Monitoring report form for CDM project activity
(Version 06.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT		
Title of the project activity	Taegisan Wind Power Project	
UNFCCC reference number of the project activity	2302	
Version number of the PDD applicable to this monitoring report	05	
Version number of this monitoring report	02	
Completion date of this monitoring report	05/03/2018	
Monitoring period number	5th monitoring	
Duration of this monitoring period	01/01/2017 ~ 31/12/2017	
Monitoring report number for this monitoring report	N/A	
Project participants	POSCO E&C Co., Ltd. Eurus Energy Holdings Corporation	
Host Party	**Republic of Korea**	
Sectoral scopes	Scope 1 : Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	ACM0002 ver. 7	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	50,056
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	59,669	

SECTION A. Description of project activity

A.1. General description of project activity

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Purpose of the project activity and the measures taken for GHG emission reductions

Taegisan Wind Power Project activity involves construction and operation of 20 numbers of 2MW capacity wind mills at south western area of Gangwon-Do, Republic of Korea.

The type of technology being employed in this project is wind power generation technology thus the proposed project is a renewable energy project that utilizes wind power energy, a renewable energy releasing no greenhouse gases. The generated electricity from the project has been displacing the electricity from existing grid from fossil fuel based power plants. The actual emission reductions of the project activities reached 50,056 tCO2e (tonnes of carbon dioxide equivalent) during the monitoring period.

Wind power energy used as the electric generation source of the proposed project is one of the clean renewable energy resources without being depleted.

Also currently in Korea, they make efforts to reduce fossil fuel usage in various ways and have great concerns about the renewable energy including wind power.

Under this situation Taegisan Wind Power Project is expected to contribute to decrease the usage of electricity by fossil fuel based power plants. In 2006, those fossil fuel based power plants take 59.47% of electricity generation in Korea according to KEPCO. (KEPCO: Korea Electric Power Co.).

Brief description of the installed technology and equipment

Total installed capacity of the proposed project is 40MW (2MW x 20). And the project is composed of 20 generators (wind power turbines) each with 2MW.

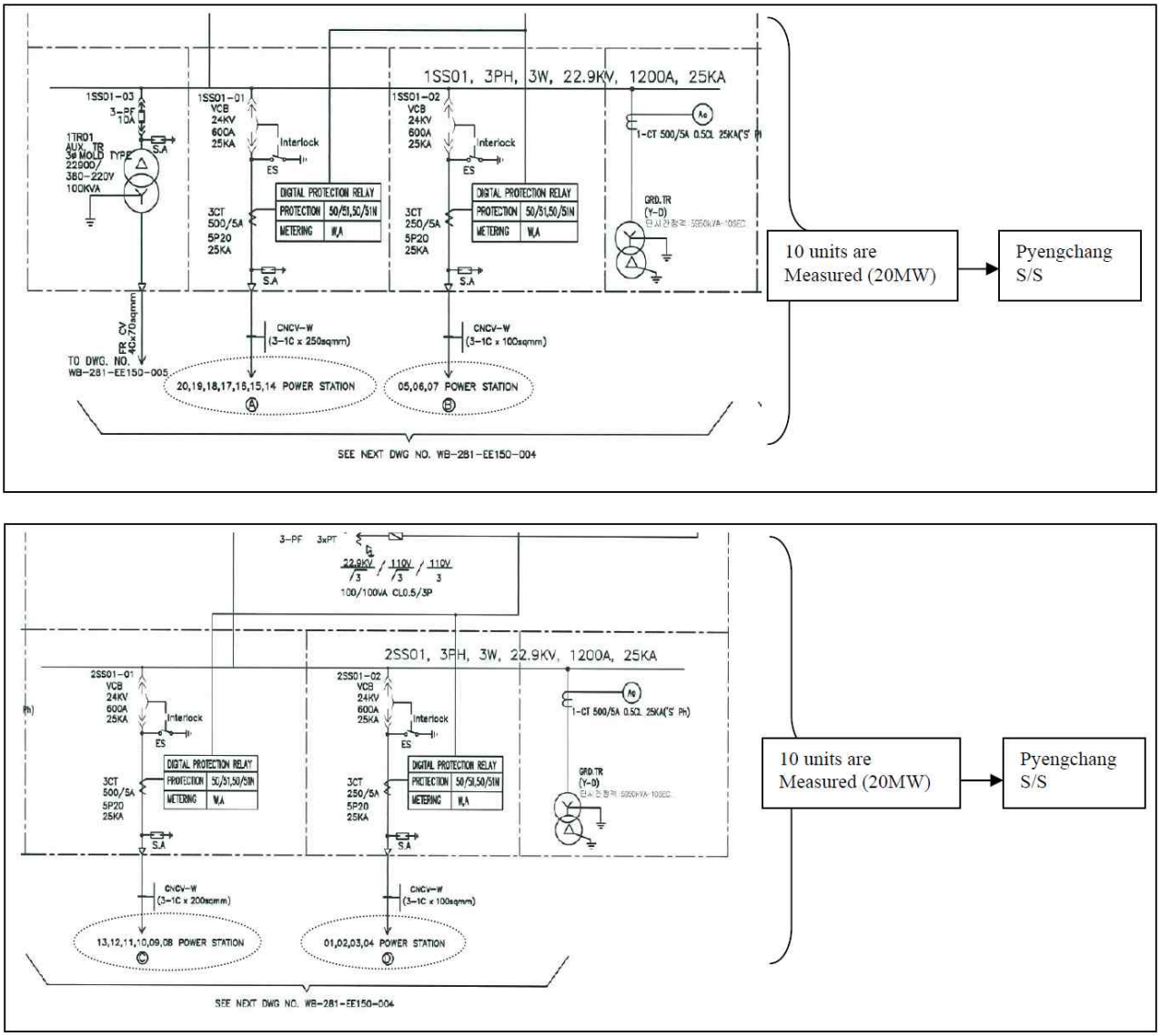
20 Units are classified as two ways which is the administrative district and the measuring electricity supplied to the grid.

For the administrative district, the project site is located between Hoengseong-gun and Pyeongchang-gun in Gangwon Province area. Therefore, 9 units are located in Hoengseon-gun and 11 units are located in Pyeongchang-gun.

