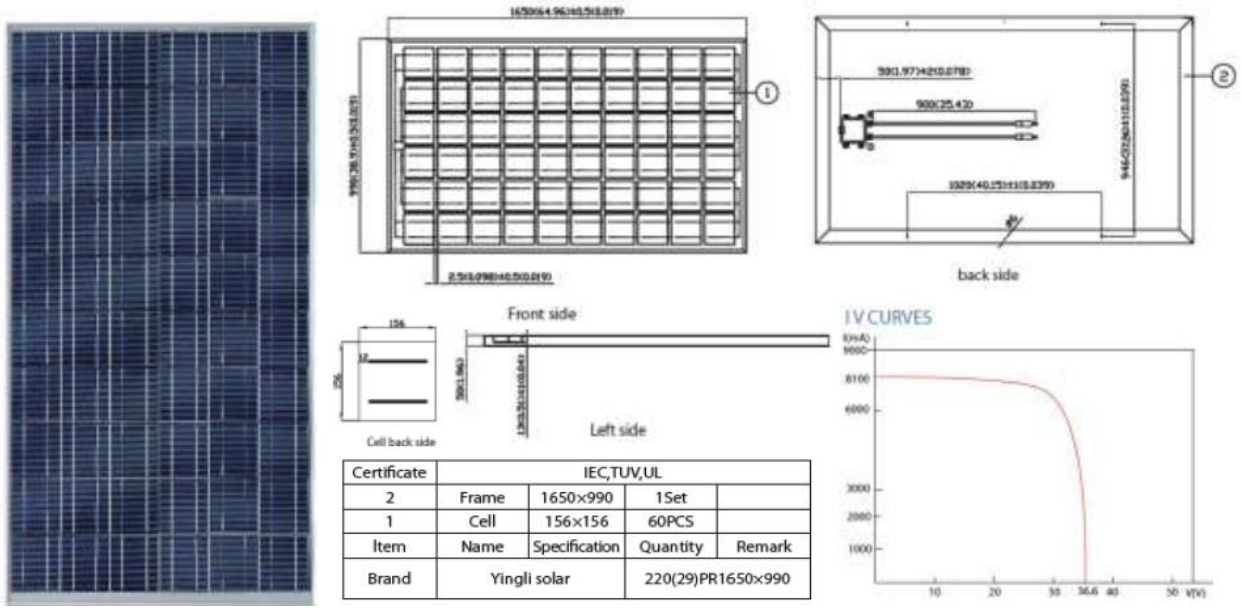
The electricity generated by this project activity is supplied to KEPCO grid. This project activity is able to apply the methodology AMS-I.D.(Version14) because the installed capacity of this project (4.85 MW) is less than 15MW.[2]

2. Technology / Measure

The PV Power System consists of modules are formed solar cells and inverters.

2-1. Solar cell modules

The solar cell module is the most important element in PV Power Plant. PV Power Plants of Yeongam 1st, Jindo, Hadong and Hoengseong used same model, YL220Pb-2 of Yingli Solar.



Certificate	IEC,TUV,UL			
2	Frame	1650×990	1Set	
1	Cell	156×156	60PCS	
Item	Name	Specification	Quantity	Remark
Brand	Yingli solar		220(29)PR1650×990	

Figure A-3. The solar cell module of Yingli Solar (YL220Pb-2)

[2] The applicable standard in a small scale methodology is under the 15MW (http://unfccc.int/2860.php)

< The character of YL220Pb-2 >

Yingli's YL220Pb-2 module is designed for large electrical power requirements. With a 25 years warranty, YL220Pb-2 has superb durability to withstand rigorous operating conditions. Ideal for grid-connected and remote power systems, it offers high usable power per square foot of solar array.

- Solar Cell: High efficiency crystalline solar cell. Even if under the weak light, the solar module can produce maximum power output.
- Tempered glass: Anti-reflecting coating and high transmission rate of tempered glass increase mechanical strength of solar module and power output.
- EVA and TPT: Using EVA and TPT of high quality to strengthen durability.
- AI frame: It is able to connect the corner without a screw. 6 holes on the frame can be installed easily.
- Junction box: It is waterproof.
- Long lifetime: ≥25 years; less power decrease.
- Good performance of preventing from atrocious weather such as wind and hails.
- Resisting moisture and etching effectively, not effect by geology.
- Yingli Solar was issued the certificate (ISO Quality Management system) from UL, TUV, and IEC of an international authority.

The solar cell module of the Goesan PV Power Plant is SPR-300-WHT-1 of SunPower Corporation.

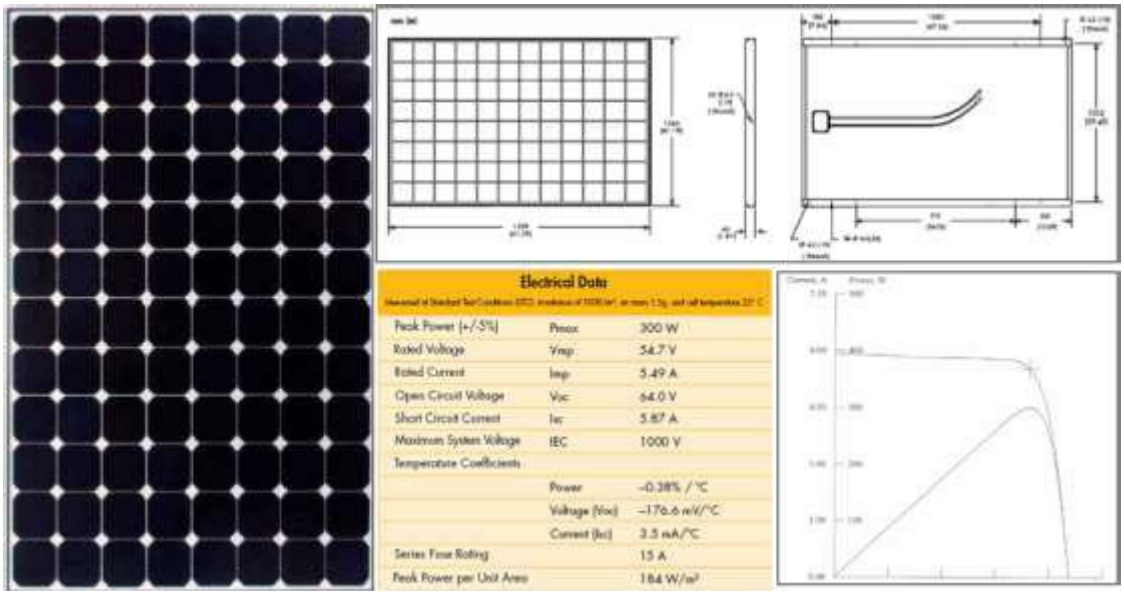


Figure A-4. The solar cell module of SunPower Corporation (SPR-300-WHT-1)

< The character of SPR-300-WHT-1>

Goesan PV Power Plant adopts SPR-300-WHT-1 which is the high efficiency solar cell module to satisfy 520kW that was permitted capacity.

- Maximum efficiency: 18.4% (highest efficiency in its class)
- Higher output energy: The module is generating 50% high energy than general module and 100% high energy than thin-film solar cell modules per unit area.
- Reducing of the equipment cost: The number of modules installed is decrease according to output energy by one module is increase. Thus, the time and the cost are able to reduce.
- Strong and reliable design: Verified materials, processed overall glass, and coating frame

The solar cell module of the Yeongam 2nd PV Power Plant is STP200-18/Ub of Suntech.

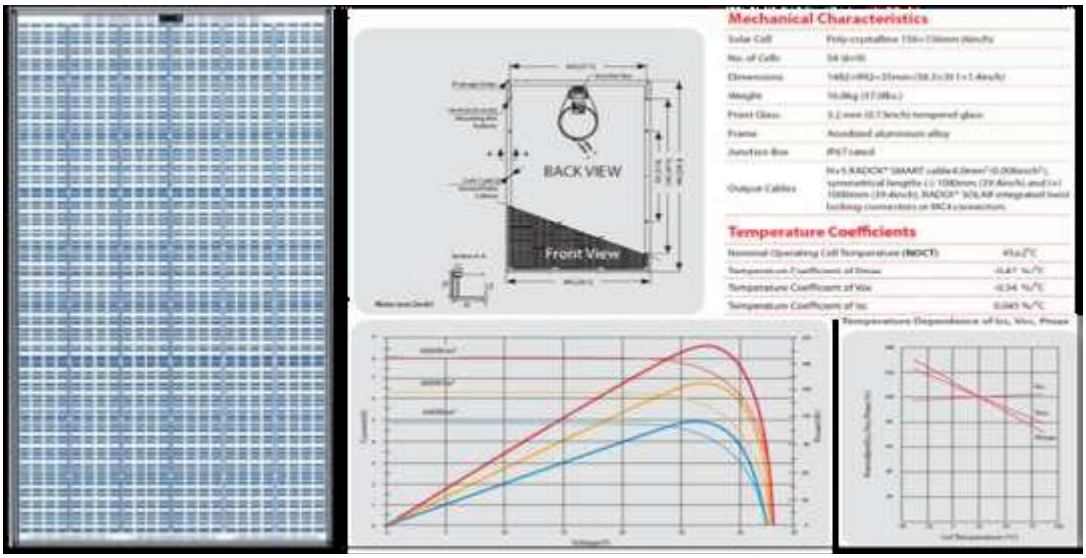


Figure A-5. The solar cell module of Suntech (STP200-18/Ub)

< The character of STP200-18/Ub >

- High conversion efficiency based on leading innovative photovoltaic technologies
- High reliability with guaranteed ±3% power output tolerance, ensuring return on investment
- Withstands high wind-pressure and snow load (passed IEC 5400Pa mechanical loading test), and extreme temperature variations
- 25-year power output warranty
- Rigorous quality control meeting the highest international standards and certified ISO 9001 (Quality Management System) and ISO 14001 (Environmental Management System)

Further information for the technology used in this project can be found at

http://www.yinglisolar.com/enmain/user/module.asp
http://www.ihaemaroo.com/
http://us.sunpowercorp.com/
http://www.suntech-power.com/index.php

2-2. Inverter

The inverters used in this project are SMA SC500HE and SMA SC100I of Sunny Central inverter one of the types of SMA Solar Technology AG's products, and GT250E (250KVA) and GT250E (250KVA) of Xantrex Technology.

SMA SC500HE was used in Yeongam 1st / Yeongam 2nd / Jindo PV power plant and SMA SC100I was used in Hadong / Hoengseong PV power plant of KRC.

< The character of Sunny Central of SMA Solar Technology AG >

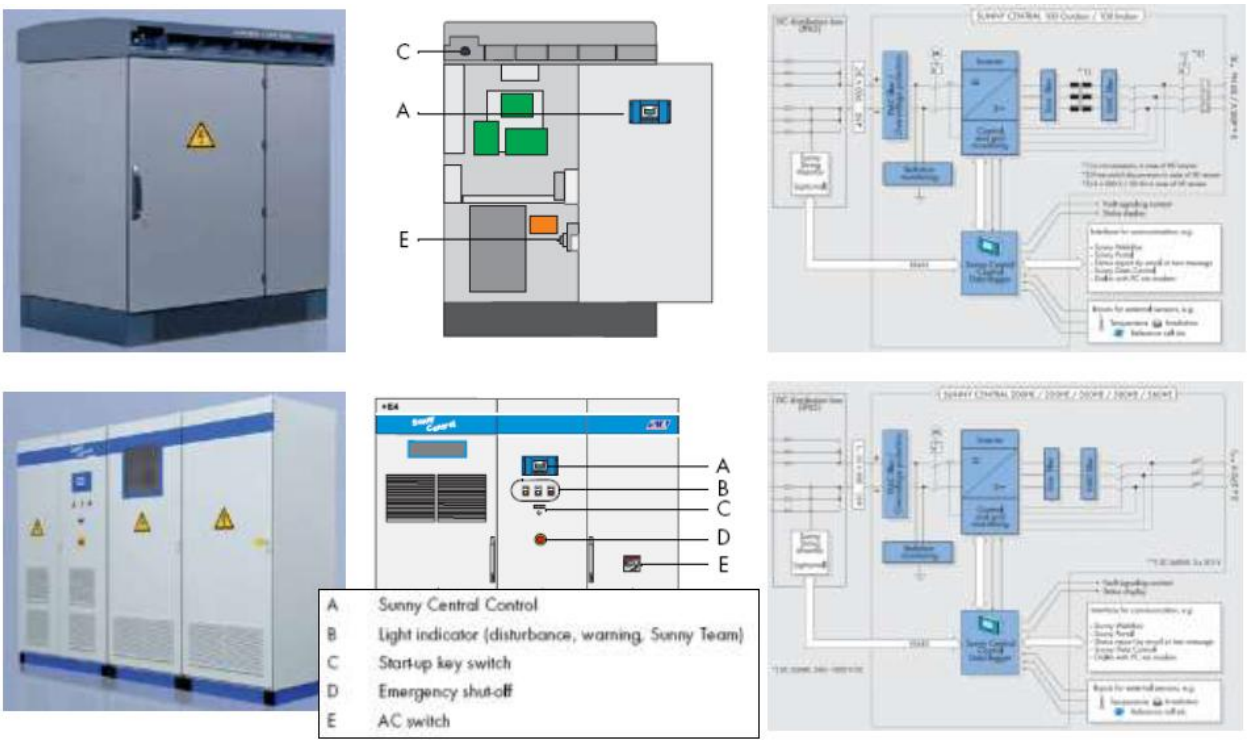


Figure A-3. Sunny Central inverter of SMA Solar Technology AG
(SMA SC100I (UP), SMA SC500HE (DOWN))

The characters of SMA SC100I inverter are as follows;

- SMA SC100I (inverter for indoor) is similar to inverter for outdoor structurally, but it is suitable for indoor installation by using a special ventilation technology.
- Can be installed in a variety of space
- Wide temperature range: -20 ℃ to +50 ℃
- Compact Design
- Maximum efficiency of 96.7 %
- Monitoring and analysis system by using an integrated automatic weather (temperature, humidity) recorder

The characters of SMA SC500HE high-efficiency inverter are as follows;

- The inverter is linked directly to the high pressure converter without using its own low pressure transformer. By reducing the loss of power conversion, the efficiency increased 1.5 ~ 2.0% degree.
- Maximum efficiency of 97.7%
- E-mail or SMS to pass the error message
- The price reduction of system

• Grid monitoring and Anti Islanding Detection (AID) feature in Sunny Central series

Irrespective of the type of a grid monitoring integrated in the Sunny Central the Anti Islanding feature can be additionally activated via the parameter setting. The inverter's grid monitoring function is permanently activated after the inverter has been connected. It is continuously monitored if the effective value of the grid voltage exceeds or falls below the set parameter limit values. In addition, the grid frequency is monitored in terms of the set parameter limit values during operation. If the value exceeds or falls below the limits, the line contactor and the inverter bridge are immediately disconnected. The inverter changes to the "Failure" operating mode and the grid failure is signalized. The inverter will not be restarted until the grid voltage is within the permitted limits.

