

# VERIFICATION REPORT

POSCO Engineering and Construction Co., Ltd.  
Eurus Energy Japan Corporation

## 2nd Periodic Verification of **Taegisan Wind Power Project**

CDM Reference No. 2302

Report No. GR11W0035D

14 March, 2012

JACO CDM

## 2nd Periodic Verification Report

Date of first issue: 14 March, 2012		Project No.: UNFCCC Ref. No. 2302							
Approved by: Yasunori SHIMOI, CEO & President, JACO CDM									
Client: POSOCO Engineering and Construction Co., Ltd., Eurus Energy Japan Corporation									
<p>Summary:</p> <p>JACO CDM has performed a verification of the CDM project "Taegisan Wind Power Project". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".</p> <p>The management of Taegisan Wind Power Co., Ltd. (TWPC) is responsible for the preparation of the GHG emission data and the reported GHG emissions reductions by the "Taegisan Wind Power Project" including the development and maintenance of records and reporting procedures in accordance with the revised Monitoring Plan which is complying with the consolidated methodology ACM0002 version 07 and approved by UNFCCC on 30 March 2011 and registered PDD. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the project.</p> <p>The verifier confirmed that the project was implemented as planned and described in the validated and registered PDD as well as the revised Monitoring Plan approved by CDM Executive Board on 30, March, 2011 and the project activity is in accordance with the approved methodology ACM0002 version 07. The installed equipments being essential for generating emission reductions run reliably and the relevant meters are calibrated appropriately. The monitoring system is in place and the project is ready to generating GHG emission reductions.</p> <p>The verifier confirmed that the monitoring was done in accordance with the monitoring plan and the GHG emission reductions stated in the revised CDM Monitoring Report version 02 dated 22 February, 2012 were calculated without material misstatements. Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated, we confirm the following statement:</p> <p><u>Reporting period:</u> From 1-06-2010 to 31-05-2011</p> <p><u>Verified emission in the above reporting period:</u></p> <table> <tr> <td>Baseline emissions:</td> <td>49,525tCO<sub>2</sub> equivalents</td> </tr> <tr> <td>Project emissions:</td> <td>0 tCO<sub>2</sub> equivalents</td> </tr> <tr> <td>Emission reductions:</td> <td>49,525tCO<sub>2</sub> equivalents</td> </tr> </table>				Baseline emissions:	49,525tCO <sub>2</sub> equivalents	Project emissions:	0 tCO <sub>2</sub> equivalents	Emission reductions:	49,525tCO <sub>2</sub> equivalents
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### Abbreviations

CAR	Corrective Action Request
CDM	Clean Develop Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EEJC	Eurus Energy Japan Corporation
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Green House Gas
IETA	International Emissions Trading Association
IPCC	Intergovernmental Panel on Climate Change
KEPCO	Korea Electric Power Corporation
KP	Kyoto Protocol
KPX	Korea Power Exchange
MP	Monitoring Plan
MW	Megawatt
O&M	Operation and Maintenance
PDD	Project Design Document
PEA	Preliminary Environmental Assessment
POSCO	POSCO Engineering and Construction Co., Ltd.
PPA	Power Purchase Agreement
TWPC	Taegisan Wind Power Co., Ltd.
UNFCCC	United Nations Framework Convention for Climate Change
VVM	Validation and Verification Manual

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### 1. INTRODUCTION

#### 1.1 Objective

Eurus Energy Japan Corporation has commissioned an independent verification of JACO CDM Co., Ltd. of its CDM project “Taegisan Wind Power Project”.

The objective of the verification work is to comply with the requirements of paragraph 62 of the CDM modalities and procedures.

This assessment shall:

- (a) Ensure that the project activity has been implemented and operated as per the registered PDD (version 05)\* and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- (b) Ensure that the monitoring report and other supporting documents provided are complete in accordance with latest applicable version of the completeness checklist for requests for issuance of CERs and verifiable and in accordance with applicable CDM requirements. The CDM Executive Board provided a standardized format for monitoring report to improve consistency in reporting of the implementation and monitoring of the project activity by project participants;
- (c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology;
- (d) Evaluate the data recorded and stored as per the monitoring methodology

#### 1.2 Scope

Verification scope is defined as an independent and objective review and ex post determination by the Designated Operational Entity of the monitored reduction in GHG emissions. The verification is based on the Monitoring Report provided, the validated project design document (PDD Version 05) including its monitoring plan and validation report, past verification report, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and EB and any other information and references relevant to the project activity’s resulting emission reductions. These documents are reviewed against Kyoto Protocol requirements, UNFCCC rules, approved methodology ACM0002 version 07 and associated interpretations. JACO CDM, based on the recommendations in the Validation and Verification Manual, employs a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of CERs. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification shall consider both quantitative and qualitative information on emission reductions. Quantitative data comprises the monitoring report submitted to the verifier by the project entity. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

The verification team has been provided with the CDM Monitoring Report version 01 dated 10 January, 2012 on 31 January, 2012. This report is covering the period 1 June, 2010 to 31 May, 2011. The version 01 has been made publicly available on 31 January, 2012 on the UNFCCC web site (<http://cdm.unfccc.int/Issuance/MonitoringReports>) and this monitoring report serves as the basis for the assessment presented herewith.