- Hoengseong-gun, Gangwon-do: 2MW × 9 units = 18 MW (5,6,8,9,11~15-the number refers to below figure)
- Pyeongchang-gun, Gangwon-do:2MW × 11 units = 22 MW (1~4,7,10,16~20-the number refers to below figure)

On the other hands, For the measuring electricity supplied to the grid, units are divided into two groups (A, B and C, D). The electricity generated from each group is measured by meters and supplied to the grid through two lines each with 20MW. Unit's number included in A, B, C and D are described as follows:

A: 14~20 / B: 5~7 / C: 8~13 / D: 1~4



Taegisan is the highest mountain in Hoengseong-gun and rises 1,261 meters above the sea level, thus the sites of the project have favorable conditions of location as a wind farm. Annual electric generation was 84,398MWh. The electricity generated from the wind turbine is transmitted to the grid, KEPCO Pyeongchang transformer substation, through 22.9kV of transmission lines.
And the whole transmission lines reach 33km (Underground 8km and Overhead 25km).Among the whole lines; the 8 km block which goes through rural communities will be constructed underground and make the maximum use of existing roads for environmentally friendly development.

Relevant dates for the project activity

Event	Time
Starting date of the construction	25/07/2007
Completion of the construction	30/01/2009
Commissioning date	06/10/2008 ~ 26/12/2008

Total GHG emission reductions achieved in this monitoring period

The 5th monitoring period is from 01/01/2017 to 31/12/2017(1year) and the total amount of GHG emission reductions achieved in the 5th monitoring period is 50,056 tCO2e.

A.2. Location of project activity

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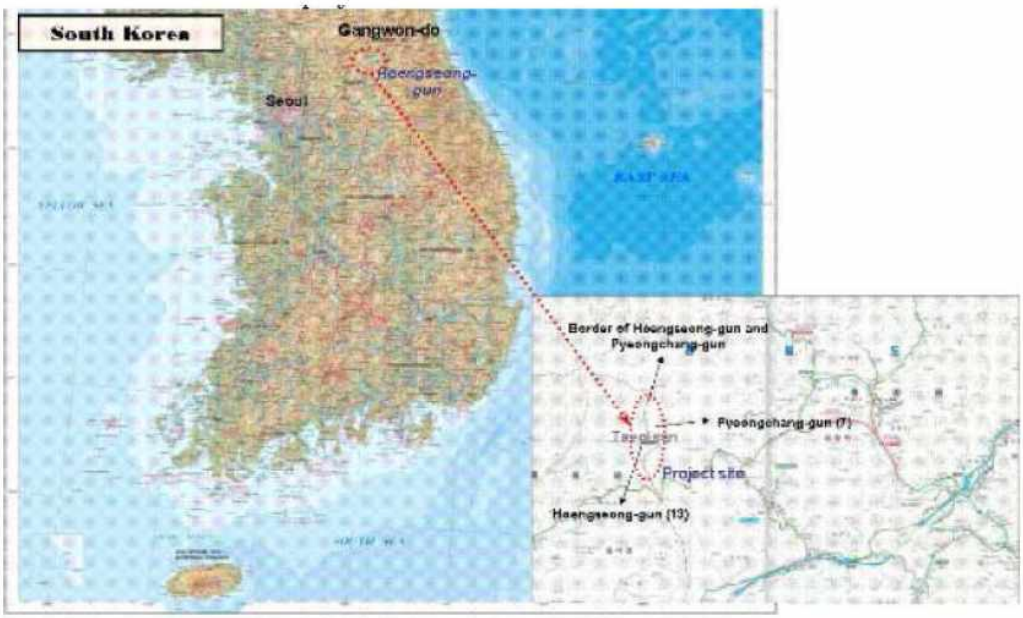
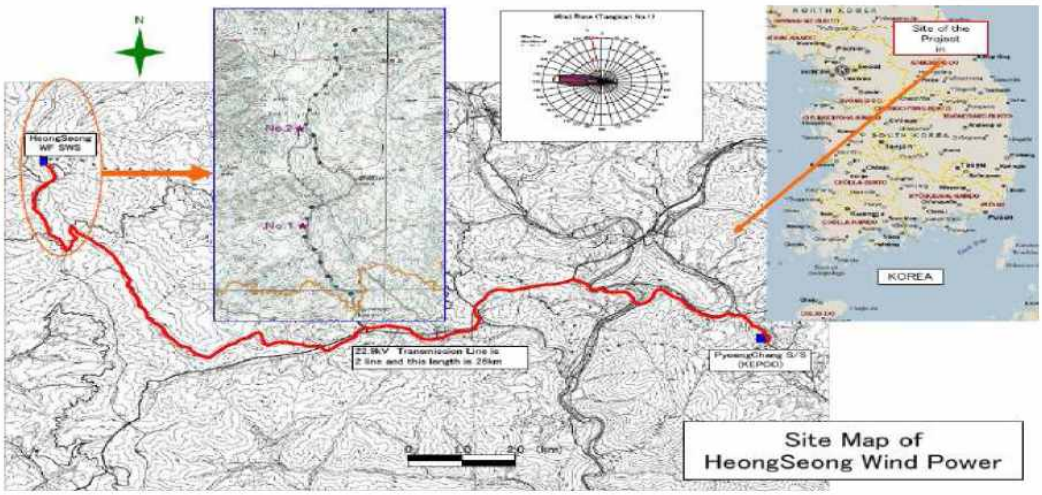
The project site is located over the area of Taegi-ri, Dunnae-myun, Hoengseong-gun and Mui-ri, Bongpyeong-myun, Pyeongchang-gun in Gangwon Province in Republic of Korea. It is situated in the mountainous area of the Taebaek Mountains, neighboring easterly to Pyeongchang-gun and westerly Hoengseong-gun.

The site location's approximate coordinates are east longitude of 128°20' and north latitude of 37°32' as its substation goes.