The inverter of Goesan PV Power Plant is GT250E (250KVA) Xantrex Technology.

< The characters of GT250E and GT30E inverter of Xantrex Technology >

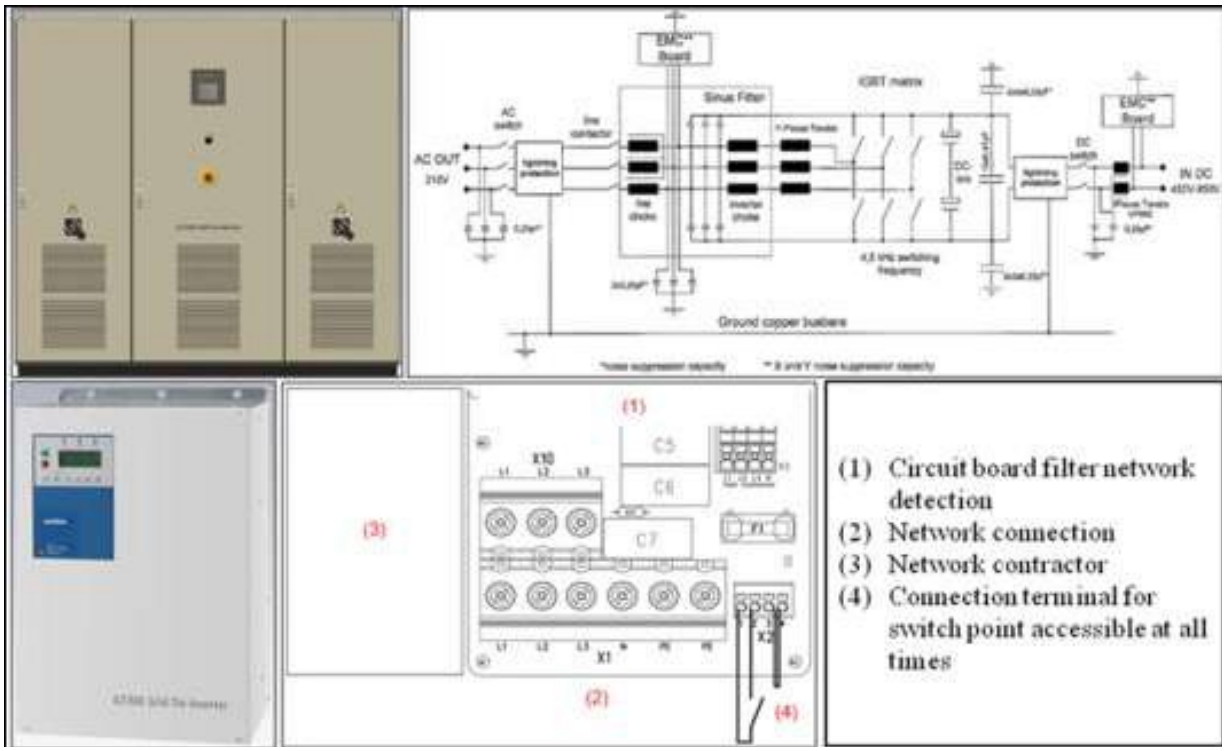


Figure A-4. GT250E inverter (UP) and GT30E inverter (DOWN) of Xantrex Technology

The characters of GT250E (250KVA) inverter are as follows;

- Digital Signal Processor (DSP) based controls with self-diagnostics and LCD for display of operating status
- Inverter shut-off and disconnects
- Over-and under-voltage and frequency protection, shutting down the inverter
- Anti-islanding protection prevents back-feeding inverter generated power to the grid in the event of a utility outage
- User definable power tracking allows the user to match the inverter to the array, as well as to adjust delay periods to customize system shutdown sequences
- DC and AC over voltage protection
- Graphical user interface software for real time communications, monitoring, and control

The characters of GT30E (30KVA) inverter are as follows;

- High-efficiency isolated HF design: one of the highest efficiencies in the 30 kW class
- Designed to maximize the return on investment: superior PV energy harvest, simplified and fast installation, excellent thermal performance
- Engineered for compatibility with thin-film technology: wide input voltage range, isolated high-frequency design, flexible array sizing and module selection
- Lightweight: lowest weight in its class at 80 kg, simplified operation and transportation
- Compact design: smallest enclosure size in its class, space-saving installation
- Local service network Reliable customer service

Further information for the technology used in this project can be found at

http://www.sma.de/en/service/downloads.html
http://www.sma-korea.com/ko/solar-technology/downloads/index.html
http://www.xantrex.com/web/id/13/type.asp

The technical details of PV power plant data are as follows;

Table A-4. The technical data details of PV power plants[3]

Classification		Yeongam 1st	Yeongam 2nd	Jindo	Hadong	Hoengseong	Goesan	
Solar Module	Type	YL220Pb-2 (Poly)	STP200-18/Ub (Poly)	YL220Pb-2 (Poly)	YL220Pb-2 (Poly)	YL220Pb-2 (Poly)	SPR-300-WHT (Single)	
	Maximum output power	220W	200W	220W	220W	220W	300W	
	Maximum power voltage	30V	26.2V	30V	30V	30V	54.7V	
	Maximum power current	7.4A	7.63A	7.4A	7.4A	7.4A	5.49A	
	Efficiency	13.5%	13.6%	13.5%	13.5%	13.5%	18.4%	
	Number of units	6,780	7,458	4,520	880	700	1,740	
Inverter	Type	SMA SC500HE (Gird connected)	SMA SC500HE (Gird connected)	SMA SC500HE (Gird connected)	SMA SC100I (Gird connected)	SMA SC100I (Gird connected)	GT250E (Gird connect-ed)	GT250E (Gird connect-ed)
	Capacity	500kW	500kW	500kW	100kW	100kW	250kW	30kW
	Rated voltage	DC 450~820V, AC 270V	DC 450~820V, AC 270V	DC 450~820V, AC 270V	DC 450~820V, AC 380V	DC 450~820V, AC 380V	DC 450 ~800V, AC 315V	DC 450 ~800V, AC 400V
	Control method	PWM	PWM	PWM	MPPT	MPPT	MPPT	MPPT
	Number of units	3 units	3 units	2 units	2 units	2 units	1 unit	1 unit

[3] Data source: The survey report of electric equipment of Korea Rural Community Corporation (KRC) PV power plants

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

Estimated amount of emission reductions over the 10 year-crediting period are 37,530 tCO_2.

Table A-5. Annual estimation of emission reductions

Year	Annual estimation of emission reductions (tons of CO_2e)
Year 1 (2011)	3,753
Year 2 (2012)	3,753
Year 3 (2013)	3,753
Year 4 (2014)	3,753
Year 5 (2015)	3,753
Year 6 (2016)	3,753
Year 7 (2017)	3,753
Year 8 (2018)	3,753
Year 9 (2019)	3,753
Year 10 (2020)	3,753
Total estimated reductions (tons of CO_2e)	37,530
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tons of CO_2e)	3,753

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

No public funding for this project activity from Parties included in Annex I to the Convention was used.

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

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

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

There is no other project activity satisfying these criteria, therefore this project is not a debundled component of a larger project.

SECTION B. Application of a baseline and monitoring methodology

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

Approved methodology: AMS-I.D.(Version14)
Project Type: I - Renewable Energy Projects
Project Category: D - Grid connected renewable electricity generation

Reference:
- Appendix B of the simplified modalities and procedures for small-scale CDM project activities (UNFCCC)
- Tool to calculate the emission factor for an electricity system (Version1.1, EB35 Annex12)
Tool for the demonstration and assessment of additionality (Version5.2, EB39 Annex10)
Guidance on the Assessment of investment Analysis (Version02, EB41 Annex45)

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

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

AMS-I.D. is applicable to renewable energy projects whose output capacity is up to 15 MW and the generated electricity is delivered to the grid. The renewable energy generation units comprise Photovoltaic, hydro, tidal / waves, wind, geothermal and renewable biomass.

Korea Rural Community Corporation (KRC) Renewable Energy Project (PV power plant):

- The installed capacity (4.85 MW) of electricity by solar energy, one of renewable energies.
- Supplies the electricity generated to the grid.

The installed capacity of this project is 4.85 MW, which is under 15 MW and the generated electricity is delivered to the grid, and the proposed project corresponds to a renewable energy project as a solar power generation.

Therefore, the methodology is applicable to this project activity.

B.3. Description of the project boundary:

According to AMS-I.D.(Version14), project boundary is delineated by the physical, geographical site of the renewable generation source.
Therefore, the boundary of project activity is the areas where the PV power plants and other facilities are installed.
The project boundary includes a grid system of Korea Electric Power Corporation (KEPCO) to calculate the baseline emissions.

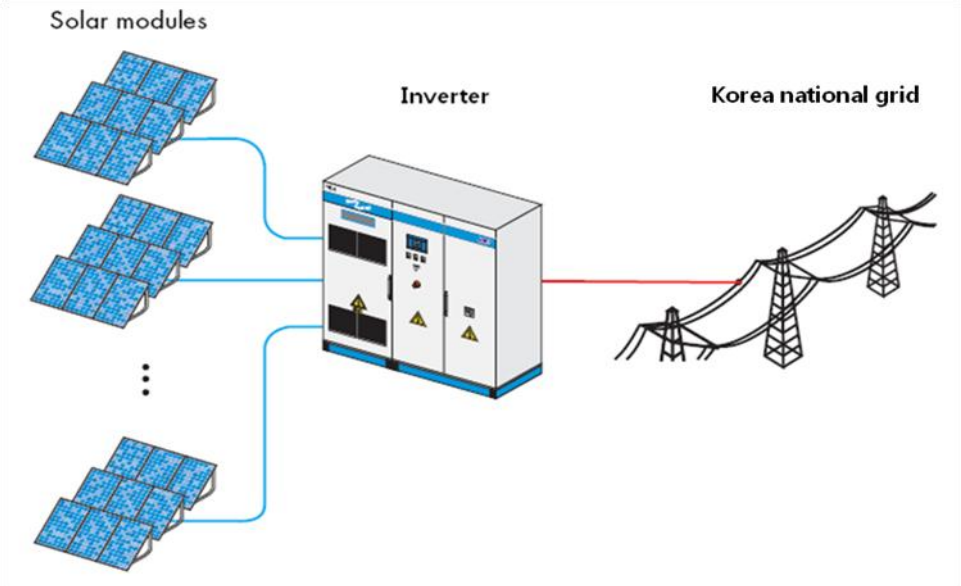


Figure B-1. Project boundary

B.4. Description of baseline and its development:

The KRC project is a solar PV power generation project providing electricity to the grid, and can be qualified as a small scale project as the installed capacity is 4.85 MW.
This project can be considered a project activity falling under category I.D. of Appendix B of "The simplified modalities and procedures for small scale CDM project activities". Projects that qualify as category I.D. can use the predefined baseline methodology as included in Appendix B under category I.D. paragraph 9. According to paragraph 9, the baseline emission is calculated multiply the emission coefficient (unit: $kgCO_2e/kWh$) by electricity produced from renewable energy.
A transparent and conservative calculated method of the emission coefficient is as follow;

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

OR

(b) The weighted average emissions (in $kgCO_2e/kWh$) of the current generation mix. The data of the year in which project generation occurs must be used.

Also, the emission coefficient can be calculated by "Tool to calculate the emission factor for an electricity system (Version1.1, EB35 Annex12)", which is described in B.6.1 above.

Calculations must be based on data from an official source and made publicly available. Therefore, OM (operating margin) and BM (build margin) were calculated using KEPCO's most recent 3 years (2006, 2007, 2008) statistical data and emission factor was estimated by OM and BM calculated above.

