



Revision of Monitoring Plan Gangwon Wind Park Project (Reference No. 0222)

SECTION D. Application of a <u>monitoring methodology</u> and plan

D.1. Name and reference of <u>approved monitoring methodology</u> applied to the <u>project activity</u>:
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Approved Monitoring Methodology ACM0002, which is the consolidated monitoring methodology for zero emissions grid-connected electricity generation from renewable sources.

D.2. Justification of the choice of the methodology and why it is applicable to the <u>project activity</u>:

This monitoring methodology is used in conjunction with the approved baseline methodology ACM0002 (consolidated baseline methodology for grid-connected electricity generation from renewable sources.) and applies to electricity capacity additions from wind energy sources. The geographic and system boundaries for the relevant electricity grid can be clearly identified, and information on the characteristics of the grid is available and data to calculate project emission is also obtainable.

**D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario**

No emissions from the project activity are identified.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
Not applicable								

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

No emissions from the project activity are identified.



D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long Is archived Data kept?	Comment
1. EGY*	Electricity quantity	Electricity supplied to the grid by the project	MWh	Directly measured	hourly measurement and monthly recording	100%	Electronic	During the crediting period and two years after	Data will be aggregated weekly, monthly and yearly Double checked against receipt of sales. Electricity transmission except Electricity consumed in the plant *
2. EFy	Emission factor	CO ₂ emission factor of the Korea grid	tCO ₂ /MWh	c	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Data will be used of 3 year vintage data. Calculated as a weighted sum of the OM and BM emission factors.
3. EF _{OM, y}	Emission factor	CO ₂ OM emission factor of the Korea grid	tCO ₂ /MWh	c	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Data will be used of 3 year vintage data. Calculated as indicated in the relevant OM baseline method above.



4. $EF_{BM,y}$	Emission factor	CO ₂ BM emission factor of the Korea grid	tCO ₂ /MWh	c	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Data will be used of 3 year vintage data. Calculated as $[\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}] / [\sum_m GEN_{m,y}]$ over recently built power plants defined in the baseline methodology.
5. $F_{i,y}$	Fuel quantity	Amount of each fossil fuel consumed by each power source / plant	Mass or volume	m	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Data will be used of 3 year vintage data. Obtained from the KEPCO.
6. $COEF_i$	Emission factor coefficient	CO ₂ emission coefficient of each fuel type i	t CO ₂ /mass or t CO ₂ /volume	c	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Calculated as $[NCVi \cdot EF_{CO2i} \cdot OXIDi]$. Data will be calculated by each energy source in accordance with IPCC 1996 default value..
7. $NCVi$ (Local value)	Net Caloric Value	Net Caloric coefficient of each fuel type i to calculate $COEF_i$	Kcal/ Mass or Kcal/ volume	m	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	$NCVi$ (Local value) is obtained from the KEPCO. Data will be calculated by each energy source in accordance with IPCC 1996 default value.
8. GEN_y	Electricity quantity	Electricity generation of each power source / plant	MWh/ each plant	m	Once at the time of PDD submission	100%	Electronic	During the crediting period and two years after	Data will be used of 3 year vintage data. Obtained from the KEPCO.
9. OM plant	Plant name	Identification of power source / plant for the OM	text	e	Once at the time of PDD submission	100% of set of plants	Electronic	During the crediting period and two years after	Identification of plants to calculate Operating Margin emission factors.



10. BM plant	Plant name	Identification of power source / plant for the BM	text	e	Once at the time of PDD submission	100% of set of plants	Electronic	During the crediting period and two years after	Identification of plants to calculate Build Margin emission factors.
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* According to the regulation on the electricity measurement equipment, the equipment must use the main metering equipment that has allowable error of $\pm 0.2\%$, and the sub-metering equipment that has allowable error of $\pm 0.5\%$. This equipment shall be sealed by the authorised person from the connected substation right after the installation of the equipment. Also, electricity generation will be checked every 5 minutes, and the data will be kept for two years after CERs are issued

* The amount of electricity consumed in the plant and electricity transmission to a grid will be measured by bidirectional meter. EGy means a net amount of electricity transmitted to the grid excluding electricity consumed in the plant.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

$$BE_y = EF_y \times EG_y$$

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Option 2 is not selected as it is not appropriated to ACM0002 Baseline methodology for small grid-connected zero-emission renewable electricity generation.

**D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:**

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.):

Option 2 is not selected.

