

MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

- A. General description of the project activity
 - A.1. Brief description of the project activity
 - A.2. Project participants
 - A.3. Location of the project activity
 - A.4. Technical description of the project
 - A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity
 - A.6. Registration date of the project activity
 - A.7. Crediting period of the project activity and related information
 - A.8. Name of responsible person(s)/entity(ies)
- B. Implementation of the project activity
 - B.1. Implementation status of the project activity
 - B.2. Revision of the monitoring plan
 - B.3. Request for deviation applied to this monitoring period
 - B.4. Notification or request of approval of changes
- C. Description of the monitoring system
- D. Data and parameters monitored
 - D.1. Data and parameters used to calculate baseline emissions
 - D.2. Data and parameters used to calculate project emissions
 - D.3. Data and parameters used to calculate leakage emissions
 - D.4. Other relevant data and parameters
- E. Emission reductions calculation
 - E.1. Baseline emissions calculation
 - E.2. Project emissions calculation
 - E.3. Leakage calculation
 - E.4. Emission reductions calculation
 - E.5. Comparison of actual emission reductions with estimates in the registered CDM-PDD
 - E.6. Remarks on difference from estimated value

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 03and date 16/12/2011

4.85MW Korea Rural Community Corporation(KRC) PV Power Plants bundling Project
CDM Registration Reference number : 3152
1st monitoring period: 24/09/10 -30/09/11)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;
 - 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.
 - CERs obtain from CDM project development.
 - Profit generation by selling electricity generated on unused land space of KRC to grid.
2. Brief description of the installed technology and equipments;

The project is electricity generation with the photovoltaic system and supplies the generated power to the grid. The PV power generation system consists of modules, inverters and monitoring systems. The project is composed of 5 sites and the PV power generation systems of 5 sites are similar. Every site has their own monitoring system and all the datas are send to the main office in monthly base. During the 1st monitoring period there's no event such as overhaul, downtimes or exchange of equipment except the out of order of data recorder in Heongseong from 14/September/2010 to 30/September/2011(2weeks).
3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

The 5 sites are already in operation and have different construction and commercial operation starting date. The first and latest date of completion of installation is 09/September/2008(Hoengseong) and 26/June/2009(Goesan). The first and latest date of starting date of operation is 29/September/2008(Yeongam1, Jindo, Hadong and Hoengseong) and 10/August/2009(Goesan). The first and latest date of operation is 29/September/2008(Yeongam1, Jindo, Hadong and Hoengseong) and 10/August/2009(Goesan). More detailed implementation status is described in section B.1.
4. Total emission reductions achieved in this monitoring period.

The emission reductions of this project in the 1st monitoring period are 5,029t-CO₂eq. Every site has different emission reductions in base of their power generation quantities.

A.2. Project Participants

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The project participant is only one entity-the Korea Rural Community Corporation.

Table A-1. 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

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.>

A.3. Location of the project activity:

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

Table A-2. The geographic coordinates of each project site

	latitude	longitude
Yeongam 1 st	34°43'29"N	126°28'34"E
Yeongam 2 nd	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

A.4. Technical description of the project

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The PV Power System consists of modules of solar cells and inverters. The solar cell module is the main element in PV Power Plant that converts the solar energy which is generated from the sun light to electric energy. The inverters are the converting system Direct Current from the modules to the Alternating Current. After the inverter, the current jointed to the substation near to the power plant and then connect to the grid.

Table A-3 is the details of PV Power system of the project.

Table A-3. The technical data details of PV power plants²

Classification		Yeongam 1 st	Yeongam 2 nd	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