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

CDM Consideration

The proposed project activity was considered CDM project activity from the beginning. Korea Rural Community Corporation (KRC) had the 88th board meeting titled "In-house Renewable Energy Development Plan" on May 31, 2007 and discussed the goal and promotion direction of renewable energy power plant project along with CDM project developments. According to the results of economical analysis based on data of board of directors, economic feasibility is low without CDM project. Therefore, the proposed project activity was considered CDM project activity from the beginning. The chronology of events is as follow Table B-1

Table B-1. The chronology of events (Yeongam 1st, 2nd / Jindo / Hadong / Hoengseong PV plants)

Date	Event
23/Mar/2007	KRC received a feasibility study for CDM project from Ecosense
26/Mar/2007	A report for approval on new project for renewable energy
06/Apr/2007	The education on CDM (by Ecosense)
09/Apr/2007	Discussion by a management commission
31/May/2007	KRC had the 88th board meeting titled "In-house Renewable Energy Development Plan" (CDM was considered)
06/Nov/2007	KRC received the permission for PV power plant from Jeollanam-do (Jindo PV Power Plant)
21/Nov/2007	KRC received the permission for PV power plant from Gangwon-do (Hoengseong PV Power Plant)
28/Nov/2007	KRC received the permission for PV power plant from Gyeongsangnam-do (Hadong PV Power Plant)
17/Dec/2007	KRC received the permission for PV power plant from Jeollanam-do (Yeongam 1st, 2nd PV Power Plants)
25/Jun/2008	KRC made a contract for starting construction work (Yeongam 1st, Yeongam 2nd, Jindo, Hadong, Hoengseong PV Power Plant, Starting date)
15/Jul/2008	KRC was starting construction work (Yeongam 1st, Jindo, Hadong, Hoengseong PV Power Plants)
05/Sep/2008	KRC signed with Ecosense to promote CDM project of this project
21/Sep/2008	Actual operating (Yeongam 1st PV Power Plant)
22/Sep/2008	Actual operating (Jindo PV Power Plant)
22/Sep/2008	Actual operating (Hadong PV Power Plants)

29/Sep/2008	Completion of KRC PV power plants (Yeongam 1st, Jindo, Hadong, Hoengseong PV Power Plants)
01/May/2009	KRC was starting construction work (Yeongam 2nd PV Power Plant)
28/May/2009	Actual operating (Yeongam 2nd PV Power Plant)
31/Jul/2009	Completion of KRC PV power plant (Yeongam 2nd PV Power Plant)

Also, KRC had a 105th board meeting titled "PV Power Project (2nd) Action Plan" on September 25, 2008 and discussed the additional plan to add PV power plant of Goesan for on-going PV power project. Relate to CDM Consideration of Goesan PV power project, KRC was submitting the document for promoting CDM project to DNA of the Republic of Korea on June 8, 2009.

Table B-2. The chronology of events (Goesan PV plant)

Date	Event
21/Apr/2008	KRC received the permission for PV power plant from Chungcheongbuk-do
18/Sep/2008	Discussion by a management commission
25/Sep/2008	KRC had the 105th board meeting titled "The plan for Promoting 2nd PV power plants"
30/Apr/2009	KRC made a contract for starting construction work (Starting date)
06/May/2009	KRC was starting construction work
08/Jun/2009	Submitting the document for promoting CDM project to DNA
26/Jun/2009	Actual operating
10/Aug/2009	Completion of KRC PV power plant

Enforcement of applicable laws and regulations

According to "Annex 3 - Clarifications on the treatment of national and/or sectoral policies and regulations in determining a baseline scenario" of the 16th report of CDM EB (Oct, 2004), the national/sectoral policies for reducing greenhouse gas emissions which was introduced after adoption Marrakesh Accords (Nov, 2001) don't need to consider.

The proposed project observes all of laws and restrictions which are applicable to power generation in Republic of Korea. Also, the decisions of CDM EB, sectoral policies and regulations are observed.

Additionality

Additionality of the project activity is demonstrated based on "Appendix B of the Simplified Modalities and Procedures for small-scale CDM project activities" in Attachment A.

The project participant must demonstrate the additionality on at least one barrier among the following barriers;

1) Investment barrier
2) Technological barrier
3) Barrier due to prevailing practice
4) Other barriers

For the project activity, barrier analysis is focused on the Investment Barrier due to its significant effect on renewable energy sector.

Investment analysis

The purpose of an investment analysis is to determine whether the project is less financially attractive than at least one alternative in which the project participants could have invested.
According to "Tool for the demonstration and assessment of additionality (Version5.2)", the investment analysis is proceeded as follows;

Option I: The simple cost analysis
Option II: The investment comparison analysis
Option III: The benchmark analysis

The profits by this project of Korea Rural Community Corporation (KRC) included not only CER but also electricity sales. Among the three types suggested from the tool for additonality analysis, Option I (Apply simple cost analysis) couldn't be selected, so it is necessary to choose the proper analysis method between Option II (Apply Investment comparison analysis) and Option III (Apply benchmark analysis). According to the methodology for demonstration of additionality, Option III must be used if the alternative to the CDM project activity does not include investments of comparable scale to the project. Therefore, this project applies to Option III.
To evaluate the economical efficiency, the proposed project uses NPV (Net Present Value) and IRR (Internal Return Rate). The project is considered economical with positive NPV and not economical with negative NPV.

Economical analysis

Korea Rural Community Corporation (KRC) invested a total of ₩ 35,560 million ($ 32.25 million) for this project. For the economical analysis, KRC applies the SMP (System Marginal Price) which was suggested by KPX as the power price.[4] The 6 sites (Yeongam 1st, 2nd, Jindo, Hadong, Hoengseong, Goesan) were applied ₩ 122.63/KWh that was average price in 2008. It was decided based on "Annual operating performance of the power market in 2009".

The economic analysis on solar PV plant can be done by the following variables;

- Total amount of electricity produced
- Maintenance cost
- Total investment
- CER price

[4] Data source: Annual operating performance of the power market in 2009 (http://epsis.kpx.or.kr/)

Table B-3 shows the result of economic analysis with the variables indicated.

Table B-3. The economic analysis of each PV power project site[5] (Unit: million won)

Project site	Sales of Electricity	Investment cost	Maintenance	NPV
Yeongam 1st, 2nd	8,485	20,889	2,507	-16,414
Jindo	2,818	7,542	905	-6,065
Hadong	543	1,754	211	-1,475
Hoengseong	432	1,530	184	-1,309
Goesan	1,919	3,845	475	-2,840

NPV is less than zero and IRR isn't calculated because the profit from the proposed project is too low. Therefore, this KRC PV Power Plant not economically attractive at all.
The object of KRC PV Power Plant is not economical profit but the CDM project is able to prevent global warming.

Sensitivity Analysis

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The parameters and variation range of the Sensitivity Analysis in the proposed project activity is as follow;

- Total Generation: -20% ~ +20%
- Investment Cost: -10% ~ +10%
- Operation Expenses: -10% ~ +10%
- CER price: -10% ~ +10%

Above indicators don't fluctuate much widely because the economical condition of Korea is relatively stable. Therefore, variations rise up normally within the range of ±10% (Only Total Generation is ±20%).

The sensitivity analysis results are as follow in Table B-4.

[5] Data source: The minutes of a board of directors meeting on PV Power Project (Korea Rural Community Corporation)

Table B-4. Sensitivity analysis for each PV site (Unit: million won)

Project site	Variable		NPV	Variable		NPV
Yeongam 1st, 2nd	Total Generation	-20%	-17,376	Operation Expenses	-10%	-16,272
		-10%	-16,895		-5%	-16,343
		-	-16,414		-	-16,414
		10%	-15,934		5%	-16,485
		20%	-15,453		10%	-16,556
	Investment	-10%	-14,434	CER Price	-10%	-15,930
		-5%	-15,424		-5%	-15,903
		-	-16,414		-	-15,876
		5%	-17,404		5%	-15,849
		10%	-18,394		10%	-15,822
Jindo	Total Generation	-20%	-6,384	Operation Expenses	-10%	-6,014
		-10%	-6,225		-5%	-6,039
		-	-6,065		-	-6,065
		10%	-5,905		5%	-6,091
		20%	-5,746		10%	-6,116
	Investment	-10%	-5,350	CER Price	-10%	-5,904
		-5%	-5,708		-5%	-5,895
		-	-6,065		-	-5,886
		5%	-6,423		5%	-5,877
		10%	-6,780		10%	-5,868
Hadong	Total Generation	-20%	-1,536	Operation Expenses	-10%	-1,463
		-10%	-1,505		-5%	-1,469
		-	-1,475		-	-1,475
		10%	-1,444		5%	-1,481
		20%	-1,413		10%	-1,486
	Investment	-10%	-1,308	CER Price	-10%	-1,444
		-5%	-1,391		-5%	-1,442
		-	-1,475		-	-1,440

		5%	-1,558		5%	-1,438
		10%	-1,641		10%	-1,437
Hoengseong	Total Generation	-20%	-1,358	Operation Expenses	-10%	-1,299
		-10%	-1,334		-5%	-1,304
		-	-1,309		-	-1,309
		10%	-1,285		5%	-1,315
		20%	-1,260		10%	-1,320
	Investment	-10%	-1,164	CER Price	-10%	-1,285
		-5%	-1,237		-5%	-1,283
		-	-1,309		-	-1,282
		5%	-1,382		5%	-1,281
		10%	-1,454		10%	-1,279
Goesan	Total Generation	-20%	-3,047	Operation Expenses	-10%	-2,815
		-10%	-2,944		-5%	-2,828
		-	-2,840		-	-2,840
		10%	-2,737		5%	-2,853
		20%	-2,633		10%	-2,865
	Investment	-10%	-2,478	CER Price	-10%	-2,726
		-5%	-2,659		-5%	-2,720
		-	-2,840		-	-2,714
		5%	-3,021		5%	-2,707
		10%	-3,202		10%	-2,701

The result of sensitivity analysis (Table B-4 above) shows that the proposed project is not financially attractive. Thus, KRC promotes this project to reduce GHG emission not for financial purpose.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

$EF_{grid,y}$ can be calculated by "Tool to calculate the emission factor for an electricity system (Ver01.1)" (EB35 Annex12) as follows;

A combined margin (CM) consisting of the combination of Operating Margin (OM) and Build Margin (BM). OM and BM are calculated using the data from existing power plants that provide electricity to current grid. These two results are then used to calculate the $EF_{grid,y}$ (Emission Factor). The steps used in the baseline calculation methodology are as follows;

Step 1: Identify the relevant electric power system.

The DNA of Republic of Korea has not published a delineation of the project electricity system and connected electricity systems. Thus, as national grid, project electricity system is defined by default.

Step 2: Select an operating margin (OM) method.

"Tool to calculate the emission factor for an electricity system (Ver01.1)" offers four options in calculating OM;

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis, or

(d) Average OM.

The option (a) is chosen because the power generated from the low-cost/must run resources during the five most recent years are less than 50% of total grid generation. The percentage of power generation from the low-cost/must run resources were 41.36% (2004), 43.02% (2005), 41.66% (2006), 38.02% (2007), and 38.50% (2008) with sources from hydro, geothermal, wind, biomass, nuclear, and solar. In case of Republic of Korea, the government supported domestic coal is included additionally.

Table B-5. The ratio of low cost/must run power generation by year. Generation of Electricity based on the Source of Energy[6] (Unit: million kWh)

Classification		2004	2005	2006	2007	2008
Hydro*		5,861	5,189	5,219	5,042	5,563
Coal	Coal (Domestic)*	4,603	4,484	4,312	4,470	5,010
	Coal (Bituminous)	122,556	129,174	134,894	150,204	168,498
Oil	Oil(Heavy)	21,591	20,079	18,596	20,769	15,033
	Oil(Diesel)	474	412	599	446	392
LNG		55,999	58,118	68,302	78,427	75,809
Nuclear*		130,715	146,779	148,749	142,937	150,958

[6] Data source: Electricity Generation Facilities, 2008 (KEPCO) (http://www.kepco.co.kr/)

Alternative · Renewable*	350	404	511	829	1,092
Total amount of generation	342,149	364,639	381,182	403,124	422,355
Low cost/must run power generation	141,529	156,856	158,791	153,278	162,623
Rate of low cost/must run power generation (%)	**41.36**	**43.02**	**41.66**	**38.02**	**38.50**
The amount of low cost/must run power generation* = Hydro* + Coal (Domestic)* + Nuclear* + Alternative · Renewable*					

The Simple OM can be calculated using either of the two following data vintages for years *y*:

- (Ex-ante) The full generation-weighted average for the most recent 3years for which data are available at the time of PDD submission, if or,
- (Ex-post) The year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex-post monitoring. The choice between ex-ante and ex-post vintage should be specified in the PDD, and cannot be changed during the crediting period.

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

Simple OM can be calculated by a choice of options from Option A, B, and C.

- 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)

This project will use the *ex-ante* alternative.
Simple OM is calculated by Option A where the emission factor is not changed during the project. Thus, the project is not required the monitoring of the emission factor.

According to "Tool to calculate the emission factor for an electricity system", $EF_{OM,y}$ is calculated as a generation-weighted average emission factor (tCO_2/MWh) not considering the low cost/must run power generation. $EF_{OM,y}$ can be calculated using the data on generation of electric power and the quantity of fuel consumed during the most recent 3 years.

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

Where:
$EF_{grid,OMsimple,y}$ = 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

When calculating $EF_{grid,OMsimple,y}$, it is appropriate to use the value of $NCV_{i,y}$ and $EF_{CO2,i,y}$ estimated at the project site. If the $NCV_{i,y}$ and $EF_{CO2,i,y}$ value at the project site is not available, then the national emission factor should be used. In case where the national emission factor doesn't exist, IPCC guideline can be used. Fraction of carbon oxidized is using 0.98 (Coal), 0.99 (Oil and Oil products), and 0.995 (Gas) by Revised 1996 IPCC guideline. The detail data on the power plants connected to KEPCO grid are based on the 'Statistics of Electric Power in Korea' of KEPCO, and are presented in Annex 3.

Step 4: Identify the cohort of power plants to be included in the build margin

According to "Tool to calculate the emission factor for an electricity system (Ver01.1)", the sample group of power plants (*m*) for the calculation of $EF_{BM,y}$ can be the larger one of electricity generation of the followings.

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

Table B-6. Sample plant group (*m*) to calculate BM ($EF_{BM,y}$)[7]

Sample group (m)	Type (a)	Type (b)	Comments
	five power plants that have been built most recently	Power plants capacity that comprise 20% of the system generation and have been built most recently	
Electricity quantity	12,227 GWh	84,873 GWh	Net generation in Korea in 2008 was 404,981GWh
Proportion (ratio to total generation in Korea) (%)	3.02%	20.96%	

[7] Data source: Statistics of Electric Power in Korea of KEPCO (http://www.kepco.co.kr/) (2008.5)

The electricity generation of the "five power plants that have been built most recently" was 12,277 GWh, which is equivalent to 3.02% of the total power generation for 2008 (404,981GWh). The result of the calculation of the "Power plants capacity that comprises 20% of the total generation and has been built most recently" is 84,873 GWh, which is equivalent to 20.96% of the total generation. This second case was selected because this one represents the larger electricity generation. The detailed data used in the calculation are presented in Annex 3.