Based on the this Monitoring Report and other related documents provided, a document review and a fact finding mission in the form of an on-site assessment has taken place.

JACO CDM has conducted the 2nd periodic verification for the CDM project “Taegisan Wind Power Project” based on the Kyoto Protocol requirements, modalities as agreed in Marrakech Accords and

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\* Registered date: 15 May, 2009

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decisions of UNFCCC CDM EB, using the Validation and Verification Manual (VVM) version 01.2, EB55 Annex1 /35/.

### Verification team

The verification team was formed considering the needs of competence for the team in the following aspects:

- Knowledge of the Kyoto Protocol and the Marrakech Accords
- Environmental and Social Impact Assessment
- Skills in environmental auditing
- Quality assurance
- Technical aspects of wind power project
- Monitoring concepts
- Political, economical and technical conditions in host country

According to these requirements JACO CDM has composed following verification team in accordance with the appointment rules of the JACO CDM QC Manual.

Yukio TAKANO                      JACO CDM   Team Leader (SS1, TA.1.2 qualified)  
Akihide MADENOKOJI   JACO CDM   Team Member (SS1, TA.1.2 qualified)

### Duration of verification

#### (1) 2nd Periodic Verification

Document Review:      From January, 2012 to February, 2012  
On-site Assessment:    16 February, 2012  
Reporting:                14 March, 2012

### 1.3 GHG Project Description

The Taegisan Wind Power Project (the "Project") is a wind power generation plant in Republic of Korea with the total capacity of 40 MW by 20 units of wind turbines. The project site is located between Hoengseong-gun and Pyeongchang-gun in Gangwon Province area in Republic of Korea. Taegisan is the highest mountain in Hoengseong-gun and rises 1,261 meters above the sea level. The project is interconnected with the grid by the 22.9kV transmission line at the KEPCO's substation which is 33km away from the project site.

The Project was registered as a CDM project on 15 May, 2009 with the reference number of 2302, and has a fixed crediting period of 10 years with the starting date of 15 May, 2009.

**Table 1 Taegisan Wind Turbine Specification**

Rated output		2,000 kW
Design Wind Speed	Start up wind speed (m/s)	4
	Nominal wind speed (m/s)	15
	Stop wind speed (m/s)	25
Generator		Asynchronous Three Phase Generator
Rotor	Diameter (m)	80
	Hub Height (m)	80

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The past monitoring period of this project activity has been verified ahead of this verification /36/. This periodic verification covers the 2nd monitoring period which directly follows the 1st one. There is no change in the project since 1st verification.

## 2. METHODOLOGY

The proposed assessment aims at being a risk based approach and is based on the methodology developed in the Validation and Verification Manual (Version 01.2, EB55 Annex 1), an initiative for all Applicant Entities, which aims to harmonize the approach, and quality of all such assessments.

In order to ensure transparency, a verification checklist was customized for the project, according to the Validation and Verification Manual. The checklist shows, in a transparent manner, criteria (requirements), means of verification and the results. The verification checklist serves the following purposes:

- It organizes, details and clarifies the requirements a CDM/JI project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been proved and the result of verification.

The verification checklist consists of 3 tables. The different columns in these tables are described in Figure 1 below. The completed checklist is enclosed in Appendix 1 to this report.

**Figure 1: Verification Checklist Tables**

Table 1: Implementation Status and Operation Checklist			
OBJECTIVE	Ref.	COMMENTS	Conclusion (incl. FARs/CARs)
The requirements the project must meet	Gives reference to the sources of evidences for the comments and conclusions.	Description of circumstances and further commendation to the conclusion.	This is either acceptable based on evidence provided ( <b>OK</b> ), or a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report. <b>Clarification Request (CL)</b> is used when the verification team has identified a need for further clarification. The Verification has additional <b>Forward Action Requests (FAR)</b> . FAR indicates essential risks for further verifications.

Table 2: Data Management System/Controls		
Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	A score is assigned as follows: <b>Full</b> all best-practice expectations are implemented. <b>Partial</b> a proportion of the best practice expectations is implemented <b>Limited</b> this should be given if little or none of the system component is in place.	Description of circumstances and further commendation to the conclusion. This is either acceptable based on evidence provided ( <b>OK</b> ), or a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report.