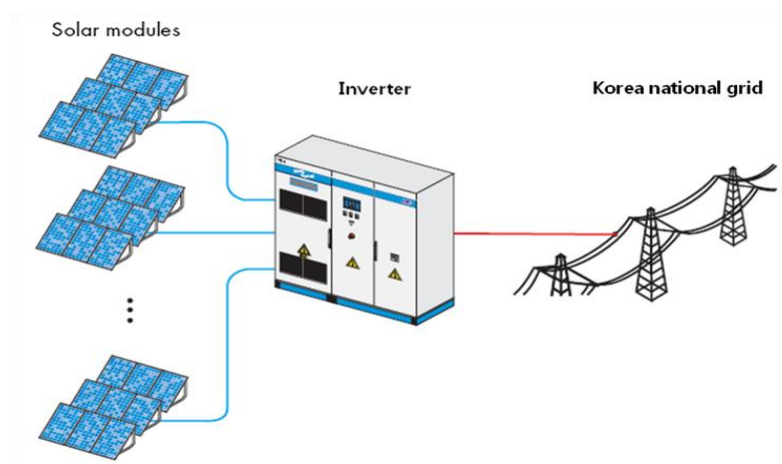


Figure A-2. System diagram of PV power plant

² Data source: The survey report of electric equipment of Korea Rural Community Corporation (KRC) PV power plants

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Title of the baseline and monitoring methodology applied to the project activity:

Approved methodology: AMS-I.D.(Version14)

Project Type: I - Renewable Energy Projects

Project Category: D - Grid connected renewable electricity generation

Reference of the baseline and monitoring methodology applied to the project activity:

- 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)

A.6. Registration date of the project activity:

>>

24/09/10

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Starting date of crediting period : 24/sep/2010

The first crediting period of the project : 24/sep/2010-30/sep/2011

Choice of crediting period : renewable crediting period

Length of crediting period : 10 years

A.8. Name of responsible person(s)/entity(ies):

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Name	e-mail address	Company
Jeong-ha Park	yesawill@naver.com	Ecosense(consulting company)
Min-hee Cho	chomanui@naver.com	ERC(Project participant)

SECTION B. Implementation of the project activity**B.1. Implementation status of the project activity**

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1. The starting date of operation of the project activity.

Key events	Yeongam1	Yeongam2	Jindo	Hadong	Hoengseong	Goesan
Completion of installation	21/Sep/2008	28/May/2009	22/Sep/2008	22/Sep/2008	09/Sep/2008	26/Jun/2009
Starting date of operation	29/Sep/2008	31/Jul/2009	29/Sep/2008	29/Sep/2008	29/Sep/2008	10/Aug/2009
Continued operation	29/Sep/2008-	31/Jul/2009-	29/Sep/2008-	29/Sep/2008-	29/Sep/2008-	10/Aug/2009-

2. The information regarding the actual operation of the project activity:

No overhaul, downtimes or exchange of equipment happened during this monitoring period.

Key events	Yeongam1	Yeongam2	Jindo	Hadong	Hoengseong	Goesan
Overhaul	N/a	N/a	N/a	N/a	N/a	N/a
Downtimes	N/a	N/a	N/a	N/a	N/a	N/a
Exchange of equipment	N/a	N/a	N/a	N/a	N/a	N/a

3. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.

The data recorder of Heongseong was out of order from 14/09/2010 to 30/09/2010, so we calculated the power generation exported to Grid on that period as “0” on the conservative aspects.

B.2. Revision of the monitoring plan

>>
N/A

B.3. Request for deviation applied to this monitoring period

>>
N/A

B.4. Notification or request of approval of changes

>>
N/A

SECTION C. Description of the monitoring system

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The electricity meter(M1) measures the electricity supply to the grid from the project sites. The imported electricity for site use is measured by the wattmeter(M2). Electricity supplied to the grid is measured every hour and recorded every month by the metering equipment which is connected to the grid. The generated electricity is cross checked by receipt of sales from KPX(Korea Power Exchange) or KEPCO(Korea Electric Power COporation). Yeongam1st, Yeongam2nd, Jindo and Goesan are adjusted and billed from KPX and Hadong and Hoengseong are from KEPCO.