In terms of vintage of data, project participants can choose one of the following two options;

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

Option 2 (ex-post): For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

$EF_{BM,y}$ is calculated by Option 1 (ex-ante), and this project does not require monitoring the emission factor during the crediting period because the emission factor is not changed.

Step 5: Calculate the build margin emission factor

According to "Tool to calculate the emission factor for an electricity system", $EF_{BM,y}$ is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year, and calculated as follows:

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

Where:

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

Step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows;

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

Where:

$EF_{grid,CM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

The fixed values of w_{OM} and w_{BM} are applied as follows;

The weight of w_{OM} and w_{BM} are, by default, 50% (ie. $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 3 and 5 above and are expressed in tCO_2/MWh. However, for wind and solar projects, the default weights are as follows;
$w_{OM} = 0.75$ and $w_{BM} = 0.25$, owing to their intermittent and non-dispatchable nature.

This PV Power Project is applied $w_{OM} = 0.75$, $w_{BM} = 0.25$ during crediting period.

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

Data / Parameter:	Total installed Capacity of the project activity
Data unit:	MW
Description:	The installed capacity of the project activity
Source of data used:	The data of the board of directors of Korea Rural Community Corporation
Value applied:	4.85
Justification of the choice of data or description of measurement methods and procedures actually applied :	The total installed capacity of each site
Any comment:	

Data / Parameter:	Electricity generation ($EG_{m,y}$)
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power plant / unit *m* in year y
Source of data used:	Statistics of Electric Power in Korea (2006, 2007, 2008), KEPCO
Value applied:	Statistics of Electric Power in Korea from Korea Electric Power Corporation (Refer to Annex 3)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The official (KEPCO) data (Reliable)
Any comment:	

Data / Parameter:	Amount of fuel consumed ($FC_{i,m,y}$)
Data unit:	Mass or volume
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 (2006, 2007, 2008), KEPCO
Value applied:	Statistics of Electric Power in Korea from Korea Electric Power Corporation (Refer to Annex 3)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The official (KEPCO) data (Reliable)
Any comment:	

Data / Parameter:	NCV_i
Data unit:	kcal/kg
Description:	Net Calorific Value (energy content) of fossil fuel *i* in year y per mass or volume unit of a fuel *i*
Source of data used:	Statistics of Electric Power in Korea (2006, 2007, 2008), KEPCO
Value applied:	Statistics of Electric Power in Korea from Korea Electric Power Corporation
Justification of the choice of data or description of measurement methods and procedures actually applied :	The official (KEPCO) data (Reliable)
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the fuel *i*
Source of data used:	IPCC 2006 Guidelines
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The official (IPCC) data (Reliable)
Any comment:	

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating Margin Emission Factor of the grid
Source of data used:	Calculated by using a factor of $FC_{i,m,y}$ and Electricity generation
Value applied:	0.7016
Justification of the	The emission factor has been calculated using the *ex*-ante method based on the

choice of data or description of measurement methods and procedures actually applied :	most recent information available on plants already built at the time of PDD submission, because this has been considered the most appropriate method for the project development and for the emission reductions verification.
Any comment:	Data used of 3 year vintage data (2006 ~ 2008)

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/TJ
Description:	Build Margin Emission Factor of the grid
Source of data used:	Calculated by using a factor of $FC_{i,m,y}$ and Electricity generation
Value applied:	0.4717
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor has been calculated using the *ex*-ante method based on the most recent information available on plants already built at the time of PDD submission, because this has been considered the most appropriate method for the project development and for the emission reductions verification.
Any comment:	Data makes used of a year vintage data 2008. Calculated as recently built power plants defined in the baseline methodology.

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/TJ
Description:	Emission factor ex-ante
Source of data used:	Calculated by using a factor of $EF_{grid,BM,y}$ and $EF_{grid,OM,y}$
Value applied:	0.6441
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor has been calculated using the *ex*-ante method based on the most recent information available on plants already built at the time of PDD submission, because this has been considered the most appropriate method for the project development and for the emission reductions verification.
Any comment:	Data used of 3 years vintage data (2006 ~ 2008)

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

The emission reductions of the proposed project are calculated as follows;

$$ER_y = BE_y - PE_y - L_y$$

Baseline emissions (BE_y)

The baseline emission factor is able to calculate based on Section B.6.1.

Table B-7. Baseline emission factor

Classification	Year	CO_2 emissions (tCO_2)	Electricity (MWh)	Baseline emission factor
Simple OM	2006	144,909,916	206,605,842	**0.7016 tCO_2/MWh**
	2007	161,488,372	230,640,458	
	2008	167,303,865	237,888,671	
BM	2008	40,031,543	84,873,315	**0.4717 tCO_2/MWh**
CM		Simple OM × 0.75 + BM × 0.25		**0.6441 tCO_2/MWh**

According to the PV power CDM project of Korea Rural Community Corporation, the total capacity of generator and electricity are 4.85 MW and 5,826 MWh/yr.

Based on the calculation result above, the calculation equation of emission reductions is as follows;

BE_y = 5,826 MWh/yr × 0.6441 tCO_2/MWh = 3,753 tCO_2/yr

Thus, baseline emission of the project is about 3,753 tCO_2/yr.

Project emissions (PE_y)

There is no project emission by the project. $PE_y = 0$
The electric power used in all PV plant as purchasing from KPX will be considered when calculating emissions reductions.

Leakage (L_y)

As described in section B.6.1, the leakage of the Project is zero. $L_y = 0$

Emission reductions (ER_y)

The emission reductions of PV power CDM project, Korea Rural Community Corporation, are about 3,753 tCO_2/yr. Thus, the total emission reductions are about 37,530 tCO_2 during the crediting period (10years).

However, estimation of total emission reductions is able to change by following risks.

● The risks that affect PV power generation

- Excessively hot summer weather: Power generation rate reduction by temperature increase of modules
- Decrease in the amount of sunshine by climate effect as the rainy spell, a typhoon etc.

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

Table B-8. Estimation of total emission reductions

Year	Estimation of Project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of Leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Year 1 (2011)	0	3,753	0	3,753
Year 2 (2012)	0	3,753	0	3,753
Year 3 (2013)	0	3,753	0	3,753
Year 4 (2014)	0	3,753	0	3,753
Year 5 (2015)	0	3,753	0	3,753
Year 6 (2016)	0	3,753	0	3,753
Year 7 (2017)	0	3,753	0	3,753
Year 8 (2018)	0	3,753	0	3,753
Year 9 (2019)	0	3,753	0	3,753
Year 10 (2020)	0	3,753	0	3,753
Total (tonnes of CO_2e)	**0**	**37,530**	**0**	**37,530**

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

B.7.1. Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied to the grid by the project
Source of data to be used:	Metering equipment and bills of electricity sales
Value of data	5,826 MWh
Description of measurement methods and procedures to be applied:	Electricity supplied by the project activity to the grid (Electricity is measured every hour and recorded every month by the metering equipment connected to grid) Double check by receipt of sales to KEMCO (takes into account the transportation electric losses to the metering equipment)
QA/QC procedures to be applied:	The metering equipment is required the accuracy, because this data will be used directly for calculation of emission reductions. The metering equipment is installed according to 'The operation rule in power generation market' and 'The law on Measurement'.

	Therefore, the metering equipment will be periodically calibrated and checked every 3 years by KPX to do not exceed the margin of sampling error. To guarantee QA/QC, it will be double-checked with bills of electric sales. All procedure for calibrating and operation of the meters will follow 'The operation rule in power generation market' on KPX. There are two different energy measurement systems available in Korea following KPX and KEPCO: the first one relates net generation directly, including consumption for operation. In the second one, two meters are used independently: an export meter (KPX) and an import meter (KEPCO). The only measurement that is required in this case is the net generation sold to KEPCO.
Any comment:	The data will be archived electronically. Archived data, including utility bills will be kept during the crediting period and 2 years later. Also, any consumption from project sites will be monitored through KEPCO bills, in case 'an initial plant installation, a trial tests, a natural disaster, an unexpected defect or a stop of power supply'.

B.7.2. Description of the monitoring plan:

The emission reductions of the proposed project are calculated by the equation below;

Annual emission reductions = Annual electricity dispatched to the grid by the project activity × CO_2 emission factor (ex-ante) of the estimated baseline

Thus, to calculate emission reductions, only needs the monitoring on electric power generation by this project.

- Monitoring equipment: Wattmeter
- Related Laws and standard in Korea: 'The operation rule in power generation market', 'The law on Measurement'

1. Monitoring reporting system

The reporting system of Korea Rural Community Corporation (KRC) is as follows;

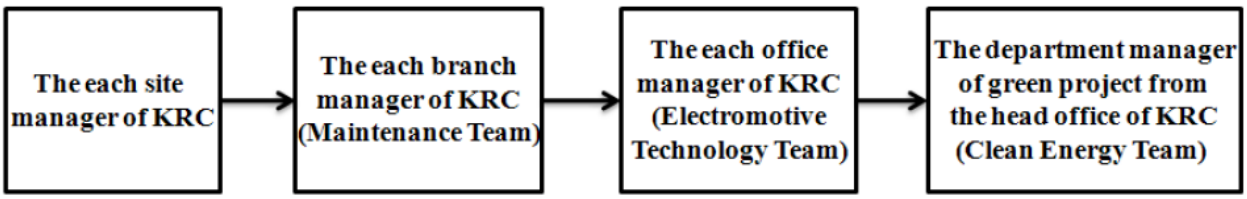


Figure B-2. The reporting system of Korea Rural Community Corporation (KRC) in the project

The each site manager of KRC reports quarterly to the each branch manager (Maintenance Team), and the each branch manager reports to each office manager (Electromotive Technology Team). Also, the each

office manager reports to the department manager of green project from the head office of KRC (Clean Energy Team). The department manager of green project records/manages the reported data.

2. QA / QC (Quality Assurance and Quality Control)

The procedure related to QA/QC is developed as follows;

- Monitoring record and management for produced electric power
- Management of the person in charge for monitoring and maintenance
- Management of monitoring equipment

The procedure generally consists of 'object, application range, responsibility and authority, applicable target and method, management, period of preservation/discard', although there may be some differences depending on the procedures.

2-1. Monitoring record and management for generated electric power

Electric power generated in each branch of KRC is measured by the metering equipment that is possible a seal and management by KPX.
Monitoring record and management system for power generation is as follows;

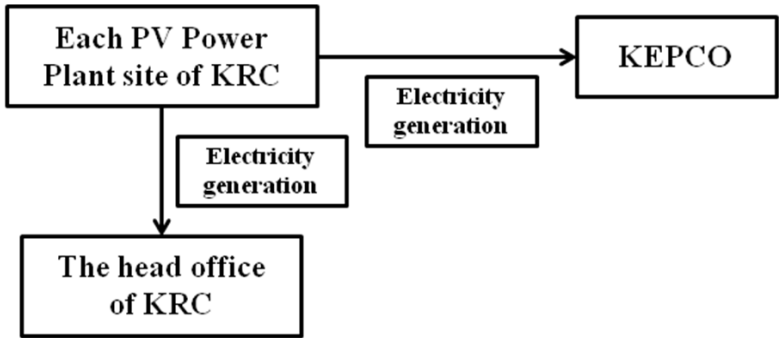


Figure B-3. Monitoring record and management system of Korea Rural Community Corporation

The electric power generated by this project is monitored continuously by the monitoring system of KPX. This monitored data is transmitted to both a central system of each branch and the head office of KRC, and kept in the Workbook everyday. Also, the data is transmitted to KPX and KEMCO (Korea Energy Management Corporation) to cross-check with the electric power sales receipt of KPX. The person in charge of each site should record / manage the monitoring data and report to the superior office for the verification in future. The monitoring data should be preserved for 2 years at least after expiration of the crediting period (10 years).

2-2. Management of the person in charge for monitoring and maintenance

The person in charge of the monitoring and maintenance in this project is appointed by the procedure. He/She is responsible for the monitoring and maintenance, and educates the other staff just in case. After checking the archive on electric power record, he/she should write a report, and report following the monitoring reporting system.

2-3. Management of monitoring equipment

The monitoring equipment is installed by 'The operation rule in power generation market', 'The law on Measurement'. According to 'The law on Measurement', the electronic wattmeter has 7 years of official effective period, and should receive an inspection within the available period if you want to use continuously it.
The electronic wattmeter controlled directly in KPX is carried out a safety inspection every 2 years periodically and carried out at any time in case of need.[8]

Monitoring reporting system in emergency situation, please refer to Annex 4.

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

- Date of completion: June 8, 2009
- Name of entity determining the baseline: Hyun Kyu Park (blue81@ecosense.co.kr)
Dong Myoung Kwon (kdm9401@ecosense.co.kr)

ECOSENSE Co., Ltd.
1414 Kolon science valley 2., #811 Guro 3dong, Guro-gu, Seoul, 152-848, Korea
Tel: +82-2-850-3100
Fax: +82-2-850-3102

[8] Data source: "The operation rule in power generation market (Dec, 2007)" (http://www.kpx.or.kr/)

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:

Yeongam 1st PV Power Plant: June 25, 2008 (The contract date of the start of construction work)
Yeongam 2nd PV Power Plant: June 25, 2008 (The contract date of the start of construction work)
Jindo PV Power Plant: June 25, 2008 (The contract date of the start of construction work)
Hadong PV Power Plant: June 25, 2008 (The contract date of the start of construction work)
Hoengseong PV Power Plant: June 25, 2008 (The contract date of the start of construction work)
Goesan PV Power Plant: April 30, 2009 (The contract date of the start of construction work)

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:

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Expected date: 01/Jun/2010, or
On the date of registration of the CDM project activity, whichever is later.