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

**D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)****D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)**

$$ER_y = BE_y - PE_y - L_y$$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

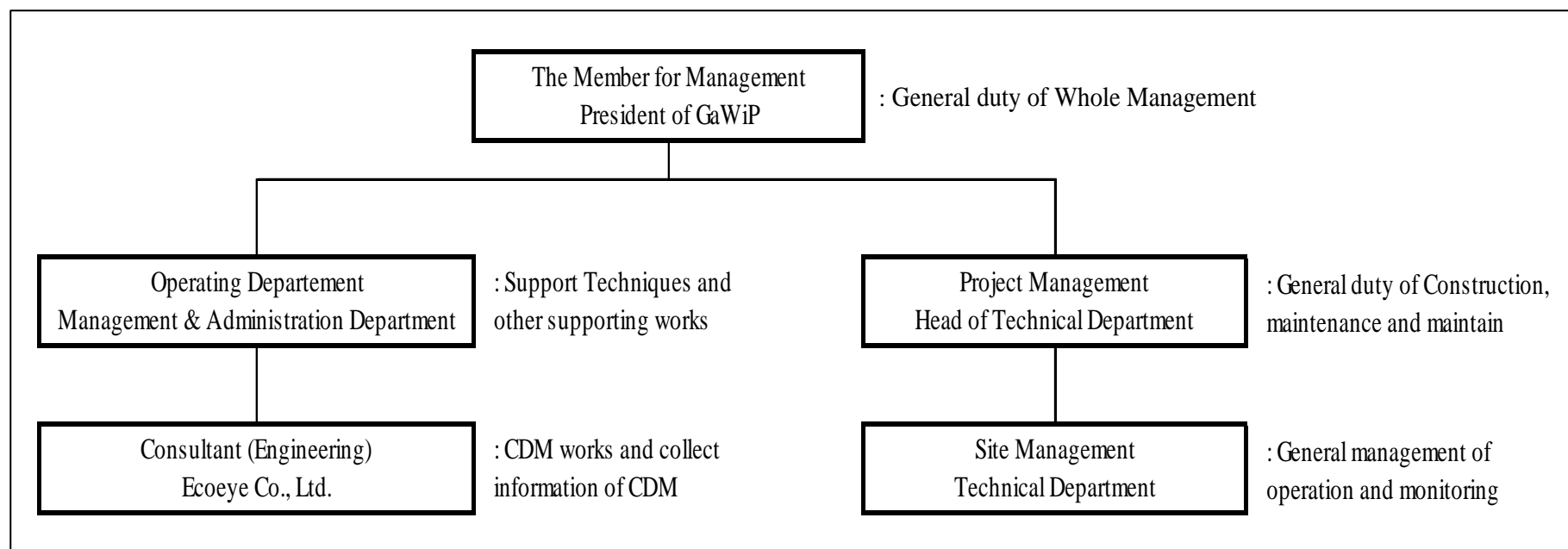
All variables, except one related to off-site transportation, used to calculate project and baseline emissions are directly measured or are publicly available official data. To ensure the quality of the data, in particular those that are measured, the data are double-checked against commercial data. The quality control and quality assurance measures planned for the Project are outlined in the following table.

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1.EG _y	Low	QA/QC procedure for this are planned. The electricity output from each wind turbine to the grid will be monitored and recorded at the on-site control The allowable error of data must be within $\pm 0.2\%$.
5. F _{i,y}	Low	QA/QC procedure for this are planned. The data will be obtained by KEPCO.
6.COEF _i	Low	QA/QC procedure for this are planned. Data will be checked against other sources.
Others	Low	QA/QC procedure for this are planned. All the data and grid statistics data will be used, and provided by KEPCO

See Annex 4 about detail of QA/QC

**D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity**

This figure describes the operational and management structure that will monitor emissions reductions generated by the project activity.



<Figure 6> operational and management structure



D.5 Name of person/entity determining the monitoring methodology:

This monitoring methodology is determined and planned by Dr. Jae-su Jung, ecoeye Co.,Ltd (Korea, see Annex1) on February 1, 2005.