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		<b>Clarification Request (CL)</b> is used when the verification team has identified a need for further clarification. The Verification has additional <b>Forward Action Requests (FAR)</b> . FAR indicates essential risks for further periodic verifications.
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Table 3: Resolution of Corrective Action and Forward Action Requests

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question at table 1 and 2	Summary of project owner response	Verification team conclusion
Detailed FAR, CL and/or CAR pointed at previous table.	Item at the table where FAR/CL/CAR were found.	Answer of the project owner	Analysis and conclusion of the verification team

### 2.1 Review of Documentation

The monitoring reports submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is shown in References (chapter 6 of this report).

### 2.2 On-site inspections

Verification team visited TWPC office and project sites in Taegi-ri, Dunnae-myun, Hoengseong-gun and Mui-ri, Bongpyeong-myun, Pyeongchang-gun, Republic of Korea on 16 February, 2012. Interviewed organizations and topics are summarized in Table 2 below.

Table 2: Interviewed Organization and Topics at Periodic Verification

Interviewed organizations/ visited sites	Interview topics/ Inspected items
TWPC Office	Monitored data Data uncertainty and residual risks Management & operational systems GHG calculation and reporting procedures Environment and socio-economic impacts Compliance with National laws and regulations
TWPC Wind Power Site	Implementation of facilities (Wind turbines, Monitoring equipments & system) Operation of facilities Observation of operators
Sapgyo3-ri Village	Stakeholders comments

### 2.3 Resolution of Corrective and Forward Action Requests

The objective of this phase of the verification was to resolve the requests for corrective actions and any other outstanding issues which needed to be clarified for JACO CDM's positive conclusion on the GHG emission reduction calculation.

Findings established during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.



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**Corrective Action Requests (CAR)** is raised, where:

- i) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reduction.
- iii) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants

**Clarification Request (CL)** is raised, where:

- iv) If information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

**Forward Action Requests (FAR)** are raised, where:

- v) The monitoring and reporting are required attention and/or adjustment for the next verification period.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

To guarantee the transparency of the verification process, the concerns raised and responses that have been given are summarized in chapter 3 below and documented in more detail in the verification checklist in Appendix 1.

## 2.4 Internal Quality Control

As final step of verification, the final documentation including the verification report and the checklist have to undergo an internal quality control by JACO CDM's Certification Determination Committee (CDC) to ensure that all procedures have been followed and all conclusions are justified. After the documents have been satisfactorily approved, then only the request for issuance is submitted to the CDM-EB with the relevant documents. Two-third of the CDC members is selected from outside of JACO CDM. It was concluded on 9 March, 2012 and the verification report was approved by CDC.

## 3. PERIODIC VERIFICATION FINDINGS

The verification team assessed and verified the followings in line with the 2nd Verification Checklist as Appendix 1.

### 3.1 Remaining issues, CARs, FARs from previous Validation or Verification

#### 3.1.1 Discussion

There are no remaining issues from previous validation and verification /33/,/36/.

#### 3.1.2 Findings

None

#### 3.1.3 Conclusion

The project complies with the requirements.

### 3.2 Implementation of the Project

#### 3.2.1 Discussion

The Project is the wind power generation by 20 turbines with each capacity of 2 MW. The total capacity of 20 turbines is 40 MW. Based on the completion documents and the site visit, the verification team identified that all required facilities were installed and being operated as described in the registered PDD /32/. They were installed during the period of 25-07-2007(construction start date) to 26-12-2008(last commissioning date) as follows;

- Wind Turbine (V80) manufacturer: Vestas Wind System (Denmark)
- Plant design: Hyundai Engineering CO., Ltd. (Korea)

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- Installation work: POSCO Engineering and Construction Co., Ltd. (Korea)

The verification team confirmed that the construction start date was 25/07/2007 based on the document by POSCO and the approval of The Ministry of Commerce (/17/, /18/) as the planned date 1/5/2007 was described in PDD and the commercial operation start date was 28/01/2009 based on the report to Ministry of Knowledge Economy. (/19/, /20/)

The verification team also confirmed that the 20 wind turbine generators were divided into 4 groups and 2 groups had the same transmission lines to the central control panel of the site.

And also the watt-hour meters (export and import), checking system by PC and 2 transmission lines (22.9 kV 33km) were operated.

Roles and responsibilities are clearly stipulated in the Monitoring Manual /2/ in line with the PDD from the top management to the manager level. Taegisan Wind Power Company takes charge of overall operation, monitoring and audit of the plant. Monitoring section has a responsibility of operating and managing generators and measuring machines, and Audit section has a responsibility of internal audit, QA/QC and maintenance.