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

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

1. According to "the provisions of Enforcement Decree of the Act on Impact Assessment on Environment, Traffic, and Disasters, etc", any plant facility whose power source is solar power, wind power or fuel cell of which capacity is more than 100 MW shall be carried out the EIA. Since the installed capacity of Korea Rural Community Corporation is 4.85 MW only, the Environmental Impact Assessment is not required.

2. According to the provisions of Enforcement Decree of the Framework Act on Environment Policy, any plant facility less than 100 MW and size of the project area more than 10,000m^2 may be subject to the pre environmental review

Table D-1. The PV power plants area of KRC

PV power plants	Yeongam 1st	Yeongam 2nd	Jindo	Hadong	Hoengseong	Goesan
Area (m^2)	29,980	36,955	23,433	2,542	1,952	9,429
Pre environmental review	O	O	O	X	X	X

Yeongam 1st, Yeongam 2nd, and Jindo PV Power Plant had been carried out the pre environmental review.

The pre environmental review is considered by an actual inspection of the Ministry of Environment. The pre environmental review was studied only Yeongam 1st, Yeongam 2nd, and Jindo PV Power Plant among 6 PV Power Plants.

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:

The management results by reviewed opinion of pre environmental review in Yeongam 1st, Yeongam 2nd, and Jindo PV Power Plant are as follow;

Table D-2. KRC's action about pre environmental review of Yeongam 1st PV Power Plant

Council opinion	KRC's action
According to this site is dead level and possible using for all sorts of things, there is no changing of the land by installing of facilities. However, the reduction plan to minimize for damages of surroundings by the soil effluence should be established because there are Yeongam-River and farmland nearby the project site. - To need setup and operation about a proper sedimentation basin and tentative waterway.	The proposed project is going to be carried out avoid the farming season and the rainy season. Two tentative waterways (0.5×0.3) and sedimentation basins (2.0×5.0×1.0) will be installed to minimize environmental effects caused by the soil effluence. => action completion
This project site is expected to disharmony with surroundings by the installation of artificial facilities. Therefore, the plans able to harmony with surroundings are established and operated through establishing a landscape architecture plan by planting trees to the boundary.	To prevent disharmony with surroundings within the extent no effect to PV power plant, trees (under 60cm) will be planting to the boundary. => action completion
To reduce the bad effects by implementing this plan, the reduction plans that presented at conference opinion and pre environmental review are previously reflected and needed continued maintenance and management until the goal is achieved.	To reduce bad effects by this project, reduction plans are reflected to be implementing in the design. It will be continually maintained and managed. => action completion
When the unexpected bad effects environmentally are happened by constructing and operating, the damage of surroundings and popular complaint should be prevented previously according to additional reduction plan is considered and operated as soon as possible.	When the unexpected bad effects environmentally are happened by constructing and operating, the work will be suspended immediately. After taking a proper measure as soon as possible, the work is reopened and environmentally damage and popular complaint will be prevented beforehand. => action completion

Table D-3. KRC's action about pre environmental review of Yeongam 2nd PV Power Plant

Council opinion	KRC's action
This project should be promoted considering reduction plan and discussed opinion presented by pre environmental review.	This project will be promoted considering reduction plan and discussed opinion presented by pre environmental review. => action completion
This project should be promoted after installing a waterway and sand-basin to prevent damages by outflow sand - First, proper sand-basin considering initial precipitation and a waterway are installing and should be operating considering water supply area facility.	This project will be promoted after installing a waterway and sand-basin to prevent damages by outflow sand - First, proper sand-basin considering initial precipitation and a waterway are installing and will be operating considering water supply area facility. => action completion

This project is unused site around the reclaimed farmland but connect water way with farmland biologically. Therefore security route for amphibian, reptile, mammal, we need to establish and implement one biology route in reviewing report and additionally 2~3(more than 10m wide) biologically routes.	We secure the route for amphibian, reptile and mammal through establish one biological route accordingly reduction of this project. (As size down of this project, maximum clearance is 850m(south to north)) => action completion
To minimize the effects of dust, noise and vibrating in near farmland when constructing, the reduction plan (car washing) should be set up.	To minimize the effects of dust, noise and vibrating in near farmland when constructing, the reduction plan (car washing, periodically sprinkling water) will be acting. => action completion
Mismatch is expected because of the artificial facilities so we establish and implement the townscape for match with the circumference environments.	To match circumference area with landscape, make the feeds naturally at the early days of project and establish the tree planting plane annually at the business boundary to minimize the differences with the circumference environments. => action completion
All of wasted concretes are handled by propriety disposal before completion when establish the condensing plate.	All of wasted concretes are handled by propriety disposal before completion when establish the condensing plate. => action completion
Reducing the bad influence to environment, we designed the reduction way reflect to the plane previously prior environmental review system report and consultation report. Therefore we implement in suitably time and maintain steadily until achieve the goal.	Reducing the bad influence to environment, we designed the reduction way reflect to the plane previously prior environmental review system report and consultation report. Therefore we should implement in suitably time and maintain steadily until achieve the goal. => action completion
In case unexpected environmental bad effect is occurred or expected under construction and operation, environmental damage and popular complaints should be prevented as establishing additional reduction plan rapidly.	In case unexpected environmental bad effect is occurred or expected under construction and operation, environmental damage and popular complaints will be prevented as establishing additional reduction plan rapidly. => action completion
This project is list to pay caused by Environmental Conversation Law article 47 clause2 number3, the target of preservation ecology fee. Therefore after the conclusion of city management plan and follow the same law article 47 clause1, we report the provider business contents, project scale to the governor of Jeollanam-do province (preservation ecology fee division) within 20 days.	This project is list to pay caused by Environmental Conversation Law article 47 clause2 number3, the target of preservation ecology fee. Therefore after the conclusion of city management plane and follow the same law article 47 clause1, we report the provider, business contents, project scale to the governor of Jeollanam-do province (preservation ecology fee division) within 20 days. => action completion

Table D-4. KRC's action about pre environmental review of Jindo PV Power Plant

Council opinion	KRC's action
According to this site is level ground and possible using for all sorts of things, there is no changing of the land by installing of facilities. However, the reduction plan to minimize for damages of surroundings by the soil effluence should be established because there are Sukgoy-River and the sea nearby the project site. - Waste water occurred by operating should be treated properly according to water quality standard of discharge water.	After establishing a sedimentation basin and a tentative waterway properly to the condition of the land and construction status, continually dredging and reinforcement work for minimizing of the soil effluence will be in force. This site will be positively maintained and waste water will be treated by 2nd handled by contact with oxygen according to water quality standard of discharge water. => action completion
This project site is expected to disharmony with surroundings and to effect by traffic along the road because the site is adjacent to a district road. Therefore, the proper plans that planting trees on the side of the road and so on are established and operated.	Because the species of trees that exert influence on PV power generation are not proper, the species (Azalea, spindle tree) of trees that aren't exerting influence on PV power generation are going to be selected and planting on the side of the road. Therefore, the effect by disharmony with surroundings and traffic along the road will be minimized. => action completion
To reduce the bad effects by implementing this plan, the reduction plans that presented at conference opinion and pre environmental review are previously reflected and needed continued maintenance and management until the goal is achieved.	This project is going to promote as reflecting a plan offered by a reduction plan already designed and a conference opinion. It will be continually maintained and managed to achieve the goal. => action completion
When the unexpected bad effects environmentally are happened by constructing and operating, the damage of surroundings and popular complaint should be prevented previously according to additional reduction plan is considered and operated as soon as possible.	When the unexpected bad effects environmentally are happened by constructing and operating, the work will be suspended immediately. After taking a proper measure as soon as possible, the work will be reopened. => action completion

SECTION E. Stakeholders' comments

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

The stakeholder related to the proposed project is local government and local residents. The stakeholder for 6 PV power plants of KRC is as follow table.

Table E-1. The stakeholder for 6 PV power plants of KRC

site	The stakeholder	
	Local government	Local residents
Yeongam 1st	O (The permission for the power plant business)	Local residents presentation ×
Yeongam 2nd	O (The permission for the power plant business)	Local residents presentation ×
Jindo	O (The permission for the power plant business)	Local residents presentation ×
Hadong	O (The permission for the power plant business)	Local residents presentation ×
Hoengseong	O (The permission for the power plant business)	Local residents presentation O
Goesan	O (The permission for the power plant business)	Local residents presentation O

Yeongam 1st, 2nd, Jindo, Hadong PV power plants didn't have local residents presentation because there is no local residents nearby the sites. Only Hoengseong and Goesan PV power plants had local residents' presentation.

The permission for the power plant business received from local government is as follow;

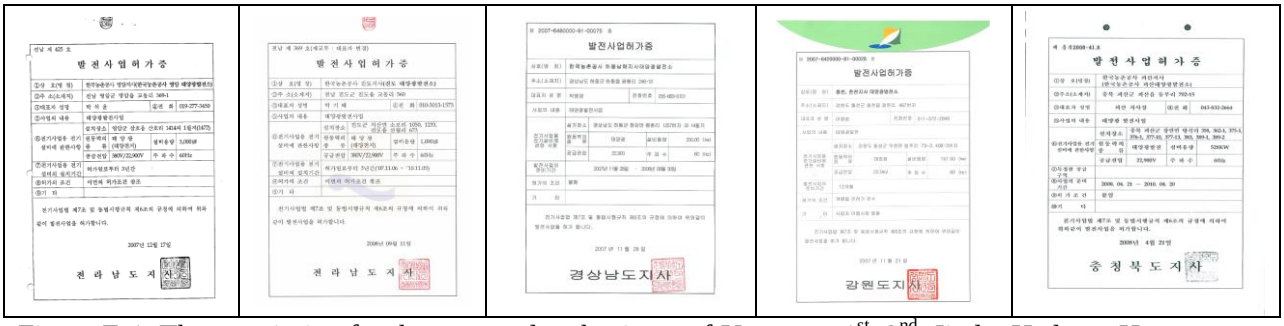


Figure E-1. The permission for the power plant business of Yeongam 1st, 2nd, Jindo, Hadong, Hoengseong, and Goesan PV Power Plants

KRC announced articles that they promote positively investment about development of renewable energy to take the initiative in alternating generating power and preventing global warming by renewable energy. Also, they announced CDM project to promote, too.

에너지타임즈
The Energytimes News

편집 : 2010.2.23 화 17:50

산업 정책 기업 기획/특집 국제 오피니언 자매지

에너지효율 · 전력/원자력 · 가스 · 석유/자원 · 신재생 · 지역난방/열

홈 > 뉴스 > 산업 > 신재생 뒤로가기

메일보내기 오류신고 프린트 가 가

농촌公, 신재생에너지 사업 적극 추진

태양광·소수력·풍력 등 총 82개소, CDM 사업도 '눈독'

2008년 11월 04일 (화) 18:34:07 오혜은 기자 eun@energytimes.kr

한국농촌공사(사장 홍문표)가 농촌을 활용한 신재생에너지 사업을 본격적으로 추진키로 해 주목된다.

농촌공사는 최근 신재생에너지를 생산해 낼 수 있는 농촌의 저수지(3321개소), 취입보(4129개소), 방조제(156개소) 등을 비롯해 저수지 주변부지, 방조제 내부 유휴부지 등을 활용, 신재생에너지를 개발해 나갈 계획이라고 밝혔다.

농촌공사는 이번 신재생에너지 개발 사업을 효과적으로 추진하기 위해 '신재생에너지 사업 개발 중장기 전략'을 마련하고 2010년대까지 태양광 발전단지 60개소, 소수력 21개소, 풍력 1개소 등 총 82개소에 달하는 신재생에너지 단지를 개발한다는 방침이다.

여기에서 일반가정 15만 가구가 1년 동안 사용할 수 있는 발전규모 45만㎾, 연간발전량 63만㎿h를 생산할 계획이다.

아울러 신재생에너지를 통한 청정개발체제(CDM) 사업에도 참여해 약 30억원의 탄소배출권도 판매할 수 있을 것으로 전망했다.

농촌공사 관계자는 "신재생에너지는 고유가 문제를 해결하면서 친환경 에너지 생산, 외화획득 대체까지 1석 3조의 효과가 있다"며 "정부의 정책과제중 하나인 저탄소 녹색성장을 주도하면서, 농촌지역 개발과 연계한 깨끗한 환경 청정에너지를 가미해 나갈 계획"이라고 전했다.

관련기사

· 농촌공사, 향후 83개 신재생E 기지 건설

오혜은 기자의 다른기사 보기

The Energytimes News
< 12, Nov, 2008 (Wed) >

Korea Rural Community Corporation (KRC),
Take an active part in Renewable Energy Project
Total 82 power plants (PV / Small Hydro / Wind and so on),
and CDM Project

KRC will be develop a renewable energy complex by 2010.
(PV: 60 sites, Small Hydro : 21 sites, Wind : 1 sites)
This complex will be generating 630,000 MWh/yr
in 450 MW power capacity.

Also, they expect CERs via promote CDM project

Figure E-2. The 1st article about development of renewable energy

'E2 News (Energy & Environment)'
< 21, June, 2008 (Mon) >

KRC, focus on investment in Renewable Energy (PV Power ..)
The ground-breaking ceremony of PV Power Plant in Yeongam, Jeollanam-do…
Generating 630,000 MWh in 2010

KRC will be generating 6,561MWh (capacity : 4,357kW) in Yeongam (the ground -breaking ceremony in this day), Jindo, Hadong, Hongcheon(Hoengseong) PV Plants in this year by investing 31.7 billion won.

Figure E-3. The 2nd article about development of renewable energy

E.2. Summary of the comments received:

- Bad influence to farm that caused by solar energy generating facilities
- The damage to stocks that caused by absorption of much lights from solar energy generating facilities
- Ground pollution from solar battery's material and the dazzling that caused by light from module
- The damage of crops that caused by thermal rise of solar energy generating facility's circumference
- The damage that caused by electromagnetic waves origination in surround area from solar energy generating facilities

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

The answer of the person in charge of Korea Rural Community Corporation (KRC) about the questions above is follows.