<Figure A.1> The location of Taegisan Wind farm



<Figure A.2> The location of Taegisan Wind farm

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Korea (Host)	POSCO Engineering and Construction Co., Ltd.	No
Japan	Eurus Energy Holdings Corporation	No

A.4. Reference to applied methodologies and standardized baselines

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- ACM0002 ver.7 Consolidated baseline methodology for grid-connected electricity generation from renewable sources.
- Tool to calculate the emission factor for an electricity system (Ver. 01)

A.5. Crediting period type and duration

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- Type of the crediting period : Fixed
- Start date of the crediting period : 15/05/2009
- The crediting period of the project : 15/05/2009 ~ 14/05/2019
- The 5th monitoring period of the project : 01/01/2017 ~ 31/12/2017

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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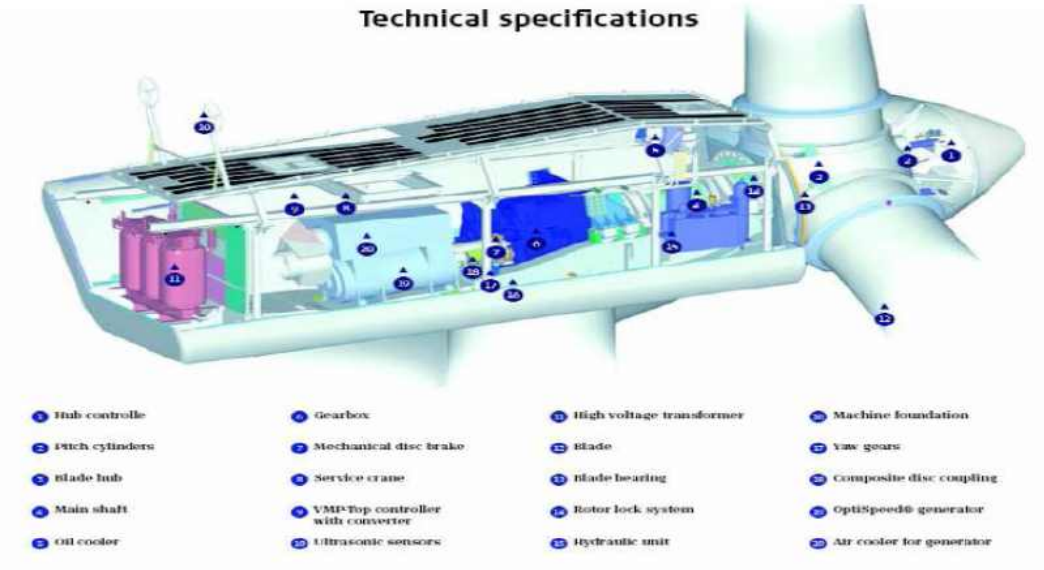
Description of the installed technology, technical process and equipment

Wind power generation uses the current of wind to rotate the blades and gets electric power from it. So the proper amount of wind and choice of the generator which fits to the purpose is very important to build a wind power plant.
Wind, the energy source of wind power generation mostly depends on the terrain. So the project developers considered weather conditions and chose Mt. Taegi area as the plant site, which is the highest mountain of Hoengseong area in Gangwon Province. And total installed capacity of the project is 40MW (2MW x 20), which is composed of 20 generators (wind power turbines) with 2MW. The project uses the turbine technology with OptiSpeed ™1 and OptiTip®2 and these generator facilities were imported from Denmark.
The turbine model is VESTAS V80-2.0MW, which has already been installed around the world for large scale wind power generation projects and it was chosen through bids.
The main facilities of the wind farm consist of rotor, nacelle, tower and generator.
And the VESTAS V80-2.0MW turbine being used the project has following features.
The VESTAS V80-2.0MW is a pitch regulated upwind turbine with active yaw and a rotor with three blades. The rotor is converting kinetic energy of wind to rotatory power and it effects on the efficiency of generator. Especially the design of each rotor blade is very important part of the facilities. This turbine has a rotor diameter of 80m and this feature enables the rotor to operate with variable speed (RPM). With pitch regulating system, the angles of the blades are constantly regulated so they are always pitched at the optimal angle for current wind conditions to optimize power production and noise levels. At higher wind speeds, the pitch regulating system keeps the power at normal, regardless of the air temperature and density.
At lower wind speeds it optimizes the power output by selecting the optimal RPM and pitch angle.
Also all functions of the wind turbine are monitored and controlled by microprocessor based control units.
A detailed technical specification of VESTAS V80 is shown as followed.



<Figure A.3> VESTAS V80 technical specification

<Table A.1.> Power Curves VESTAS V80-2.0 MW

Rotor	
Diameter	80m
Swept area	5027m2
Rotational speed static, rotor	16.7 RPM
Rotational speed operation interval rotor	9.0 - 19.0 RPM
Rotational direction	Clockwise(front view)
Orientation	Upwind
Tilt	6°
Blade coning	2°
Number of blades	3
Aerodynamic brakes	Full feathering
Tip angle	Pitch regulated
Turbulence	10%

Specification Vestas V80-2MW wind turbine		
Operational data	Cut-in wind speed	4m/s
	Normal wind speed	15m/s
	Cut-out wind Speed	25m/s
Generator	Nominal output	2000kW
	Operation data	50Hz / 60 Hz 690V
Weight	Nacelle	67t
	Rotor	37t

The generated electricity is 84,398 MWh/year and it was transmitted to KEPCO Pyeongchang transformer substation and replaces the electricity generated by fossil fuel in the grid, through

22.9kV of transmission lines which is described in ANNEX2. (Impedance map)
In Korea, KEPCO represents the grid system. Therefore, the boundary of the project could be identified as KEPCO and the proposed project site.

Information on the implementation and actual operation

Events/Month	1	2	3	4	5	6	7	8	9	10	11	12
Troubleshooting	9	4	2	7	6	5	12	7	6	7	3	18
Overhaul		1	14	4	12	12	12	28	11	40	16	3

Any events or situations that may impact the applicability of the methodology have occurred during the this monitoring period.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

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N/A

B.2.2. Corrections

>>
N/A

B.2.3. Changes to the start date of the crediting period

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N/A

B.2.4. Inclusion of monitoring plan

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N/A

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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Monitoring plan of revision was approved on 30 Mar 2011.
Relevant information refer to the UNFCCC website
:http://cdm.unfccc.int/filestorage/4/3/K/43K0SUBCF9LOXRDIH5GTZJ6APW12MV/1st%20Revision%20of%20Monitoring%20Plan_Taegisan%20WP.pdf?t=bDV8cDJtbHBrfDDj7wGDFW9RCT7YSfjC6G7O

B.2.6. Changes to project design

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N/A

SECTION C. Description of monitoring system

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Monitoring plan is setting up the series of monitoring works on GHG emission reduction of the proposed project.