CDM project manager takes the responsibility for entire compliance of the monitoring plan including confirmation of monitoring plan, emission reduction and report and also is in charge of making efforts to protect and manage information.

The revision of the monitoring plan regarding the calibration of the monitoring equipment was appropriately implemented.

Personnel related to O&M and the CDM monitoring are carried out the training as described in the monitoring manual and PDD

The verification team confirmed above by the training record /12/. The verification team also confirmed that the Management Review was conducted by TWPC in Dec., 2011 /26/.

The verification team visited the electricity room to inspect meters and the wind turbine No.1, 5, 8, 11, 14 and 18 during on site assessment. The verification team confirmed that all equipments were under operation.

### 3.2.2 Findings

#### **Clarification Request 1**

Maintenance record during this monitoring period is to be clarified during on-site assessment. It will be confirmed whether any modification of equipment was done during the monitoring period.

#### **Response**

There were no special issue in this monitoring period. The generator was not replaced. The maintenance record was provided /11/.

### 3.2.3 Conclusion

#### **Clarification Request 1**

The verification team confirmed the generator was not replaced and total capacity of the project remains unchanged as described in the registered PDD. Therefore there was no impact to the generation capacity.

CL1 was clarified.

The project complies with the requirements.

## 3.3 Compliance of the monitoring Plan with the monitoring methodology

### 3.3.1 Discussion

The verification team verified the monitoring plan of the registered PDD /32/ and revised Monitoring Plan /31/ against the methodology ACM0002 Version 07 /34/ applied by the project, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures as described in the monitoring plan, and is able to confirm that the monitoring plan of the registered PDD and the revised Monitoring Plan are in accordance with the applied methodology, ACM0002 Version 07 /34/.

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### 3.3.2 Findings

None

### 3.3.3 Conclusion

The project complies with the requirements.

## 3.4 Compliance of monitoring with the monitoring plan

### 3.4.1 Discussion

#### (1) Monitoring plan and methodology

The PP implemented and followed the registered PDD /32/, the revised monitoring plan approved by EB on 30 March, 2011 /31/ and applied methodology, ACM0002 Version 07 /34/.

#### (2) Project emission parameters

Since the project is grid-connected electricity generation from renewable energy sources, there are no GHG emissions from the project activity, so that the project emissions ( $PE_y$ ) are zero, according to the approved methodology ACM0002 Version 07 /34/.

#### (3) Leakage parameter

It was verified during on-site assessment that there was no energy generating equipment transferred from another activity and no existing equipment transferred to another activity. Therefore the leakage emissions are zero,  $L_y=0$  according to ACM0002 Version 07 /34/.

#### (4) Baseline emission parameters

According to the registered PDD, the annual electricity supplied by the project to the grid ( $EG_y$ ) is calculated as the Electricity Delivered minus the Electricity Obtained.

As verified during site visit, the Electricity Delivered by the project to the grid and the Electricity Obtained by the project are continuously measured by KPX Meters and KEPCO Meters. There are 1 Main meter and 1 Backup- meter per each group x2 groups, total 4 meters for the Electricity delivered by the project to the grid. And there are 1 Main meter per each group x2 groups, total 2 watt-hour meters for the Electricity imported to the project. They are installed on the transmission line at the project site.

Electricity generation data of the main watt-hour meter monitored by KPX is transferred daily from KPX (Korea Power Exchange) to TWPC through KPX web system after checking in KPX side. TWPC's designated operators are daily comparing the previous day's KPX data with the main watt-hour meter reading installed in the TWPC site /3/.

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 are checked if they are working properly by internal investigation and procedures regulated in the related laws. Then the results will be reported to the CDM project manager for appropriate follow-up measures.

The electricity imported from KEPCO is measured automatically by the meters. The measured data is recorded monthly and checked out against receipts provided monthly by KEPCO for accuracy and reliance. The data is obtained by the KEPCO's watt-hour meters installed in the TWPC /4/.

The verification team has verified the values reported in the Monitoring Report /1/ and CER calculation spreadsheet /5/ against the Monthly Power Trading Record during this monitoring period (1 Jun., 2010 to 31 May, 2011) of Taegisan Wind Power Co., Ltd. by Korea Power Exchange /3/ and the Monthly Used Electricity Amount during this monitoring period (1 Jun., 2010 to 31 May, 2011) by KEPCO /4/, and found that they are consistent with each other after excluding the impact of the transmission line loss.

### 3.4.2 Findings

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### **Clarification Request 2**

It is to be checked by the evidences during on-site assessment, whether the monitoring is being carried out in accordance with the procedures established.

### **Response**

Daily operation log book, monthly reading records and other CDM related records were demonstrated.