- As the solar energy is unlimited clean energy, it is changing solar energy to electric power. Moreover, it is recognized from Europe and Japan that had a rigid standard of natural environment, so the solar energy doesn't damage to farm.

- The surface of solar energy module absorbs lights, so the temperature of module is higher than surrounds. However this situation doesn't be happened with rise of surrounds in same time. Therefore the crops away from solar energy generating facilities have not any damages.

- Silicon which is main material of PV module is chemically compatible material and never be exposed. Because absorption of the low iron glasses is higher than a glass, the reflexibility of the low iron glasses that used at PV module is lower than a glass.

- The electromagnetic wave is generating by PV plant. However, it doesn't cause serious problems because the electromagnetic wave (3.8mG) from PV plant is lower than the electromagnetic wave (19mG) generated under general transmission line.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Korea Rural Community Corporation
Street/P.O.Box:	487, Poil-Dong
Building:	-
City:	Uiwang-Shi
State/Region:	Gyunggi-Do
Postfix/ZIP:	437-703
Country:	Republic of Korea
Telephone:	82-31-420-3114
FAX:	82-31-423-6561
E-Mail:	-
URL:	http://www.ekr.or.kr/
Represented by:	-
Title:	CEO
Salutation:	Mr
Last Name:	Hong
Middle Name:	-
First Name:	Moon Pyo
Department:	-
Mobile:	-
Direct FAX:	82-31-420-3889
Direct tel:	82-31-420-3003
Personal E-Mail:	mphong@ekr.or.kr

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding to constitute a diversion of official assistance, nor to count towards any financial obligation from Parties included in Annex I.

Annex 3

BASELINE INFORMATION

<Table 1> Fuel consumption of each power plant 2008, 2007, 2006

Fuel Type	Plant	No.	Fuel Consumption in 2008 (t)	Fuel Consumption in 2007 (t)	Fuel Consumption in 2006 (t)
Bituminous	honam	#1	793,048	866,853	781,139
		#2	887,772	846,931	859,736
	Samchonpo	#1	1,759,936	1,631,706	1,696,271
		#2	1,628,693	1,804,695	1,508,082
		#3	1,635,809	1,755,374	1,519,385
		#4	1,662,981	1,543,140	1,521,263
		#5	1,718,759	1,850,764	1,665,339
		#6	1,844,647	1,714,320	1,770,348
	Yonghung	#1	1,894,596	1,902,557	2,004,193
		#2	1,881,013	2,296,289	2,129,118
		#3	1,694,625	119,883	-
		#4	1,217,547	-	-
	Boryeong	#1	1,697,622	1,466,761	1,638,140
		#2	1,328,646	1,655,488	1,389,425
		#3	1,528,112	1,648,008	1,323,779
		#4	1,694,212	1,347,303	1,610,928
		#5	1,503,611	1,629,904	1,296,455
		#6	1,704,157	1,490,809	1,553,273
		#7	1,102,498	-	-
		#8	227,312	-	-
	Taean	#1	1,493,418	1,524,391	1,354,832
		#2	1,570,393	1,434,221	1,532,209
		#3	1,442,632	1,521,349	1,338,967
		#4	1,582,461	1,320,380	1,548,909
		#5	1,566,721	1,342,358	1,542,775
		#6	1,419,495	1,535,931	1,294,577
		#7	1,285,747	1,430,171	61,910
		#8	1,553,992	919,055	-
	Hadong	#1	1,478,000	1,582,726	1,373,049
		#2	1,551,832	1,396,830	1,543,074
		#3	1,573,892	1,424,033	1,549,094
		#4	1,469,828	1,572,409	1,376,612
		#5	1,592,246	1,486,776	1,554,524
		#6	1,525,471	1,585,307	1,371,801
		#7	310,138	-	-
	Dangjin	#1	1,559,086	1,512,904	1,380,527
		#2	1,621,753	1,358,316	1,570,077
		#3	1,474,550	1,516,065	1,402,916
		#4	1,457,994	1,519,231	1,386,317
		#5	1,490,658	1,279,796	1,456,458
		#6	1,509,171	1,281,318	1,216,582
		#7	1,264,913	1,059,612	1,008
		#8	1,494,311	467,807	-
Fuel Type	Plant	No.	Fuel Consumption in 2008 (t)	Fuel Consumption in 2007 (t)	Fuel Consumption in 2006 (t)
Heavy Oil	honam	#1	808	889	1,113
		#2	1,225	811	1,251
	Ulsan	#1	30,689	107,844	72,243
		#2	29,228	108,381	80,187
		#3	32,541	120,571	96,459
		#4	228,138	341,170	360,919
		#5	163,748	370,712	375,985

		#6	225,645	216,409	378,331
	Youngnam	#1	59,763	174,082	107,090
		#2	40,030	122,249	95,127
	Yosu	#1	32,576	121,572	99,129
		#2	111,854	257,420	215,957
	Pyongtaek	#1	91,937	269,284	261,458
		#2	125,789	359,870	277,025
		#3	135,720	349,481	303,858
		#4	86,454	255,443	245,602
	Namjeju	#1	-	-	11,406
		#2	-	-	9,772
		#3	132,984	124,559	46,504
		#4	119,301	127,900	-
	Jeju	#1	-	1,049	8,603
		#2	84,258	70,122	113,679
		#3	89,652	98,846	117,464
	Namjeju	D/P	19,875	35,297	51,347
	Jeju	D/P	46,728	49,613	52,907
Fuel Type	**Plant**	**No.**	**Fuel Consumption in 2008 (t)**	**Fuel Consumption in 2007 (t)**	**Fuel Consumption in 2006 (t)**
Diesel Oil	honam	#1	177	281	279
		#2	167	262	359
	Samchonpo	#1	137	296	860
		#2	1,065	384	1,362
		#3	614	434	457
		#4	726	677	1,818
		#5	874	315	977
		#6	448	619	428
	Yonghung	#1	5,594	3,320	2,548
		#2	3,033	1,779	2,545
		#3	2,173	3,964	-
		#4	769	-	-
	Boryeong	#1	566	811	306
		#2	196	169	1,137
		#3	233	187	514
		#4	339	646	82
		#5	642	195	541
		#6	301	387	518
		#7	2,696	-	-
		#8	1,060	-	-
	Taean	#1	589	410	514
		#2	146	374	162
		#3	551	350	575
		#4	122	422	133
		#5	363	676	544
		#6	626	491	1,113
		#7	1,224	2,321	4,799
		#8	635	3,636	-
	Hadong	#1	355	178	515
		#2	311	637	293
		#3	474	375	153
		#4	495	292	796
		#5	256	452	242
		#6	521	109	690
		#7	2,900	-	-
	Dangjin	#1	60	269	966
		#2	136	543	161
		#3	751	119	433
		#4	771	342	1,549

		#5	250	1,038	745
		#6	132	878	3,051
		#7	645	6,681	505
		#8	314	4,873	-
	Ulsan	#1	565	406	605
		#2	562	483	469
		#3	480	576	518
		#4	4,016	3,525	3,729
		#5	2,965	4,711	3,678
		#6	3,757	3,021	3,694
	Youngnam	#1	1,476	1,232	1,016
		#2	802	796	1,494
	Yosu	#1	202	332	281
		#2	341	367	291
	Pyongtaek	#1	77	114	141
		#2	90	140	166
		#3	145	157	134
		#4	100	117	103
	Namjeju	#1	-	-	17
		#2	-	-	14
		#3	146	225	2,509
		#4	127	341	-
	Jeju	#1	-	4	23
		#2	81	112	64
		#3	101	34	67
	Seoul	#4	1	1	1
		#5	-	1	1
	Incheon	#3	292	354	311
		#4	238	201	311
	Namjeju	D/P	482	238	111
	Jeju	G/T	503	850	8,264
	Pyongtaek C/C	C/C	-	67	45
	Ilsan C/C	C/C	-	-	1,384
	Seoincheon C/C	C/C	721	-	1,066
	Hallim C/C	C/C	6,883	17,753	48,475
	Bucheon C/C	C/C	-	-	215
Fuel Type	**Plant**	**No.**	**Fuel Consumption in 2008 (t)**	**Fuel Consumption in 2007 (t)**	**Fuel Consumption in 2006 (t)**
L.N.G	Pyongtaek	#1	2,562	3,316	3,997
		#2	4,744	6,339	5,687
		#3	4,232	4,874	3,891
		#4	3,020	4,047	3,473
	Seoul	#4	155,095	75,080	69,383
		#5	138,068	206,908	152,891
	Incheon	#1	28,582	30,402	6,945
		#2	30,186	31,528	5,223
		#3	32,472	41,270	15,426
		#4	27,637	18,892	12,454
	Bundang fuel cell		-	313	-
	Pyongtaek C/C	C/C	150,276	151,414	84,054
	Ilsan C/C	C/C	636,633	635,260	556,504
	Bundang C/C	C/C	651,005	660,899	720,381
	Ulsan C/C	C/C	655,938	649,494	536,196
	Seoincheon C/c	C/C	1,436,788	1,495,687	1,199,196

	Shinincheon C/C	C/C	1,607,180	1,761,001	1,641,038
	Boryeong C/C	C/C	894,790	1,121,251	998,683
	Incheon C/C	C/C	459,923	494,690	484,606
	Busan C/C	C/C	1,456,370	1,552,997	1,396,417
	Hallim C/C	C/C	-	-	-
	Anyang C/C	C/C	292,931	289,384	230,969
	Bucheon C/C	C/C	302,746	269,651	225,713
	POSCO POWER C/C	C/C	587,956	660,445	408,018
	GS Bugog C/C #1	C/C	433,004	371,586	389,811
	GS Bugog C/C #2	C/C	276,112	-	-
	Yulchon C/C	C/C	347,123	292,336	315,132

Source : KEPCO, Statistics of Electric Power in Korea, 2008, 2007, 2006

<Table 2> Net Caloric Value(NCV) of each power plant 2008, 2007, 2006

Fuel Type	Plant	No.	Net Caloric Value in 2008 (kcal/kg)	Net Caloric Value in 2007 (kcal/kg)	Net Caloric Value in 2006 (kcal/kg)
Bituminous	honam	#1	5,089	5,186	5,164
		#2	5,104	5,190	5,137
	Samchonpo	#1	5,524	5,545	5,640
		#2	5,506	5,537	5,645
		#3	5,505	5,525	5,565
		#4	5,524	5,539	5,568
		#5	4,839	4,866	4,974
		#6	4,836	4,864	4,992
	Yonghung	#1	5,872	5,745	5,768
		#2	5,870	5,739	5,782
		#3	5,767	5,823	-
		#4	5,771	-	-
	Boryeong	#1	5,403	5,519	5,480
		#2	5,443	5,515	5,478
		#3	5,377	5,519	5,553
		#4	5,387	5,514	5,533
		#5	5,380	5,520	5,553
		#6	5,386	5,518	5,542
		#7	5,451	-	-
		#8	5,401	-	-
	Taean	#1	5,636	5,733	5,683
		#2	5,638	5,733	5,679
		#3	5,632	5,734	5,684
		#4	5,638	5,727	5,680
		#5	5,660	5,686	5,637
		#6	5,662	5,695	5,662
		#7	5,700	5,717	5,667
		#8	5,666	5,722	-
	Hadong	#1	5,579	5,647	5,671
		#2	5,569	5,645	5,661
		#3	5,576	5,627	5,660
		#4	5,572	5,638	5,671
		#5	5,573	5,653	5,665
		#6	5,573	5,640	5,669
		#7	5,798	-	-
	Dangjin	#1	5,520	5,660	5,588
		#2	5,501	5,663	5,611
		#3	5,513	5,657	5,592
		#4	5,503	5,658	5,581

		#5	5,570	5,713	5,744
		#6	5,562	5,737	5,814
		#7	5,581	5,725	5,527
		#8	5,565	5,742	-
Fuel Type	**Plant**	**No.**	**Net Caloric Value in 2008 (kcal/kg)**	**Net Caloric Value in 2007 (kcal/kg)**	**Net Caloric Value in 2006 (kcal/kg)**
Heavy Oil	honam	#1	9,311	9,311	9,319
		#2	9,312	9,311	9,332
	Ulsan	#1	9,439	9,413	9,419
		#2	9,444	9,420	9,427
		#3	9,440	9,360	9,423
		#4	9,515	9,508	9,529
		#5	9,529	9,510	9,531
		#6	9,513	9,502	9,533
	Youngnam	#1	9,675	9,643	9,631
		#2	9,677	9,643	9,605
	Yosu	#1	9,449	9,464	9,465
		#2	9,448	9,462	9,456
	Pyongtaek	#1	9,423	9,445	9,222
		#2	9,430	9,449	9,233
		#3	9,426	9,447	9,260
		#4	9,417	9,460	9,208
	Namjeju	#1	-	-	9,413
		#2	-	-	9,413
		#3	9,415	9,412	9,403
		#4	9,356	9,410	-
	Jeju	#1	-	9,413	9,377
		#2	9,423	9,420	9,454
		#3	9,421	9,418	9,455
	Namjeju	D/P	9,887	9,419	9,734
	Jeju	D/P	9,902	9,396	9,136
Fuel Type	**Plant**	**No.**	**Net Caloric Value in 2008 (kcal/kg)**	**Net Caloric Value in 2007 (kcal/kg)**	**Net Caloric Value in 2006 (kcal/kg)**
Diesel Oil	honam	#1	8,484	8,497	8,471
		#2	8,492	8,493	8,427
	Samchonpo	#1	4,577	8,373	8,373
		#2	8,373	8,373	8,373
		#3	8,349	8,349	8,373
		#4	8,349	8,349	8,363
		#5	8,550	8,550	8,550
		#6	8,550	8,550	8,550
	Yonghung	#1	8,246	8,390	8,446
		#2	8,446	8,457	8,454
		#3	9,564	7,877	-
		#4	8,416	-	-
	Boryeong	#1	8,496	8,496	8,412
		#2	8,496	8,496	8,496
		#3	1,091	8,655	8,496
		#4	8,558	8,943	8,496
		#5	9,208	8,655	8,312
		#6	9,655	8,655	8,312
		#7	8,139	-	-
		#8	4,824	-	-
	Taean	#1	8,366		8,174
		#2	8,398	8,387	7,952
		#3	8,396	8,388	8,217
		#4	8,223	7,963	8,232
		#5	8,226	8,361	8,232