Monitoring plan includes followings.

- Establishing and keeping the appropriate and transparent monitoring system for the generated electricity from the project

- Measuring instrument management, maintenance and quality control.
- Role and demands of the person in charge of monitoring
- Data management and storage system
- Preparations and coping with the third parties audit

1. Data collection procedure

- **Electricity supplied to the grid**

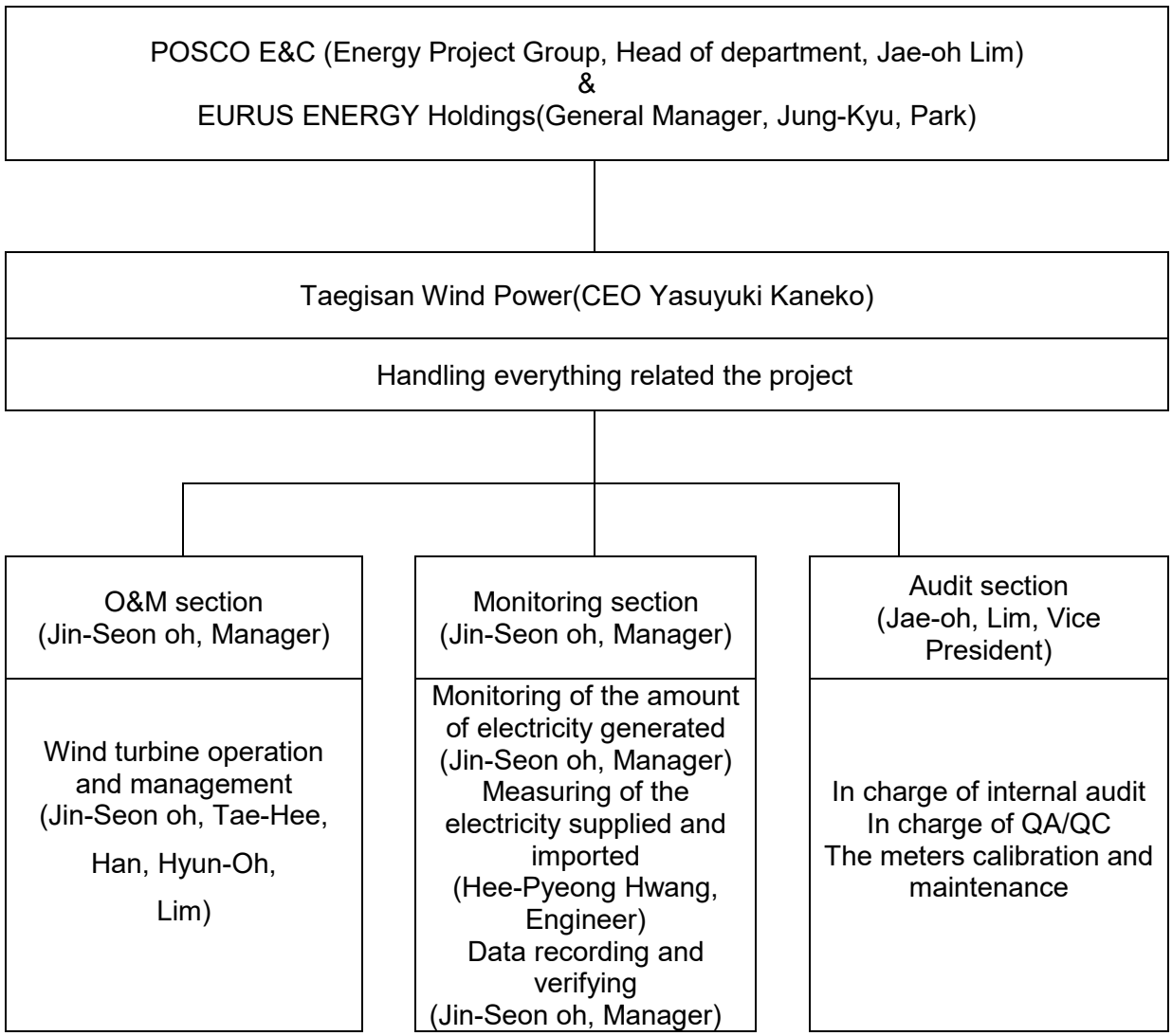
First, the electricity is generated by 20 sets of wind power generators using current of 4m/s~25m/s wind. In the control room, the status of output, direction of the wind, and wind speed is monitored in real time.
Second, the electricity is transferred to Taegisan substation where the electricity generated is primarily gathered.
Third, it goes through both of comparison meters and main meters. At this time, the amount of electricity generated from the generators is measured. The measured data is automatically sent to KPX's data base. A person in charge records the data every day through KPX's homepage and examines the receipt of the records against the data in six times a month.
Forth, the electricity is transferred to Pyeongchang transformer substation through transmission line Finally, it is sold to KPX.

- Electricity imported from the grid

Taegisan Wind Power Plant uses electricity from the grid for its startup and operation. The amount of electricity consumed is measured by electric meter. A person from KEPCO and Taegisan Wind Power records the data every month by reading the meter. And KEPCO sends the receipt to Taegisan Wind Power every month.
A person in Taegisan Wind Power compares the data with its receipt for accuracy.