### **3.4.3 Conclusion**

### **Clarification Request 2**

It was verified by demonstrated documents and by interview with operation staff during on-site assessment that monitoring has been implemented in their operation in accordance with the monitoring plan of the registered PDD.  
CL2 was clarified.

The project complies with the requirements.

## **3.5 Management and Operational System**

### **3.5.1 Discussion**

Procedures for measurement, recording and archiving are confirmed as complying with the revised Monitoring Plan /31/ approved on 30 March, 2011 and registered PDD /32/.

The CDM Monitoring Manual /2/ stipulates the establishment of the file management system and data management to keep the relevant documents under the responsibility of the CDM Project Manager. The key parameters are measured by calibrated meters. It was confirmed that the calibration of meters are controlled properly by the revised monitoring plan. The monitored data are stored in the shelf cabinet in the project office and controlled by the Project Manager. Condition of document archiving was confirmed well during on-site assessment.

#### **(1) Reporting procedures**

The responsibility of measuring, checking and reporting the amount of electricity is defined, and the qualification and training for the personnel are established and implemented. The amount of export electricity was being reported daily, monthly and yearly in the established formats and checked by responsible persons including the president with their signatures.

Reporting procedures have been already established in the CDM Monitoring Manual /2/.

#### **(2) Documented instructions**

The organization chart, detail responsibility, qualification of CDM operational staff and procedure are stipulated in the CDM Monitoring Manual /2/.

The personnel training have been established for CDM monitoring operation.

#### **(3) Qualification and training**

The qualification and training for the personnel are established and implemented. It was confirmed that the reporting was being conducted in accordance with the CDM Monitoring Manual /2/ established based on the approved revised Monitoring Plan and the registered PDD. The training record /12/ was provided and verified.

#### **(4) Responsibilities**

Roles and responsibilities are clearly stipulated in the CDM Monitoring Manual /2/ and the Monitoring Report Section C /1/. They are in line with the Monitoring Plan of the registered PDD /32/.

#### **(5) Trouble shooting procedures**

Emergency procedure for monitoring meters is stipulated in the CDM Monitoring Manual /2/ and the Monitoring Report Section C /1/.

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Although the CDM Monitoring Manual stipulates that internal investigation and corrective actions are taken if the two variables are different, no cases have occurred in this period.

(6) Data archiving

The key parameters are being measured and recorded in the respective documents / registers in paper and electronic form. Data protection measures are adequately implemented under the Project manager.

(7) Monitoring report

The Monitoring Report to be submitted to UNFCCC is prepared by TWPC, checked by external consultant and approved by President of TWPC.

(8) Internal audit and management review

Internal audit and management review have been conducted and the internal review for the GHG emission reduction has been carried out.

(9) Environmental impact, Socio-economic impact

The verification team interviewed a local resident /47/,/48/ from Sapgyo-3 village where the nearest village from the project site (3km), and found that there was no complaining about noise from the fan and other environmental related issue. The person mentioned that tourists were increasing to visit the wind farm and they brought the village more income. The project is supporting the village and is received well by the local community.

### 3.5.2 Findings

#### **Clarification Request 3**

It is to be checked by the evidences during on-site assessment, whether the auditing of data and system is being carried out in accordance with the procedures established.

#### **Response**

Sample of daily data sheet and monthly data sheet were provided, that had confirmation signature by management on them /22/.

#### **Clarification Request 4**

It is to be checked by the evidences during on-site assessment, whether the qualification and training for personnel are carried out in accordance with the procedures established.

#### **Response**

The training record in this monitoring period was provided /12/.

#### **Clarification Request 5**

Archiving condition of CDM related data is to be verified during on-site assessment.

#### **Response**

The electric data stored in PC had limited access, and the file of documents was kept in the office with security lock.

#### **Clarification Request 6**

Records of the Internal Audit and the Management Review are to be provided.

#### **Response**

Records of Internal Audit and the Management Review were provided /26/, /27/.

### 3.5.3 Conclusion

#### **Clarification Request 3**

It was verified by signatures on the data records, that all data was confirmed by the person in charge in accordance with the procedure of monitoring.

CL.3 was clarified

#### **Clarification Request 4**

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The verification team confirmed the training was conducted in accordance with the procedures established.

CL4 clarified.

### **Clarification Request 5**

It was confirmed during on-site assessment that the CDM data was organized and stored under reasonable security condition.

CL5 was clarified.

### **Clarification Request 6**

The verification team confirmed Internal Audits were proceeded every 3 months (1 Jun., 1 Sept., 1 Dec., 2010 and 1 Mar., 2011) and the Management review was conducted with monthly report and summarized in the end of year.

CL6 was clarified.

The project complies with the requirements.