		#6	8,341	8,347	8,232
		#7	8,355	8,044	8,130
		#8	8,393	7,256	-
	Hadong	#1	8,377	8,492	8,396
		#2	8,344	8,456	8,482
		#3	8,475	8,468	8,482
		#4	8,466	8,519	8,384
		#5	8,487	8,492	8,465
		#6	8,420	8,495	8,456
		#7	7,546	-	-
	Dangjin	#1	8,555	8,610	8,526
		#2	8,537	8,606	8,529
		#3	8,554	8,617	8,557
		#4	8,464	8,636	8,564
		#5	8,597	8,620	8,507
		#6	8,537	8,613	8,450
		#7	7,679	8,621	8,535
		#8	8,543	8,596	-
	Ulsan	#1	8,636	8,664	8,664
		#2	8,664	8,664	8,664
		#3	8,664	8,664	8,664
		#4	8,662	8,664	8,664
		#5	8,662	8,664	8,664
		#6	8,662	8,664	8,664
	Youngnam	#1	8,446	8,402	8,403
		#2	8,450	8,404	8,419
	Yosu	#1	8,352	8,368	8,358
		#2	8,352	8,370	8,356
	Pyongtaek	#1	8,525	8,534	8,496
		#2	8,532	8,530	8,496
		#3	8,456	8,518	8,502
		#4	8,522	8,517	8,502
	Namjeju	#1	-	-	8,525
		#2	-	-	8,504
		#3	8,555	8,200	8,491
		#4	8,557	8,515	-
	Jeju	#1	-	8,458	8,429
		#2	8,490	7,907	8,524
		#3	8,490	8,490	8,524
	Seoul	#4	8,617	7,411	8,617
		#5	8,610	8,617	8,617
	Incheon	#3	8,469	8,514	8,533
		#4	8,470	8,483	8,532
	Namjeju	D/P	8,546	8,323	8,462
	Jeju	G/T	8,458	8,447	8,352
	Pyongtaek C/C	C/C	-	8,503	8,503
	Ilsan C/C	C/C	-	-	8,540
	Bundang C/C	C/C	-	8,716	-
	Seoincheon C/C	C/C	-	-	8,740
	Hallim C/C	C/C	8,536	8,982	8,506
	Bucheon C/C	C/C	-	-	10,381
Fuel Type	**Plant**	**No.**	**Net Caloric Value in 2008 (kcal/kg)**	**Net Caloric Value in 2007 (kcal/kg)**	**Net Caloric Value in 2006 (kcal/kg)**
L.N.G	Pyongtaek	#1	11,592	11,651	11,647
		#2	11,663	11,652	11,647
		#3	11,615	11,651	11,573

		#4	11,661	11,651	11,667
	Seoul	#4	11,739	11,727	11,716
		#5	11,734	11,727	11,594
	Incheon	#1	11,736	11,727	11,732
		#2	11,737	11,730	11,725
		#3	11,739	11,731	11,716
		#4	11,733	11,731	11,722
	Pyongtaek C/C	C/C	11,744	11,740	11,727
	Ilsan C/C	C/C	11,732	11,725	11,715
	Bundang C/C	C/C	11,737	11,728	11,723
	Ulsan C/C	C/C	11,648	11,610	11,381
	Seoincheon C/C	C/C	11,740	11,739	11,723
	Shinincheon C/C	C/C	11,739	11,735	11,723
	Boryeong C/C	C/C	11,732	11,735	11,731
	Incheon C/C	C/C	11,697	11,726	11,698
	Busan C/C	C/C	11,730	11,727	11,715
	Anyang C/C	C/C	11,816	11,741	11,725
	Bucheon C/C	C/C	11,192	11,898	11,712
	POSCO POWER C/C	C/C	11,740	11,757	11,728
	GS Bugog C/C #1	C/C	11,383	11,734	11,727
	GS Bugog C/C #2	C/C	13,183	-	-
	Yulchon C/C	C/C	11,737	11,732	12,038

Source: KEPCO, Statistics of Electric Power in Korea, 2008, 2007, 2006

<Table 3> Carbon Emission Factor(CEF_i) and Default carbon oxidation factor

Fuel	Carbon Emission Factor (tC/TJ)	Default carbon oxidation factor	Fuel	Carbon Emission Factor (tC/TJ)	Default carbon oxidation factor
LIQUID FOSSIL			**SOLID FOSSIL**		
Secondary fuels/products			**Secondary Fuels/Products**		
Gasoline	18.9	0.995	BKB & Patent Fuel	(25.8)	0.98
Jet Kerosene	19.5	0.995	Coke Oven / Gas Coke	29.5	0.995
Other Kerosene	19.6	0.995	Coke Oven Gas	13.0	0.995
Gas/Diesel Oil	20.2	0.99	Blast Furnace Gas	66.0	0.995
Residual Fuel Oil	21.1	0.99	GASEOUS FOSSIL	-	-
LPG	17.2	0.995	Natural Gas (Dry)	15.3	0.995
Petroleum Coke	27.5	0.99	**BIOMASS**		
Refinery Feedstocks	(20.0)	0.98	Solid Biomass	29.9	0.98
Refinery Gas	18.2	0.995	Liquid Biomass	(20.0)	0.99
Other Oil	(20.0)	0.99	Gas Biomass	(30.6)	0.995

Source: 2006 IPCC Guideline

<Table 4> Calculation of Operating Margin

Generation					CO2 emission				
Plant	**No.**	**Generation in 2008 (MWh)**	**Generation in 2007 (MWh)**	**Generation in 2006 (MWh)**	**Plant**	**No.**	**CO2 emission in 2008 (tCO2)**	**CO2 emission in 2007 (tCO2)**	**CO2 emission in 2006 (tCO2)**
honam	#1	1,614,014	1,806,765	1,622,639	honam	#1	1,569,423	1,748,332	1,569,832
	#2	1,816,464	1,773,852	1,782,016		#2	1,762,994	1,709,196	1,718,805
Samchonpo	#1	4,230,470	3,903,591	4,161,219	Samchonpo	#1	3,773,912	3,512,762	3,715,727
	#2	3,931,527	4,398,382	3,703,880		#2	3,483,630	3,879,332	3,307,810
	#3	4,024,666	4,311,704	3,779,585		#3	3,497,072	3,765,697	3,283,187
	#4	4,118,892	3,840,729	3,816,997		#4	3,567,686	3,319,697	3,292,420
	#5	3,779,114	4,074,103	3,761,205		#5	3,230,766	3,496,362	3,217,893
	#6	4,071,070	3,823,174	4,065,091		#6	3,463,391	3,238,194	3,431,600
Yongheng	#1	5,137,490	5,020,901	5,337,432	Yonghung	#1	4,332,318	4,250,845	4,494,003
	#2	5,112,704	6,081,490	5,727,937		#2	4,293,676	5,119,769	4,784,700
	#3	4,535,951	320,502	-		#3	3,799,402	273,053	-
	#4	3,193,481	-	-		#4	2,729,426	-	-
Boryeong	#1	4,017,302	3,604,642	3,988,848	Boryeong	#1	3,561,454	3,143,953	3,484,960
	#2	3,247,137	4,120,511	3,423,101		#2	2,807,309	3,544,095	2,957,117
	#3	3,733,602	4,214,892	3,409,486		#3	3,189,373	3,530,570	2,854,480
	#4	4,162,971	3,438,773	4,133,946		#4	3,543,097	2,885,245	3,459,771
	#5	3,677,963	4,162,530	3,364,148		#5	3,141,637	3,493,014	2,795,629
	#6	4,170,094	3,817,024	3,987,488		#6	3,563,170	3,193,828	3,342,789
	#7	2,878,738	-	-		#7	2,339,450	-	-
	#8	748,005	-	-		#8	478,084	-	-
Taean	#1	3,894,659	4,055,394	3,556,797	Taean	#1	3,268,736	3,393,348	2,989,823
	#2	4,093,884	3,796,670	4,035,753		#2	3,437,159	3,183,621	3,377,908
	#3	3,763,910	4,039,811	3,528,613		#3	3,154,876	3,387,012	2,955,460

	#4	4,119,808	3,504,214	4,069,820		#4	3,463,502	2,935,945	3,415,232
	#5	4,089,287	3,523,988	4,013,235		#5	3,442,951	2,964,216	3,377,147
	#6	3,711,227	4,036,733	3,381,867		#6	3,121,234	3,396,603	2,847,910
	#7	3,482,731	3,868,817	159,677		#7	2,847,796	3,179,412	148,152
	#8	4,186,293	2,528,587	-		#8	3,419,143	2,049,261	-
Hadong	#1	3,827,102	4,140,667	3,607,063	Hadong	#1	3,201,705	3,469,490	3,023,440
	#2	4,012,667	3,681,670	4,068,036		#2	3,355,187	3,062,202	3,391,415
	#3	4,074,310	3,727,907	4,079,158		#3	3,407,370	3,111,150	3,403,707
	#4	3,804,790	4,115,014	3,631,374		#4	3,180,045	3,441,959	3,032,004
	#5	4,114,218	3,905,190	4,092,625		#5	3,444,763	3,263,190	3,418,733
	#6	3,953,083	4,158,792	3,610,222		#6	3,301,006	3,470,875	3,020,145
	#7	870,781	-	-		#7	704,663	-	-
Dangjin	#1	3,991,074	3,968,103	3,598,820	Dangjin	#1	3,340,333	3,324,511	2,996,812
	#2	4,162,369	3,595,927	4,115,891		#2	3,462,829	2,987,113	3,419,723
	#3	3,800,792	4,010,715	3,666,490		#3	3,157,232	3,329,382	3,046,051
	#4	3,737,406	4,009,178	3,610,984		#4	3,116,460	3,337,487	3,007,336
	#5	3,908,658	3,443,482	3,946,931		#5	3,223,368	2,840,844	3,248,997
	#6	4,006,307	3,497,359	3,392,395		#6	3,258,626	2,855,605	2,753,380
	#7	3,336,619	2,904,680	1,474		#7	2,741,779	2,372,185	3,486
	#8	3,992,732	1,297,925	-		#8	3,228,674	1,055,451	-
Ulsan	#1	114,753	406,685	275,016	Ulsan	#1	94,392	326,599	219,824
	#2	108,931	407,321	306,668		#2	90,011	328,689	243,653
	#3	123,706	458,584	376,132		#3	99,787	363,447	292,856
	#4	945,479	1,418,034	1,511,557		#4	706,804	1,049,567	1,112,741
	#5	678,426	1,540,400	1,583,846		#5	508,282	1,143,131	1,158,985
	#6	937,531	899,604	1,589,838		#6	698,371	667,448	1,166,428
Youngnam	#1	229,316	688,935	359,205	Youngnam	#1	189,243	541,466	333,368
	#2	149,357	474,475	323,595		#2	126,298	380,066	296,849
Yosu	#1	130,854	497,053	403,547	Yosu	#1	99,223	369,809	301,596

	#2	454,052	1,071,405	906,849		#2	339,759	782,025	655,624
Pyongtaek	#1	386,361	1,147,515	1,123,948	Pyongtaek	#1	284,956	824,931	784,430
	#2	534,121	1,553,162	1,198,620		#2	393,541	1,108,137	836,142
	#3	576,432	1,502,099	1,304,568		#3	422,104	1,072,398	913,144
	#4	365,269	1,095,986	1,052,228		#4	269,479	786,253	734,984
Namjeju	#1	-	-	34,448	Namjeju	#1	-	-	34,473
	#2	-	-	28,686		#2	-	-	29,533
	#3	559,817	484,459	179,033		#3	339,759	376,501	146,768
	#4	517,866	500,222	547		#4	284,956	386,832	-
Jeju	#1	-	3,019	24,748	Jeju	#1	-	3,177	25,927
	#2	336,676	280,454	462,023		#2	422,104	212,101	344,823
	#3	357,666	396,186	479,676		#3	269,579	298,629	356,342
Seoul	#4	258,052	357,572	306,558	Seoul	#4	401,908	205,771	189,983
	#5	596,641	962,861	685,011		#5	358,254	567,067	416,347
Incheon	#1	141,085	148,821	32,932	Incheon	#1	78,394	83,322	19,138
	#2	152,576	157,042	24,366		#2	82,799	86,427	14,384
	#3	162,092	205,530	78,669		#3	89,843	114,067	43,274
	#4	139,637	95,143	62,414		#4	76,403	52,316	35,111
Namjeju	D/P	93,201	164,390	239,690	Namjeju	D/P	61,129	107,225	160,563
Jeju	G/T	643	1,294	15,986	Jeju	G/T	1,306	2,204	21,191
Jeju	D/P	223,630	235,626	252,764	Jeju	D/P	140,960	149,481	155,006
Pyongtaek C/C	C/C	903,201	909,449	497,441	Pyongtaek C/C	C/C	412,456	415,595	230,481
Ilsan C/C	C/C	3,491,175	3,506,350	3,038,165	Ilsan C/C	C/C	1,745,464	1,740,764	1,527,295
Bundang C/C	C/C	3,748,232	3,741,296	4,059,300	Bundang C/C	C/C	1,785,689	1,811,446	1,973,561
Ulsan C/C	C/C	4,454,326	4,383,453	3,608,435	Ulsan C/C	C/C	1,785,562	1,762,282	1,426,223
Seoincheon C/C	C/C	10,308,626	10,895,505	8,726,521	Seoincheon C/C	C/C	3,941,978	4,103,259	3,288,187
Shinincheon C/C	C/C	11,531,252	12,533,994	11,797,500	Shinincheon C/C	C/C	4,409,128	4,829,638	4,495,801
Boryeong C/C	C/C	6,126,641	7,839,371	7,089,662	Boryeong C/C	C/C	2,453,444	3,075,090	2,737,890
Incheon C/C	C/C	3,420,631	3,696,784	3,648,288	Incheon C/C	C/C	1,257,300	1,355,673	1,324,878