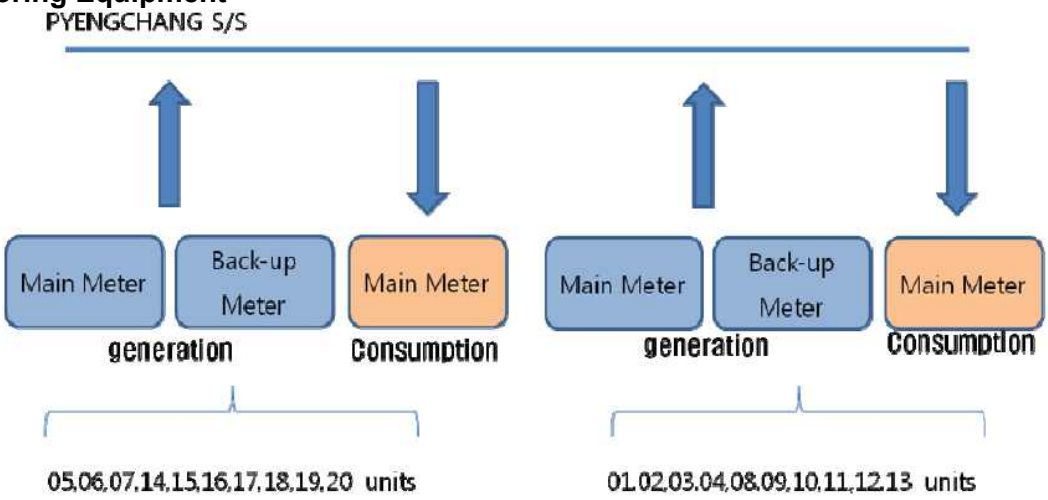
2. Monitoring Organization

The generated electricity supplied to the KEPCO grid is the main data to be monitored. And CDM project manager is in charge of all related matters including monitoring of reduction, collecting and keeping of the data, QA/QC and audit.
Project owner(s) of the Taegisan wind power plant are POSCO E&C and Eurus Energy Holdings Corporation. The former, POSCO E&C take charge of engineering, purchasing the equipment including generators and other construction work etc.
And the latter, Eurus Energy Holdings Corporation undertake management of the SPC (Taegisan wind power company) and project financing. And the SPC (Taegisan wind Power Company) is the manager of project.
So Taegisan wind Power Company take charge of overall operation, monitoring and audit of the plant.
There are two sections under the Taegisan wind power company: monitoring section and auditor section.
Monitoring section manager undertake monitoring, gathering and storage required according to the monitoring plan. And the gathered information is recorded and sent to the CDM project manager and auditor section monthly.
Also auditor section manager has audit the monitoring section's work and proceeds QA/QC process according to the monitoring plan.
CDM project manager take the responsibility for entire compliance of the monitoring plan including confirmation of monitoring plan, emission reduction and report and also are in charge of making efforts to protect and manage information by appropriately distributing information and preparing measures to trespass and destroy information.
In addition, the CDM project manager does not use and process information in an inappropriate manner.
Following figure describes the operational structure to perform the monitoring plan.



CDM project manager should report any important changes of the outline and fulfillment of entire monitoring plan to the project owner.

3. Monitoring Equipment



<Figure C.2> Monitoring Point

Electricity meters for measuring the amount of electricity was set up transparently in accordance with the Korean law “Law regarding measurement” and “Act on operation of electricity market”, and they are sealed after confirmation on the correct set up.

The meters are investigated according to “Act on operation of electricity market” by certificated examination standard.
Calibration for meters that measure electricity supplied and imported are performed according to “Act on operation of electricity market” after the installation. The first calibration was conducted the 10 September 2008 when the meters were installed. Its result was confirmed by KPX (Korea Power Exchange) and KEPCO (Korea Electric Power Co.) and proven by the related document.
The frequency of meter calibration is every 3.5year (±6month) in accordance with standard of “Act on operation of electricity market”.
The proposed project is maintained in accordance with the process defined on the “Law regarding measurement” and “Act on operation of electricity market”.
The electricity delivered to the grid and imported from the grid is measured by the meters installed on the project site. And the relevant monitoring point is described in ANNEX1 and Figure C.2.

◆ Act on operation of electricity market (December, 2011)
The measuring equipment’ inspection period is as below table.

Capacity	More than 1MW	Less than 1MW
Test Period	3 years 6 months ±6months	Exemption

4. Data Collection and Management

The amount of electricity transmitted to the grid is measured automatically by the established meters as described above. The measured variables are simultaneously transferred to central control system of KPX.
The measured amount of electricity is collected hourly, daily and monthly and are archived in electronic way.
The electricity imported from the grid for startup of the generators is measured automatically by the meters.
The measured data is recorded monthly and checked out against receipts for accuracy and reliance.

Additionally, according to “Act on operation of electricity market”, KPX shall keep and maintenance the transmitted data from the electricity meters of the proposed project in its data base.
The measured amount of electricity is compared with receipt to ensure quality of the data.
If the two variables compared are different, KPX checks its data base to compare the receipt with its data base. And the electricity meters and other equipment shall be checked if they are working properly by internal investigation and procedures regulated in the related laws. Then the results are reported to the CDM project manager for appropriate follow-up measures.
Even after the internal investigation and procedures in related laws, if the reason why those two variables are different is not found, then data stored in SCADA is used in the first place according to “Act on operation of electricity market” If SPC (Taegisan wind Power Company) cannot send the data to KPX through the line, SPC would send it by Fax or E-mail.
If the data related to generated electricity cannot be sent to KPX because of failure in the meters and SCADA, the average on the data measured in recent 10 days is applied to calculate generated electricity but is applied differently at weekend and business day.
Collected data record for monitoring will be archived electronically at least for 2 years after the crediting period (10years) to which the records pertain.

5. Training

The project developers and manager have training and maintenance over the equipment of wind power plant. And people related the CDM project is trained with monitoring manual.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	OM Emission Factor of Grid, $EF_{grid,OM,y}$
Unit	tCO_2e /MWh
Description	Operating Margin emission factor
Source of data	Calculated
Value(s) applied	0.7281 tCO_2e /MWh
Choice of data or measurement methods and procedures	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 01)." The applied value was calculated by referring Statistics of Electric Power in KOREA (2004, 2005, 2006) (KEPCO)
Purpose of data/parameter	Baseline emission calculations
Additional comments	Emission factor will be fixed during the credit period of the project

Data/Parameter	BM Emission Factor of Grid, $EF_{grid,BM,y}$
Unit	tCO_2e /MWh
Description	Build Margin emission factor
Source of data	Calculated
Value(s) applied	0.3859 tCO_2e /MWh
Choice of data or measurement methods and procedures	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 01)." The applied value was calculated by referring Statistics of Electric Power in KOREA (2004, 2005, 2006) (KEPCO)
Purpose of data/parameter	Baseline emission calculations
Additional comments	Emission factor will be fixed during the credit period of the project