## **3.6 Accuracy of Equipment**

### **3.6.1 Discussion**

#### (1) Monitoring equipments

The main and backup meters with accuracy class of 0.5S for electricity generated (KPX meters) were installed at the project site. 2 main meters with accuracy class of 0.5S for electricity imported (KEPCO meters) were also installed at the project site.

**Table 3 Detail information of meters**

Meter	Manufacturer	Type	Accuracy	Validity of Calibration	S/N
Main for export (A&B lines)	Seochang Electric Communication Co., Ltd.	SCE8711	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	46026112
Backup for export (A&B lines)	Seochang Electric Communication Co., Ltd.	SCE8711	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	46026111
Main for export (C&D lines)	Seochang Electric Communication Co., Ltd.	SCE8711	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	46026114
Backup for export (C&D lines)	Seochang Electric Communication Co., Ltd.	SCE8711	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	46026113
Main for import (A&B lines)	LS Industrial System Corp.	LGRW34-05	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	067477
Main for import (C&D lines)	LS Industrial System Corp.	LGRW34-05	0.5S	10/09/2008~10/09/2012 Last calibration date: 10/09/2008	0067467

#### (2) Calibration of meters

According to the revised Monitoring Plan approved by EB on 30 Mar, 2011, calibration should be done in accordance with the Korean laws.

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The actual calibration of the KPX Meters and the KEPCO Meters were conducted based on the “Act on operation of electricity market” /24/, which requires 3 years 6 months ± 6 months (3 years to 4 years) interval of calibration for watt-hour meter for capacity of larger than 1 MW.

The last calibration of the KPX Meters and the KEPCO Meters were conducted on 10 Sep, 2008, therefore this monitoring period was covered.

The calibration records of KPX main and backup meters and the calibration records of KEPCO meters were provided for verification /6/,/7/.

### 3.6.2 Findings

None

### 3.6.3 Conclusion

The project complies with the requirements.

## 3.7 Assessment data and Calculation

### 3.7.1 Discussion

A complete set of data is available, i.e. operation log, meter readings records, monthly reading records, Monthly Power Trading Record by KPX and Monthly Impoted Electricity Amount from KEPCO which can cover the monitoring period. The verification team confirmed that all data recorded is in compliance with the monitoring report.

According to the methodology ACM0002 Version 07 /34/ and registered PDD, emission reductions of the project are calculated by:

$$\begin{aligned} ER_y &= BE_y - PE_y - L_y \\ &= 49,525.00 \text{ tCO}_2 - 0 \text{ tCO}_2 - 0 \text{ tCO}_2 \\ &= 49,525 \text{ tCO}_2 \end{aligned}$$

Where:

$ER_y$  is emission reductions by the project activity in year y;

$BE_y$  is baseline emissions in year y

$PE_y$  is project emissions in year y; zero

$L_y$  is leakage in year y; zero

The baseline emission is calculated by:

$$BE_y = EG_y \times EF_y = ( \text{Electricity exported in year y} - \text{Electricity imported in year y} ) \times EF_y$$

Where:

$EG_y$  is net electricity supplied to the grid in year y;

$EF_y$  is baseline emission factor of Korea, calculated ex-ante and fixed during the first crediting period, the value is 0.6426tCO<sub>2</sub>e/MWh.

The 22.9kV Substation owned by KEPCO between the project and the grid is located in Pyengchang which is approximately 33km away from the project site. The watt-hour meters are installed in the Taegisan Wind Power Co., Ltd. and not in the interface substation. Therefore in order to determine accurate amount of net electricity supplied to the grid, transmission loss between the project site and the substation was considered.

$$LE_y = I^2 R_3 \times T$$

$$\text{kWh Loss} = (I_p / PF)^2 R_3 \times T$$

$$I = I_p / PF$$

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$$I_p = P / (1.732 \times 22.9 \times T)$$

Where:

**P** : Electricity generation / import (measured)

**T** : Time (period) = 24x days

**I** : Current on the transmission line (A)

**PF** : Power Factor of electricity generation (97%)

**R<sub>1</sub>** : The phase resistance (ohm) 1 phase resistance

**R<sub>3</sub>** : The phase resistance (ohm) of 3 transmission lines **R<sub>3</sub>** = 3 x **R<sub>1</sub>**

**22.9** : Voltage of power line from Teaegisan Wind Park to Substation (kV)

### Determination of amount of parameter;

**EF<sub>y</sub>**: Baseline Emission Factor of Korea is calculated ex-ante and fixed during the crediting period.  
The value is 0.6426tCO<sub>2</sub>e/MWh;

**R<sub>1</sub>** : The Wire Resistance of transmission line is based on the transmission cable specifications by manufacturer, Daeil Wire Co., Ltd., Conmolink Co., Ltd. and Taihan Electric Wire Co., Ltd /9/.