Busan C/C	C/C	10,848,484	11,616,221	10,455,401	Busan C/C	C/C	3,992,333	4,256,236	3,823,285
Hallim C/C	C/C	23,547	61,752	175,356	Hallim C/C	C/C	18,037	46,506	126,590
Anyang C/C	C/C	1,638,638	1,615,090	1,286,480	Anyang C/C	C/C	808,924	794,077	632,910
Bucheon C/C	C/C	1,657,898	1,523,068	1,241,795	Bucheon C/C	C/C	791,835	749,798	618,481
POSCO POWER C/C	C/C	3,328,129	3,788,598	2,338,128	POSCO POWER C/C	C/C	1,613,119	1,814,639	1,118,324
GS Bugog C/C	C/C	5,509,092	2,767,811	2,911,683	GS Bugog C/C	C/C	-	1,019,016	1,068,339
Yulchon C/C	C/C	2,488,267	2,083,451	2,276,276	Yulchon C/C	C/C	952,149	801,562	886,603
Total Generation (MWh)		**237,888,671**	**230,640,458**	**206,605,842**	**Total CO2 emission (tCO2)**		**167,303,865**	**161,488,382**	**144,909,616**
Total Generation during 3 years (MWh)		**675,134,971**			**Total CO2 emission during 3 years (tCO2)**		**473,702,153**		
OM(tCO_2/MWh)		**0.7016**			**CEF(tCO_2/MWh)**		**0.7033**	**0.7002**	**0.7014**

Source : KEPCO, Statistics of Electric Power in Korea, 2008, 2007, 2006

<Table 5> Calculation of Build Margin

plant	fuel	Year	Net Generation in 2008 (MWh)	Rate of Generation	CO2 emission in 2008 (tCO_2)	CEF (tCO_2/MWh)
Hadong #7	Bituminous/Diesel oil	2008.12	870,781	0.22	704,663	0.809
Boryeong #8	Bituminous/Diesel oil	2008.12	748,005	0.18	478,084	0.639
Yeongheung #4	Bituminous/Diesel oil	2008.12	3,193,481	0.79	2,729,426	0.855
Boryeong #7	Bituminous/Diesel oil	2008.6	2,878,738	0.71	2,339,450	0.813
Yeongheung #3	Bituminous/Diesel oil	2008.6	4,535,951	1.12	3,799,402	0.838
Gunjang heat&power	group energy	2008.1	159,609	0.04	-	-
Korea yeongcheon solar	solar	2007.12	1,273	0.00	-	-
Hwaseong heat & power	LNG	2007.12	2,728,110	0.67	-	-
Dangjin #8	Bituminous/Diesel oil	2007.12	3,992,732	0.99	3,228,674	0.809
Dongyan energy sinan	solar	2007.11	4,698	0.00	-	-
Hyosung daegi-wind power	wind	2007.11	409	0.00	-	-

Nonhyun heat & power	LNG	2007.10	13,929	0.00	-	-
Gomun	hydro	2007.08	3,060	0.00	-	-
Taean #8	Bituminous/Diesel oil	2007.08	4,186,293	1.03	3,419,144	0.817
DangJin #7	Bituminous/Diesel oil	2007.06	3,336,619	0.82	2,741,779	0.822
Wonjungsu	hydro	2007.05	1,761	0.00	-	-
Baekgok	hydro	2007.05	518	0.00	-	-
Damyangho	hydro	2007.05	1,048	0.00	-	-
Juam	hydro	2007.05	4,061	0.00	-	-
Namjeju #4	Heavy oil/Diesel oil	2007.03	517,866	0.13	284,956	0.550
Eco energy	LFG	2007.03	357,529	0.09	-	-
Seoul Marin(suncheon)	solar	2007.02	1,271	0.00	-	-
Dalbang	hydro	2007.02	697	0.00	-	-
Taean #7	Bituminous/Diesel oil	2007.02	3,482,731	0.86	2,847,796	0.818
Yeongju the second solar	hydro	2007.01	2,272	0.00	-	-
CheongSong pumping #2	hydro	2006.12	276,444	0.07	-	-
Bundang fuel cell	fuel cell	2006.10	1,654	0.00	-	-
HanlaJeunggong solar	solar	2006.10	1,292	0.00	-	-
Enepark	solar	2006.09	460	0.00	-	-
CheongSong pumping #1	hydro	2006.09	206,291	0.05	-	-
Namjeju #3	Heavy oil/Diesel oil	2006.09	559,817	0.14	339,759	-
Yangyang pumping #4	hydro	2006.08	163,281	0.04	-	-
Yangyang pumping #3	hydro	2006.06	169,538	0.04	-	-
Jangseong(small)	hydro	2006.05	1,937	0.00	-	-
Yangyang pumping #2	hydro	2006.04	210,031	0.05	-	-
DangJin #6	Bituminous/Diesel oil	2006.04	4,006,307	0.99	3,258,626	0.813
Sinchang-wind power	wind	2006.03	3,561	0.00	-	-
Yangyang pumping #1	hydro	2006.02	141,700	0.03	-	-

Samchueonpo solar	solar	2005.12	135	0.00	-	-
DangJin #5	Bituminous/Diesel oil	2005.10	3,908,658	0.97	3,223,368	0.825
Taean solar	solar	2005.08	130	0.00	-	-
Yulchon C/C	LNG	2005.07	2,488,267	0.61	952,149	0.383
Incheon C/C	LNG	2005.07	3,420,631	0.84	1,257,300	0.368
Jeju D/P	Heavy oil	2005.07	223,630	0.06	140,960	0.630
Daegok(small)	hydro	2005.07	1,635	0.00	-	-
Ulchin #6	nuclear power	2005.04	8,107,887	2.00	-	-
Hanrye LFG	LFG	2005.04	21,265	0.01	-	-
Busan Bio-gas #1,2	bio-gas	2005.03	2,884	0.00	-	-
Daegwanryung-wind power	wind	2004.12	4,949	0.00	-	-
Yongheng #2	Bituminous/Diesel oil	2004.11	5,112,704	1.26	4,293,676	0.840
Ulchin #5	nuclear power	2004.07	8,763,822	2.16	-	-
Yeongheng #1	Bituminous/Diesel oil	2004.07	5,137,490	1.27	-	-
Busan C/C	LNG	2004.03	10,848,484	2.68	3,992,333	0.368
Hankyung-wind power	wind	2004.03	47,237	0.01		-
Chunsang(small)	hydro	2004.02	413	0.00	-	-
Cheongju LFG	LFG	2004.02	5,675	0.00	-	-
Wunjeong LFG	LFG	2003.12	7,701	0.00	-	-
Daejon Geumgodong	LFG	2003.06	1,525	0.00	-	-
Hoicheon ENC	LFG	2003.05	2,218	0.00	-	-
Muju(small)	hydro	2003.04	220	0.00	-	-
Total			**84,873,315**	**20.96**	**40,031,543**	
2008 Total Net Generation	**404,981,026**		**BM Factor**		**0.4717**	

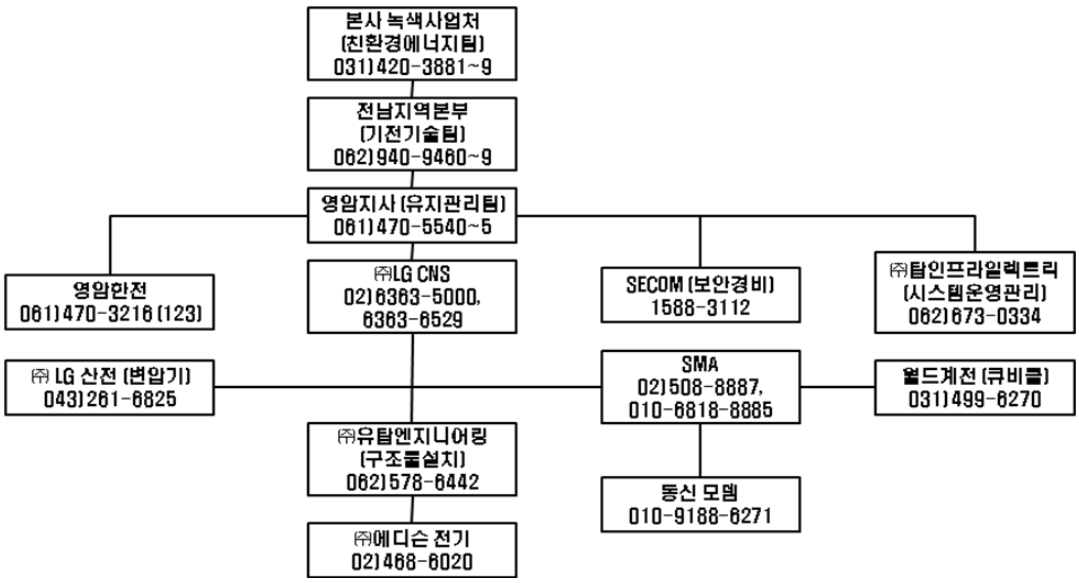
Source: KPE, The installation capacity of power generation in Korea 2009

Annex 4

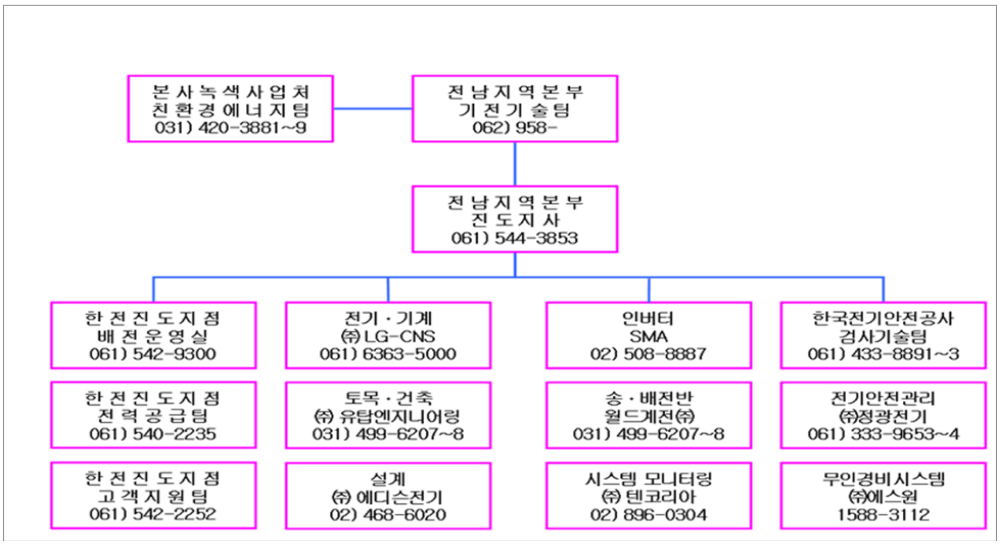
MONITORING INFORMATION

Monitoring reporting system in emergency situation

1. Yeongam 1st, 2nd PV Power Plant

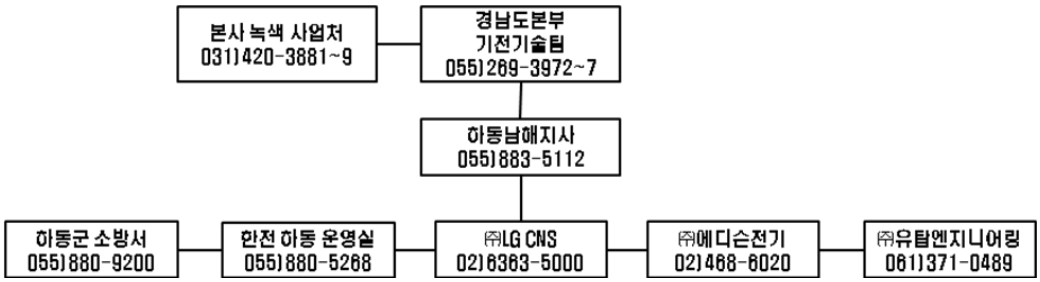


2. Jindo PV Power Plant

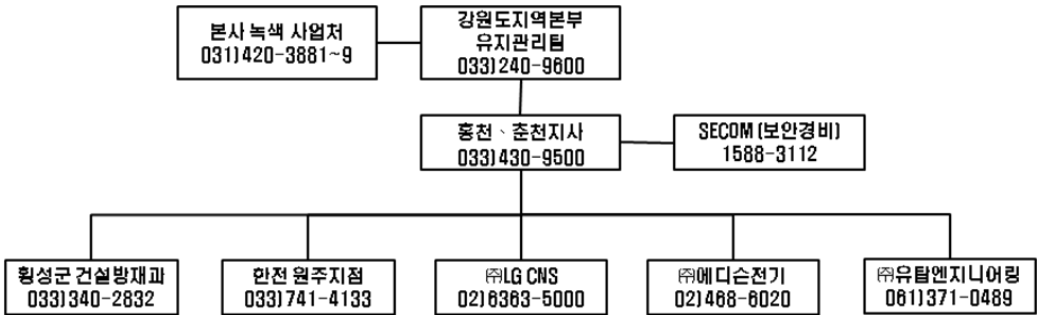


CDM – Executive Board

3. Hadong PV Power Plant



4. Hoengseong PV Power Plant



5. Goesan PV Power Plant