Data/Parameter	Combined Emission Factor of Grid, $EF_{grid,CM,y}$
Unit	tCO_2e /MWh
Description	CO_2 emissions intensity of the electricity displaced
Source of data	Calculated
Value(s) applied	0.6426 tCO_2e /MWh
Choice of data or measurement methods and procedures	This value was calculated according to "Tool to calculate the emission factor for an electricity system (version 01)." The applied value was calculated by referring Statistics of Electric Power in KOREA (2004, 2005, 2006) (KEPCO)
Purpose of data/parameter	Baseline emission calculations
Additional comments	Emission factor will be fixed during the credit period of the project

D.2. Data and parameters monitored

Data/Parameter	Electricity Quantity, EGoutput,y
Unit	MWh
Description	Electricity supplied to the grid

<table>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Meters</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>84,398.37 MWh</td></tr>
<tr><td>Monitoring equipment</td><td>- EGoutput,y: 4 watt-hour meter (2Main, 2Sub)

<table>
<tr><td></td><td>#1 Main meter</td><td>#1 Sub-meter</td></tr>
<tr><td>Type</td><td>Electric meter</td><td>Electric meter</td></tr>
<tr><td>Accuracy Class</td><td>0.5S.</td><td>0.5S.</td></tr>
<tr><td>Serial number</td><td>46026112</td><td>46026111</td></tr>
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<tr><td>Used date in the monitoring period</td><td>01/01/2017 ~ 31/12/2017</td><td>01/01/2017~ 31/12/2017</td></tr>
<tr><td>Date of previous calibration</td><td>21/08/2012</td><td>21/08/2012</td></tr>
<tr><td>Date of last calibration</td><td>10/07/2015</td><td>10/07/2015</td></tr>
<tr><td>Validity</td><td>10/07/2015 ~ 09/01/2019</td><td>10/07/2015 ~ 09/01/2019</td></tr>
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<table>
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<tr><td></td><td>#2 Main meter</td><td>#2 Sub-meter</td></tr>
<tr><td>Type</td><td>Electric meter</td><td>Electric meter</td></tr>
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<tr><td>Date of last calibration</td><td>10/07/2015</td><td>10/07/2015</td></tr>
<tr><td>Validity</td><td>10/07/2015 ~ 09/01/2019</td><td>10/07/2015 ~ 09/01/2019</td></tr>
</table></td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>measured each hourly and recorded monthly</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>The Measurement will be in compliance with the National Guidelines and requirement of the KPX(Korea Power Exchange) for accuracy and reliability.
The calibration will be carried out according to Act on operation of electricity market by authorized organization. Double checked by receipt ofsales.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Baseline emission calculations</td></tr>
<tr><td>Additional comments</td><td></td></tr>
</table>

Data/Parameter	**Electricity Quantity, EGimport,y**
Unit	MWh
Description	Electricity purchased from the grid
Measured/calculated/ default	Measured
Source of data	Recorded data

<table>
<tr><td>Value(s) of monitored parameter</td><td>274.140MWh</td></tr>
<tr><td>Monitoring equipment</td><td>- EGinput,y: 2 watt-hour meter
<table>
<tr><td></td><td>#1</td><td>#2</td></tr>
<tr><td>Type</td><td>Electric meter</td><td>Electric meter</td></tr>
<tr><td>Accuracy Class</td><td>0.5S.</td><td>0.5S.</td></tr>
<tr><td>Serial number</td><td>02112005008</td><td>02112004932</td></tr>
<tr><td>Calibration frequency</td><td>3years 6month ±6month</td><td>3years 6month ±6month</td></tr>
<tr><td>Date of installation</td><td>25/06/2012</td><td>25/06/2012</td></tr>
<tr><td>Used date in the monitoring period</td><td>01/01/2017~ 31/12/2017</td><td>01/01/2017~ 31/12/2017</td></tr>
<tr><td>Date of previous calibration</td><td>21/10/2011</td><td>21/10/2011</td></tr>
<tr><td>Date of last calibration</td><td>21/11/2014</td><td>21/11/2014</td></tr>
<tr><td>Validity</td><td>21/11/2014 ~ 20/05/2018</td><td>21/11/2014 ~ 20/05/2018</td></tr>
</table></td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>recorded monthly</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>The Measurement will be in compliance with the National Guidelines.
The allowable error of data must be within ±0.5%.
Double checked by receipt of sales.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Baseline emission calculations</td></tr>
<tr><td>Additional comments</td><td></td></tr>
</table>

D.3. Implementation of sampling plan

>>
N/A

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>
$BE_y = EG_y * EF_y$

Where:
EG_y is net electricity supplied by the project activity to the grid in year y, in MWh
EF_y is baseline emission factor in year y, in tCO_2e/MWh(according to the registered PDD)
$EG_y = EG_{output,y} – EG_{import,y}$

Where;
EG_y -Net electricity supplied to the grid during the monitoring period (MWh);

$EG_{output,y}$–Electricity supplied to the grid (MWh);
$EG_{import,y}$– Electricity purchased from the grid (MWh).

The following table provides the calculation of the baseline emissions during the monitoring period. The monitoring period is from 1 Jan 2017 to 31 Dec 2017. Electricity supplied to the grid and purchased from the grid is measured based on the period from the first day of the month to the last day of the month

Date	EGout	EGin	EGy (EGout-EGin)
01/2017	9,081.345	15.840	9,065.505

02/2017	7,074.253	12.960	7,061.293
03/2017	4,863.191	21.420	4,841.771
04/2017	9,973.630	8.460	9,965.170
05/2017	7,594.061	20.700	7,573.361
06/2017	3,913.100	35.460	3,877.640
07/2017	6,162.812	30.420	6,132.392
08/2017	6,653.949	38.700	6,615.249
09/2017	5,102.514	42.480	5,060.034
10/2017	4,162.773	36.540	4,126.233
11/2017	9,210.657	6.660	9,203.997
12/2017	10,606.080	4.500	10,601.580
Total	**84,398.365**	**274.140**	**84,124.225**

The wind park is located on a mountain ridge and supplies electricity to the public grid using an internal 33km 22.9kV power line to the local substation of the Korea Electrical Power Corporation (KEPCO). The same power line is used for electricity obtained from the grid.
Since the approved methodology of ACM 0002 specifies “grid-connected electricity generation from renewable resource”, Project Participant provided the transmission loss of the generated electricity power, there should be the clear evidence of either following case of the actual project situation;

Case-1: If there are no measuring meters of the State Grid and the generated electricity is monitored only by the Project-site meters,

1. PPA (purchase Power Agreement) clearly states that the position of the transferring the property of the generated electricity from the Project Owner to the Sate Grid as if there would be such measuring meters of the State Grid at that point.