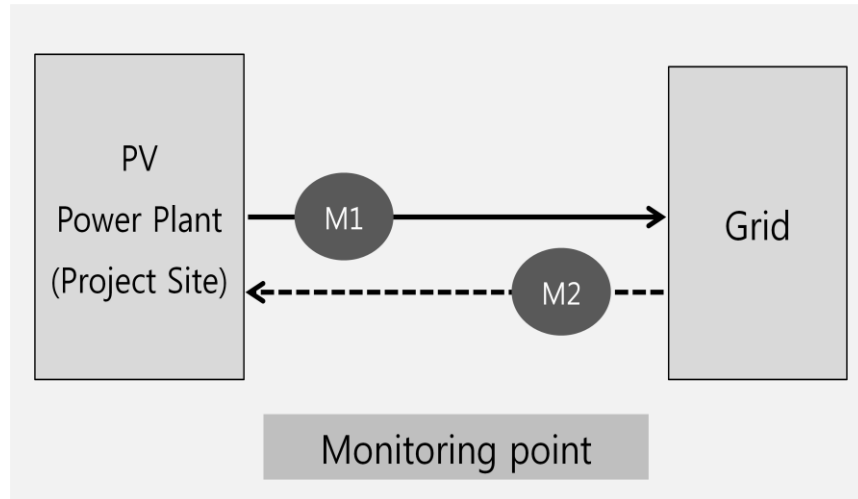


Figure C-1. The monitoring point in project activity
(M1 and M2 are the watt-meters and 6 PV project sites have same monitoring system.)

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

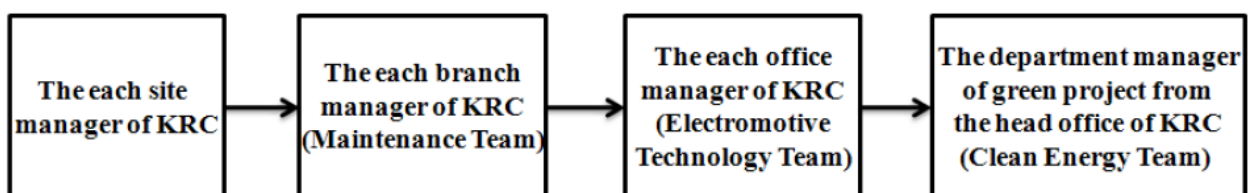


Figure C-2. The reporting system of Korea Rural Community Corporation (KRC) in the project

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.

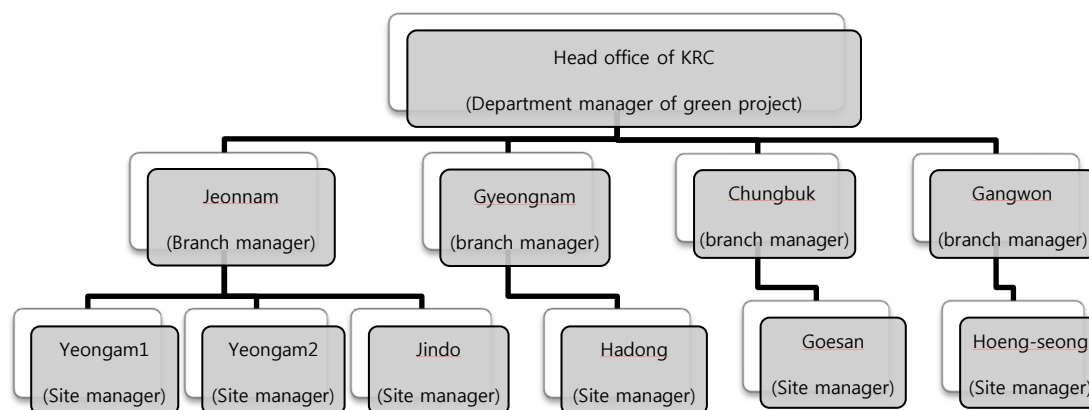


Figure C-3. The organization for reporting and management of the project activity

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	EF_y
Data unit:	tCO₂e/MWh
Description:	Emission factor
Source of data used:	Registered PDD
Value(s) :	0.6441
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used for baseline emission calculation
Additional comment:	N/A

D.2. Data and parameters monitored

Data / Parameter:	EG_y
Data unit:	MWh
Description:	The electricity supplied to the grid by the project in the year “y”.
Measured /Calculated /Default:	Measured continuously
Source of data:	M1(in 6 PV power plants) measured continuously and reported monthly and cross checked by fund adjustment bill from KPX or KEPCO.
Value(s) of monitored parameter:	The actual electricity supplied to the grid by the project is 7,807MWh from 24/09/2010 to 30/09/2011.
Indicate what the data are	The data 7,807MWh is used for baseline emission calculation.