Annex 4

MONITORING PLAN

Quality control (QC) and quality assurance (QA) procedures

1. Monitoring equipment

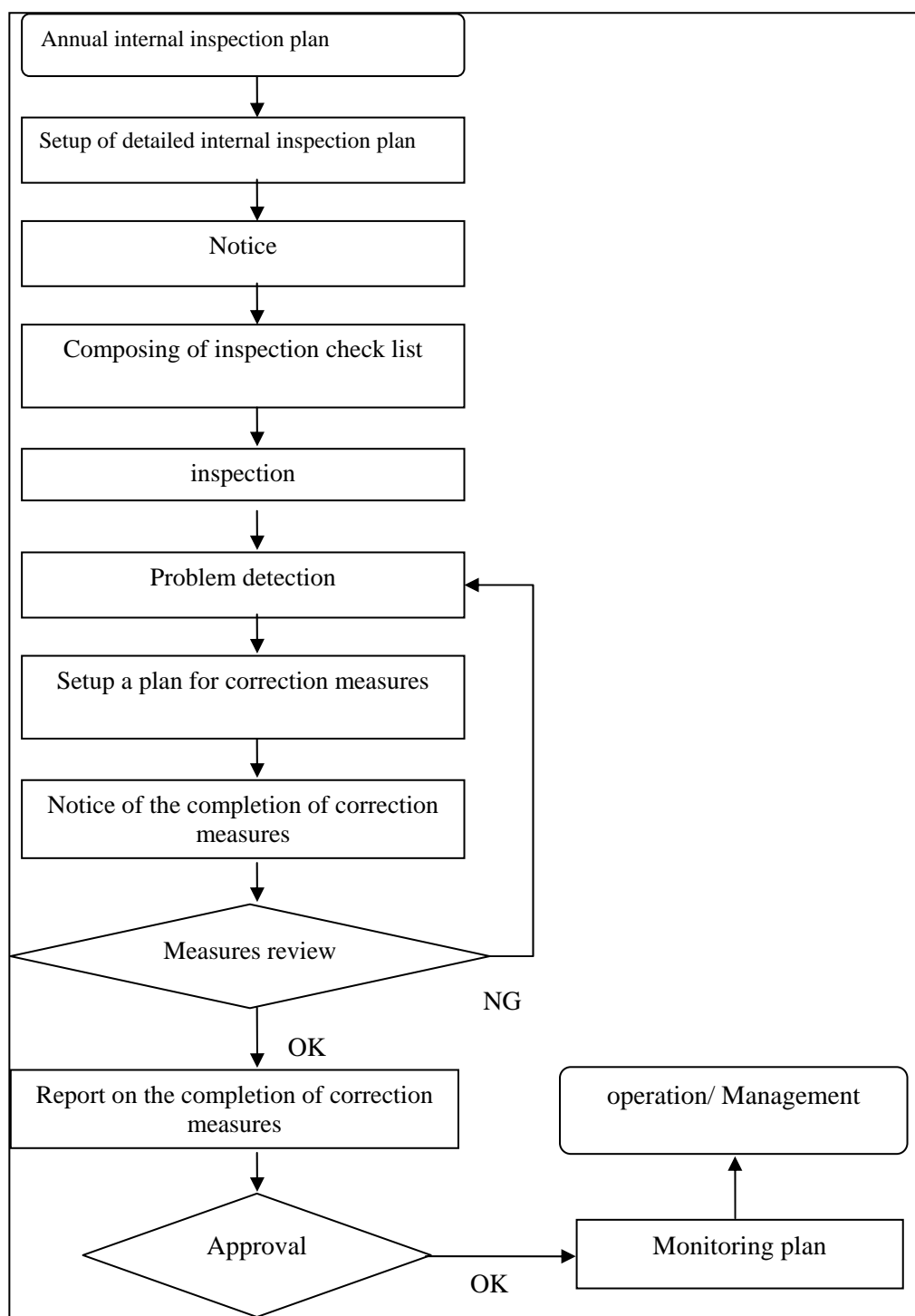
- 1-1. Electricity meters for measuring the amount of electricity shall be set up transparently in accordance with the Korean law “Law regarding measurement” and “Regulation on Electric Operation (by KPX)”, shall be sealed after confirmation on the correct set up of the meters by Korea Power Exchange.
- 1-2. The meters shall pass authorized investigation through the formal certificate process (the valid period for certificate of authorized investigation: 7 years.)
- 1-3. Calibration shall be performed at the first installation, and shall be done in accordance with the Korean laws indicated in 1-1 of Annex 4 above.

2. Monitoring of amount of electricity

- 2-1. The amount of electricity transmitted to the grid shall be measured automatically by the set-up meters and the measured variables are transferred to GaWiP central control simultaneously.
- 2-2. The measured amount of electricity shall be collected daily, weekly, and monthly and the data shall be archived in the computers.
- 2-3. The collected variables in article 2-2. shall be compared with the collected variables by Korea power Exchange.
- 2-4. If the two variables confirmed in article 2-3. are different, the electricity meters and other equipments shall be checked if they are working properly. In case of out-of-order, internal investigation and correction procedure shall be followed and be confirmed by final decision-maker and Korea Power exchange.

3. Person in charge of monitoring and electricity safety

- 3-1. The person in charge of monitoring and electricity safety shall complete the following courses once a year.
 - Course on ‘Law regarding measurement’
 - Course on ‘Regulation on Electric Operation (by KPX)’
 - Course on Electricity safety
- 3-2. In case of absence of the person in charge of monitoring and electricity safety, vice-person in charge shall be selected.
- 3-3. In case of change of the person in charge of monitoring and electricity safety, approval from the responsible person for monitoring shall be obtained.



<Figure 8> Flowchart of internal investigation and correction procedure for Monitoring the Project Activity