2. Besides the relevant correctly calculated Transmission Loss from the Project site to that point.

Or

Case-2: If there are such measuring meters of the State Grid, then such places should be clearly specified in the PDD with the absolute position description and also in the summarized flow chart of the PDD.
In case of the Taegisan Wind Power Project, there are no measuring meters of the State Grid and the generated electricity is monitored only by the Project-site meters (CASE-1). Thus the transmission loss described as below was calculated by EXCEL (calculating emission reduction) which will be provided to DOE.
Transmission line map is explained in ANNEX2 and resistance is calculated in ANNEX3.
Evidences about resistance and length of transmission line will be provided to DOE to explain transmission line (33km) and resistance.

Taking into account the transmission loss,

The value of TLy is calculated as follow:

kWh Loss $= I_2R_3 \times T$
kW Loss $= I_2R_3$
I $= Ip/P.F$
IP $= P/(1.732 \times 22.9 \times T)$

Where,
P = Electricity generation (kWh)
T = Time (period) = 24 × days
I = the current (A)
P.F = Power factor (%): 97
R_1 = the phase resistance (Ω): 3.4402 - One phase resistance (Refer to ANNEX2 and ANNEX3)
R_1(M1 and M2) = (a *22)＋(b*3)+(c*8)

		Specifications	Distance(Km)	R(Ω)
Overhead line	a	ACSR-AW/OC 240sq	22	2.6026
	b	ABC-W 150sp*3	3	0.549
Underground line	c	CNCV-W 250sq	8	0.2886

R_3 = the phase resistance (Ω): - three transmission line
R_3 =3x R_1 three phase resistance
22.9 = the voltage of power line from Taegisan Wind Park to the Substation. Unit: kV

Date	Exported MWh loss	Loss(%)	Imported MWh loss	Loss(%)
01/2017	772.897	8.51	0.003	0.015
02/2017	519.262	7.34	0.002	0.013
03/2017	221.648	4.56	0.005	0.020
04/2017	963.315	9.66	0.001	0.008
05/2017	540.467	7.12	0.005	0.019
06/2017	148.287	3.79	0.013	0.034
07/2017	355.942	5.78	0.009	0.029
08/2017	414.935	6.24	0.015	0.036
09/2017	252.133	4.94	0.018	0.041
10/2017	162.400	3.90	0.013	0.034
11/2017	821.567	8.92	0.001	0.006
12/2017	1,054.220	9.94	0.001	0.004
Total	**6,227.073**	**-**	**0.086**	**-**

Baseline emission is calculated as follow:

Date	EGy (EGout - EGin) (MWh)	TLy,supply (MWh)	TLy,import (MWh)	NE (MWh)	EFy (tCO_2e /MWh)	BEy (tCO_2e)
01/2017	9,065.505	772.897	0.003	8,292.605	0.6426	5,328.827
02/2017	7,061.293	519.262	0.002	6,542.029	0.6426	4,203.907
03/2017	4,841.771	221.648	0.005	4,620.118	0.6426	2,968.887
04/2017	9,965.170	963.315	0.001	9,001.854	0.6426	5,784.591
05/2017	7,573.361	540.467	0.005	7,032.889	0.6426	4,519.334
06/2017	3,877.640	148.287	0.013	3,729.340	0.6426	2,396.473
07/2017	6,132.392	355.942	0.009	5,776.441	0.6426	3,711.940
08/2017	6,615.249	414.935	0.015	6,200.299	0.6426	3,984.312

09/2017	5,060.034	252.133	0.018	4,807.883	0.6426	3,089.545
10/2017	4,126.233	162.400	0.013	3,963.820	0.6426	2,547.150
11/2017	9,203.997	821.567	0.001	8,382.429	0.6426	5,386.548
12/2017	10,601.580	1054.220	0.001	9,547.359	0.6426	6,135.132
Total	**84,124.225**	**6,227.073**	**0.086**	**77,897.066**	**0.6426**	**50,056.646**

E.2. Calculation of project emissions or actual net removals

>>

PE_y is project emissions during a given year y. According to ACM 0002(version 07) methodology, in renewable energy, PE_y is considered as "0".

$PE_y = 0$

E.3. Calculation of leakage emissions

>>

According to ACM0002 (Version 07), the leakage from the project is zero.

LEy=0

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals ($t CO_2e$)	Project GHG emissions or actual net GHG removals ($t CO_2e$)	Leakage GHG emissions ($t CO_2e$)	GHG emission reductions or net anthropogenic GHG removals ($t CO_2e$)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	50,056	0	0	0	50,056	50,056