used for (Baseline/ Project/ Leakage emission calculations)							
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The amount of generated electricity is measured automatically by certified meters. M1(in 6 PV power plants)measures the electricity supplied to the grid by the project.						
	Parameter	Yeongam1 st	Yeongam2 nd	Jindo	Hadong	Hoeng- seong	Goesan
	Type	3P4W	3P4W	3P4W	3P4W	3P4W	3P4W
	Accuracy class	0.5	0.5	0.5	0.5	0.5	0.5
	Serial number	46026121	51002197	30062976	46026172	46026173	95422153
	Calibration frequency	Every 3year	Every 3year	Every 3year	Every 3year	Every 3year	Every 3year
	Date of installation	21/Sep/2008	28/May/2009	22/Sep/2008	22/Sep/2008	09/Sep/2008	26/Jun/2009
	Validity	20/Sep/2011	27/May/2012	21/Sep/2011	21/Sep/2011	08/Sep/2011	25/Jun/2012
	The monthly data are archived in paper(fund adjustment bill) with an official seal from KPX or KEPCO.						
Measuring/ Reading/ Recording frequency:	The measured data are transferred to KPX or KEPCO and are measured continuously, reported monthly.						
Calculation method (if applicable):	N/A.						
QA/QC procedures applied:	<p>The meters are installed on the “The operation rule in power generation market” and “The law on Measurement”. “The law on Measurement” states that the electricity wattmeter has 7 years of official effective period and “The operation rule in power generation market” states that the wattmeter needs 3 1/2 year ± 6month period calibration when the installed capacity is more than 1MW. We adopted in the conservative aspects in calibration as CDM guidance recommends that all the wattmeters in project activities in every 3 year frequency.</p> <p>The electricity supplied to the grid by the project is measured automatically by certified meter(M1) and double checked with fund adjustment bill from KPX.</p> <p>Electricity measuring meter(M2) for importing from KEPCO is calibrated every 7 years in accordance with “the Law on Measurement” and “The operation rule in power generation market”.</p> <p>Data record and relevant document should be kept for 2 years after the ending of the crediting period.Monitoring point is shown as Figure C-1 and all the project sites have same monitoring system.</p>						

Data / Parameter:	EP_y
Data unit:	MWh
Description:	The electricity imported from Grid to the project in the year “y”.
Measured /Calculated /Default:	Measured continuously(KPX) and monthly(KEPCO).
Source of data:	M2(in 6 PV power plants) measured continuously and reported monthly and cross checked by fund adjustment bill from KPX or KEPCO.
Value(s) of monitored parameter:	The amount of electricity imported from the grid to the project is 144MWh from 24/09/2010 to 30/09/2011.
Indicate	The data 144MWh is used for baseline emission calculation.

what the data are used for (Baseline/Project/Leakage emission calculations)																																				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The amount of imported electricity is measured automatically by certified watt-hour meters. The project participant should check the electricity imported from the Grid at the web site(http://cyber.kepco.co.kr) and double check the bill from KEPCO or KPX monthly.</p> <table><tr><td>Parameter</td><td>Yeongam1st</td><td>Yeongam2nd</td><td>Jindo</td><td>Hadong</td><td>Hoeng-seong</td><td>Goesan</td></tr><tr><td>Type</td><td>3P4W</td><td>3P4W</td><td>3P4W</td><td>3P4W</td><td>3P4W</td><td>3P4W</td></tr><tr><td>Calibration frequency</td><td>Every 7year</td><td>Every 7year</td><td>Every 7year</td><td>Every 7year</td><td>Every 7year</td><td>Every 7year</td></tr><tr><td>Date of installation</td><td>21/Sep/2008</td><td>28/May/2009</td><td>22/Sep/2008</td><td>22/Sep/2008</td><td>09/Sep/2008</td><td>26/Jun/2009</td></tr><tr><td>Validity</td><td>20/Sep/2015</td><td>27/May/2016</td><td>21/Sep/2015</td><td>21/Sep/2015</td><td>08/Sep/2015</td><td>25/Jun/2016</td></tr></table> <p>The monthly data are archived in paper(fund adjustment bill) with an official seal from KPX or KEPCO.</p>	Parameter	Yeongam1 st	Yeongam2 nd	Jindo	Hadong	Hoeng-seong	Goesan	Type	3P4W	3P4W	3P4W	3P4W	3P4W	3P4W	Calibration frequency	Every 7year	Every 7year	Every 7year	Every 7year	Every 7year	Every 7year	Date of installation	21/Sep/2008	28/May/2009	22/Sep/2008	22/Sep/2008	09/Sep/2008	26/Jun/2009	Validity	20/Sep/2015	27/May/2016	21/Sep/2015	21/Sep/2015	08/Sep/2015	25/Jun/2016
Parameter	Yeongam1 st	Yeongam2 nd	Jindo	Hadong	Hoeng-seong	Goesan																														
Type	3P4W	3P4W	3P4W	3P4W	3P4W	3P4W																														
Calibration frequency	Every 7year	Every 7year	Every 7year	Every 7year	Every 7year	Every 7year																														
Date of installation	21/Sep/2008	28/May/2009	22/Sep/2008	22/Sep/2008	09/Sep/2008	26/Jun/2009																														
Validity	20/Sep/2015	27/May/2016	21/Sep/2015	21/Sep/2015	08/Sep/2015	25/Jun/2016																														
Measuring/Reading/Recording frequency:	The monthly data is archived in paper bill from KPX or KEPCO. The measured data are transferred to KPX or KEPCO and are checked and archived daily, weekly and monthly in electronic way.																																			
Calculation method (if applicable):	N/A.																																			
QA/QC procedures applied:	<p>The watt-meters are maintained and tested regularly to ensure accuracy. The meters(M2) are calibrated every 7 years, of which complies with “The operation rule in power generation market” and “The law on Measurement”. The electricity imported from KPX is measured and double checked with the electricity bills from KPX.</p> <p>Data record and relevant documents should be kept for 2years after the ending of the crediting period. Monitoring point is shown as Figure C-1 and all the project sites have same monitoring system.</p>																																			