1) Underground Transmission Line:

Cable Length: 8km (2 parallel lines)

Test Result of Resistance (per km): 0.07215

Total Resistance for underground T/L: 0.07215 x 8 / 2 = 0.2886

2) Overhead Transmission Line 1:

Cable Length: 22km

Test Result of Resistance (per km): 0.1183

Total Resistance for overhead T/L: 0.1183 x 22 = 2.6026

3) Overhead Transmission Line 2:

Cable Length: 3km

Test Result of Resistance (per km): 0.183

Total Resistance for overhead T/L: 0.183 x 3 = 0.549

Thus overall resistance is calculated sum of underground transmission line resistance and overhead transmission line resistance, which is 0.2886 + 2.6026 + 0.549 = 3.4402.

**R<sub>3</sub>** : = 3 x **R<sub>1</sub>** = 10.3206

**Table 4 Baseline Emission Reduction**

Month	(a) EG <sub>output,y</sub> (MWh)	(b) EG <sub>import,y</sub> (MWh)	(c) TL <sub>y,supply</sub> (MWh)	(d) TL <sub>y,import</sub> (MWh)	NE (MWh) (a-b-c-d)	EF (tCO <sub>2</sub> e/MWh)	BE (tCO <sub>2</sub> e) (NE*EF)
6	2,852	52	39	0.013	2,760	0.6426	1,774
7	6,676	34	210	0.005	6,432	0.6426	4,134
8	5,329	38	133	0.007	5,158	0.6426	3,315
9	4,421	37	95	0.007	4,289	0.6426	2,756
10	4,746	36	106	0.006	4,604	0.6426	2,959
11	9,085	11	400	0.001	8,674	0.6426	5,574
12	10,583	13	525	0.001	10,045	0.6426	6,455
1	9,163	9	395	0.000	8,760	0.6426	5,629



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2	4,573	20	109	0.002	4,445	0.6426	2,856
3	6,507	27	202	0.004	6,278	0.6426	4,034
4	7,948	18	306	0.002	7,624	0.6426	4,899
5	8,355	24	332	0.003	7,999	0.6426	5,140
<b>Total</b>	<b>80,241</b>	<b>320</b>	<b>2,851</b>	<b>0.05</b>	<b>77,070</b>	<b>0.6426</b>	<b>49,525</b>

**3.7.2 Findings**

None

**3.7.3 Conclusion**

The monitoring and the measurement of electricity generation and consumption are done diligently every month as core business of the company and hence a permanent control of the figures in finalizing the amount of electricity generation and consumption takes place.

Quality assurance procedures are in place as for example the double checking of the electricity generation in KPX and TWPC, and comparison with the bill.

The verification team verified the following parameters;

- Daily generation records and “weekly” records
- Monthly record by TWPC and monthly bills by KPX and KEPCO /3/, /4/

The verification team confirmed that daily and monthly record for electrical generation at TWPC site is correct. The monthly data is identical with the monthly bill issued by KPX (Electricity generation) and KEPCO (Electricity consumption).

The data for the electricity consumption is recorded based on the bill for electricity consumption provided monthly by KEPCO. The data is obtained by the KEPCO's watt-hour meters installed in the TWPC.

All parameters stated in the monitoring plan of the registered PDD have been sufficiently monitored and correctly listed. The monitored data for required parameters have been verified and found complete and consistent by checking the whole procedure for information aggregation.

The interface between the project and the grid is located in the Pyeongchang substation owned by Korea Electrical Power Corporation (KEPCO) which is approximately 33km away from the project site.

The watt-hour meters are installed in the project site and not in the interface.

The losses in the transmission line (approx. 33 km) were estimated properly by using the resistance data of the power cable of the transmission line provided by the cable manufacturer and the daily fluctuating wind power current /5/,/9/.

There was no missing data for the emission reductions calculation for the monitoring period.

It was verified by provided various evidences that data used for calculation, method of calculation and result of calculation emission reductions by the project for the monitoring period was in accordance with the revised Monitoring Plan /31/, the registered PDD /32/ and the approved methodology ACM0002 Version 07 /34/.

The emission factor determined ex-ante in the registered PDD is applied in the monitoring report and the calculations have been justified.

The achievement of this monitoring period (1 Jun., 2010 to 31 May, 2011) was approximately 17% less than the estimate of the PDD.

The project complies with the requirements.

### 4. PROJECT SCORE CARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Calculated Emission Reductions	
<b>Completeness</b>	Source coverage/ boundary definition	✓	✓	✓	All relevant sources are covered and boundaries of the project are defined correctly and transparently.
<b>Accuracy</b>	Physical Measurement and Analysis	✓	✓	✓	Meters used for measuring electricity generation and consumption are calibrated.
	Data calculations	✓	✓	✓	Emission reductions are re-calculated correctly.
	Data management & reporting	✓	✓	✓	Data management system is in place.
<b>Consistency</b>	Changes in the project	✓	✓	✓	There are no changes in the project.