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

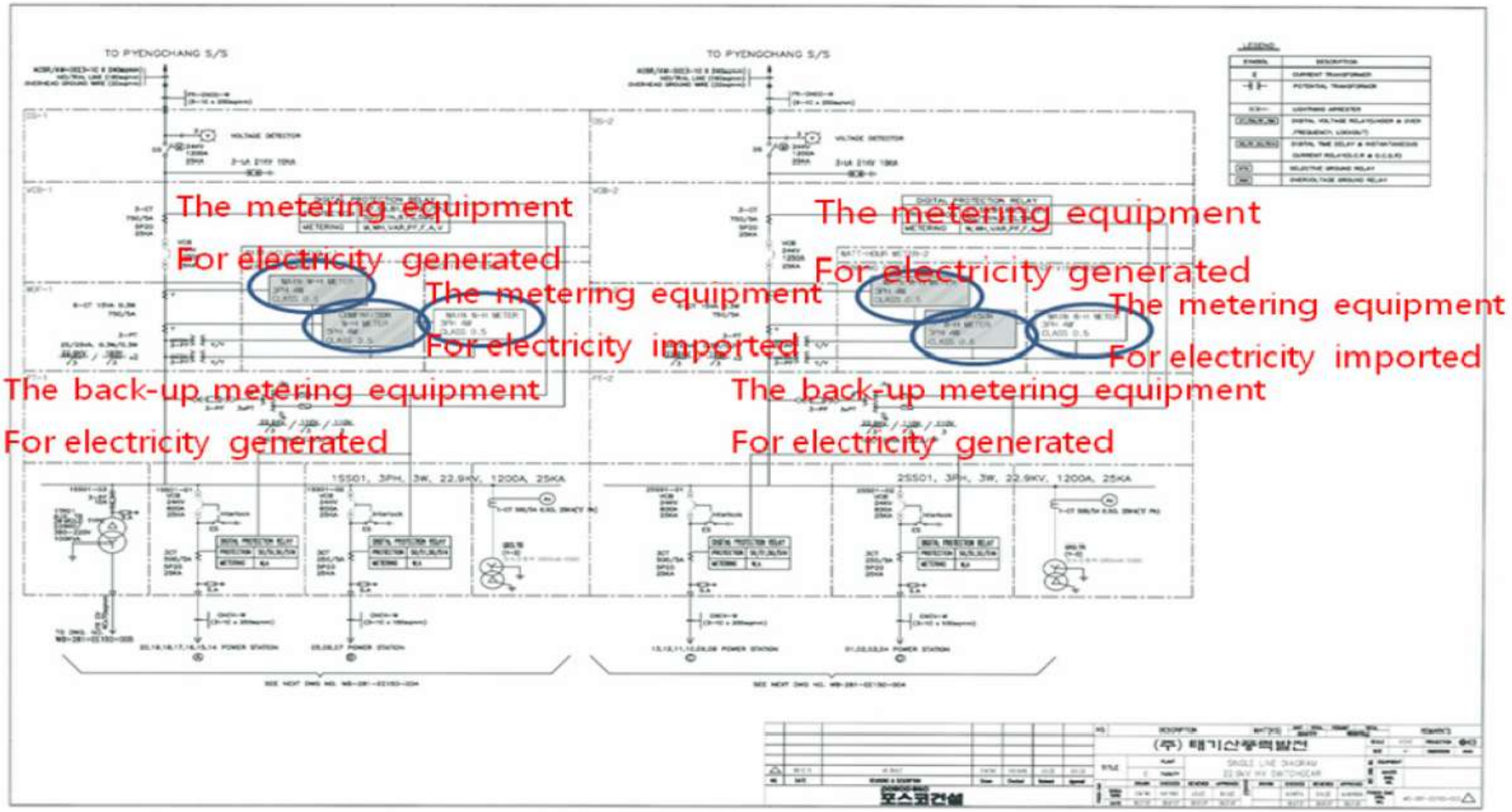
Amount achieved during this monitoring period ($t CO_2e$)	Amount estimated ex ante ($t CO_2e$)
50,056	59,669

E.6. Remarks on increase in achieved emission reductions

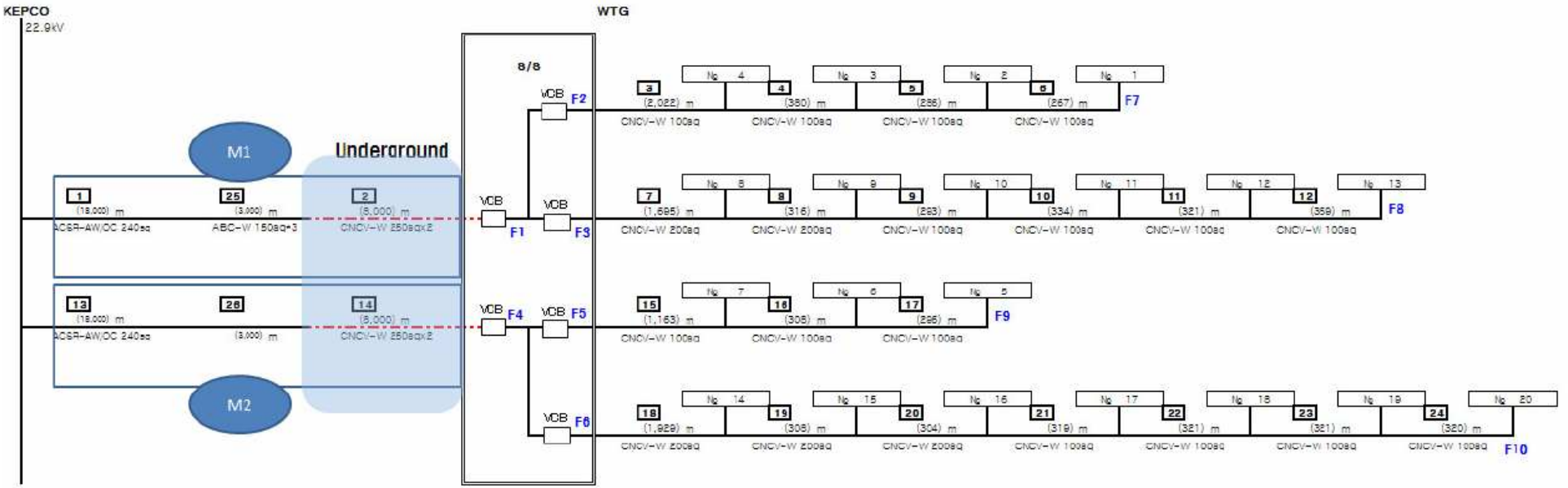
>>

The emission reduction achieved during this monitoring period is 50,056 tCO_2e. This value is 16.11% less than estimated reduction value 59,669 tCO_2e.

Annex1. Monitoring point



Annex2.Transmission line map



Annex3 Resistance

ACSR-AW/OC	R(Ω)
240sqmm	0.1183
FR-ABC-W	R(Ω)
150sq	0.183
CNCV-W	R(Ω)
250sq	0.07215

	Order	Specifications	Distance(Km)	R(Ω)
Overhead line	1, 13	ACSR-AW/OC 240sq	22	2.6026
	25, 26	ABC-W 150sp*3	3	0.549
Underground line	2, 14	CNCV-W 250sq	8	0.2886

M1(1,2,25)	3.4402
M2(13,14,26)	3.4402