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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baseline emissions are equal to:

$$BE_y = (EG_y - EP_y) \times EF$$

Parameter	Unit	Description
BE_y	tCO ₂ e	Baseline emissions
EG_y	MWh	The electricity supplied to the grid by the project activity
EP_y	MWh	The electricity imported from grid for the project activity
EF	tCO ₂ e/MWh	Emission factor

EF is 0.6441 tCO₂e/MWh and this is fixed during the first crediting period according to the registered PDD. The main monitoring data is electricity supplied to the grid because the baseline emission factor is fixed.

6 PV power plants generated 7,807MWh during the first monitoring period and 6 PV power plants imported 144MWh from the grid during the first monitoring period. So the net electricity generated from the project is 7,663MWh.

So, baseline emission is 4,936 tCO₂e.

$$BE_y = (7,807 - 144) \text{ MWh} \times 0.6441 \text{ tCO}_2\text{e/MWh} = 4,936 \text{ tCO}_2\text{e}$$

Total net electricity by the project activity is listed in Table E-1.

Table E-1. Total net electricity generation by the project activity

period(1st to last date of month) Sep-10	electricity exported(kWh)						electricity imported(kWh)						Net electricity generation(MWh)					
	A						B						C=(A-B)/1000					
	Yeonga m 1 st	Yeonga m 2 ⁿ d	Jindo	Hadong	Hoengs e o n g	Goesan	Yeonga m 1 st	Yeonga m 2 ⁿ d	Jindo	Hadong	Hoengs e o n g	Goesan	Yeonga m 1 st	Yeonga m 2 ⁿ d	Jindo	Hadong	Hoengs e o n g	Goesan
	41,177	41,828	27,579	5,695	0	17,538	1,409	1,409	1,738	172	255	156	40	40	26	6	0	17
Oct-10	179,374	181,882	122,627	122,627	16,822	55,516	3,908	3,908	5,396	672	720	721	175	178	117	122	16	55
Nov-10	146,593	148,616	102,805	102,805	14,503	57,481	2,762	2,762	5,306	560	696	1,091	144	146	97	102	14	56
Dec-10	104,191	119,873	74,225	74,225	10,637	43,126	1,601	1,601	2,102	482	734	754	103	118	72	74	10	42
sum of 2010	471,335	492,199	327,235	305,351	41,962	173,661	9,679	9,679	14,542	1,886	2,405	2,722	462	483	313	303	40	171
Jan-11	140,741	155,141	84,948	84,948	12,386	63,550	1,338	1,338	1,585	554	766	737	139	154	83	84	12	63
Feb-11	153,720	159,332	103,040	103,040	12,773	49,631	1,287	1,287	1,957	532	784	802	152	158	101	103	12	49
Mar-11	232,493	230,607	153,010	153,010	20,798	78,982	1,331	1,331	1,448	484	710	514	231	229	152	153	20	78
Apr-11	217,981	219,544	146,675	146,675	18,173	62,420	1,796	1,796	1,830	558	717	821	216	218	145	146	17	62
May-11	199,387	198,007	128,771	128,771	18,502	63,944	2,018	2,018	2,365	600	765	831	197	196	126	128	18	63
Jun-11	172,479	170,724	107,721	107,721	18,547	59,908	2,711	2,711	3,234	758	919	774	170	168	104	107	18	59
Jul-11	186,691	187,885	124,241	124,241	13,008	45,801	4,363	4,363	3,938	820	1,210	696	182	184	120	123	12	45
Aug-11	143,957	135,762	87,842	87,842	15,902	50,088	5,897	5,897	6,093	766	625	791	138	130	82	87	15	49
Sep-11	192,759	197,010	132,310	16,484	16,877	58,721	5,748	5,748	7,684	828	1,289	717	187	191	125	16	16	58
sum of 2011	1,640,208	1,654,012	1,068,558	952,732	146,966	533,045	26,488	26,488	30,134	5,900	7,785	6,683	1,614	1,628	1,038	947	139	526
sum of the 1st monitoring period	2,111,543	2,146,211	1,395,793	1,258,083	188,928	706,706	36,167	36,167	44,676	7,786	10,190	9,405	2,075	2,110	1,351	1,250	179	697
	7,807,265						144,392						7,663					
	Total Net Electricity(MWh)						Baseline emission factor(tCO₂e/MWh)						Baseline emission(tCO₂e)					
	C=(A-B)/1000						D						E=C*D					

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

	7,663	0.6441	4,936
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Data source : All data come from the measurement(M1, M2) were cross checked with the official bill from the KPX or KEPCO.

E.2. Project emissions calculation

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PE_y is project emissions during a given year y. the project activity generates electricity by utilizing solar power and it means no greenhouse gas was emitted from the project activity. Therefore, the project emission is zero.

$$PE_y = 0$$

E.3. Leakage calculation

>>

L_y is leakage during a given year y. greenhouse gas emissions by leakage is not estimated at photovoltaic system. So , for this project activity, there is no leakage effect.

$$L_y = 0$$

E.4. Emission reductions calculation / table

>>

The emission reductions are equal to:

$$ER_y = BE_y - PE_y - L_y$$

Project emission and leakage are equal to zero. So,

$$ER_y = 4,936tCO_2 - 0 - 0 = 4,936tCO_2e$$

Therefore the emission reductions by the project activity is 4,936 tCO₂e

Table E-2. Total emission reductions by the project activity

Monitoring period	Baseline emission(tCO ₂ e)	Project emission(tCO ₂ e)	Leakage(tCO ₂ e)	Total emission reductions(tCO ₂ e)
Sep-2010	84	0	0	84
Oct-2010	428	0	0	428
Nov-2010	361	0	0	361
Dec-2010	268	0	0	268
Jan-2011	344	0	0	344
Feb-2011	370	0	0	370
Mar-2011	557	0	0	557
Apr-2011	517	0	0	517
May-2011	469	0	0	469
Jun-2011	402	0	0	402
Jul-2011	428	0	0	428
Aug-2011	324	0	0	324
Sep-2011	380	0	0	380
Total	4,936	0	0	4,936

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	3,753 tCO₂e	4,936 tCO₂e

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

The actual emission reduction is higher than the estimated reductions in registered PDD.

E.6. Remarks on difference from estimated value in the PDD

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There are several reasons for the higher emission reductions. At first, the 1st monitoring period in registered PDD is 1 year but actual monitoring period on the 1st is longer than 1 year(1 year and 7 days). Second, the weather condition is better than expected. According to the Annual Climatological Report 2010, total sunshine time of January to September (the ending monitoring month) on project sites are 6,310hrs.³ But, total sunshine time of same period in 2011 is 7,569hrs.

³ When the project area weather information is not available, the nearest weather condition is used. Yeongam1,2, hadong, heongseong, goesan is the condition of nearlist community, jangheung(yeaongam1,2), soonchun, wonju, cheongju. http://www.kma.go.kr/weather/observation/data_monthly.jsp