## 2nd Periodic Verification Report

**5. VERIFICATION STATEMENT**

JACO CDM has performed a verification of the CDM project "Taegisan Wind Power Project". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

The management of Taegisan Wind Power Co., Ltd. (TWPC) is responsible for the preparation of the GHG emission data and the reported GHG emissions reductions by the "Taegisan Wind Power Project" including the development and maintenance of records and reporting procedures in accordance with the revised Monitoring Plan which is complying with the consolidated methodology ACM0002 version 07 and approved by UNFCCC on 30 March, 2011 and registered PDD Ver.05 registered on 15 May, 2009.

The verifier confirms that the project is implemented as planned and described in the validated and registered PDD as well as the revised Monitoring Plan approved by CDM Executive Board on 30, March, 2011. The project activity is in accordance with the approved methodology ACM0002 version 07. The installed equipments being essential for generating emission reductions run reliably and the relevant meters are calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions.

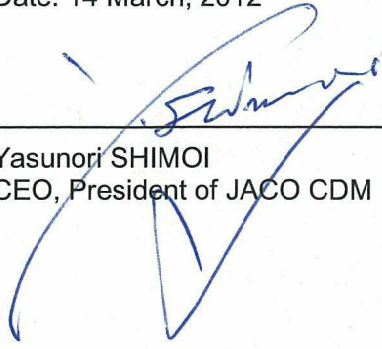
The verifier confirmed that the monitoring was done in accordance with the monitoring plan and the GHG emission reductions in the revised Monitoring Report version 02, dated 22 February, 2012 are calculated without material misstatements. Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated, we confirm the following statement:

Reporting period: From 1 June 2010 to 31 May 2011

Verified emission in the above reporting period:

Baseline emissions:	49,525 tCO <sub>2</sub> equivalents
Project emissions:	0 tCO <sub>2</sub> equivalents
Emission reductions:	49,525 tCO <sub>2</sub> equivalents

Date: 14 March, 2012



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Yasunori SHIMOI  
CEO, President of JACO CDM

## 2nd Periodic Verification Report

## 6. References

**Category 1 Documents:**

*List documents provided by the Client that relate directly to the GHG components of the project. These should have been used as direct sources of evidence for the verification conclusions, and are usually further checked through interviews with key personnel.*

- /1a/ CDM Monitoring Report (1 June, 2010 to 31 May, 2011) Version 01< dated 10/01/2012>
- /1b/ CDM Monitoring Report (1 June, 2010 to 31 May, 2011) Version 02< dated 22/02/2012>
- /2/ Monitoring Manual (Version 1.4, dated 01 November, 2011)
- /3a/ Monthly exchange amount of electric power for Taegisan Wind Power Co., Ltd. by KPX (period:1/06/2010 to 31/05/2011) (Original)
- /3b/ Monthly exchange amount of electric power for Taegisan Wind Power Co., Ltd. by KPX (period:1/06/2010 to 31/05/2011) (Translation)
- /4a/ Monthly electric power usage for Taegisan Wind Power Co., Ltd. by KEPCO (period:1/06/2010 to 31/05/2011) (Original)
- /4b/ Monthly electric power usage for Taegisan Wind Power Co., Ltd. by KEPCO (period:1/06/2010 to 31/05/2011) (Translation)
- /5/ Calculation of Emission Reduction & Transmission Loss for Taegisan WP (period: June 2010 to May 2011)
- /6a/ Calibration Report of watt-hour meters<A/B lines Main/Sub meters> (Initial calibration for KPX meters) (Original)
- /6b/ Calibration Report of watt-hour meters<A/B lines Main/Sub meters> (Initial calibration for KPX meters) (Translation)
- /7/ Calibration Report of watt-hour meter <A/B lines Import meters> (Initial calibration for KEPCO meters)
- /8/ Completion of construction inspection (30/01/2009)
- /9a/ The Result of performance test (Certificate of Resistance (ACSR-AW/OC 240sq )
- /9b/ The Result of performance test (Certificate of Resistance (RP-ABC-W 150sq)
- /9c/ The Result of performance test (Certificate of Resistance (CNCV-W 250sq)
- /10/ Map of transmission line to the substation
- /11/ WTG Record of Maintenance (2010-2011)
- /12/ Training Record
- /13/ Contract for joint development (decision as CDM PJ)
- /14/ ENGINEERING,PROCUREMENT AND CONSTRUCTION CONTRACT FOR HOENGSEONG WIND POWER PROJECT
- /15/ The Service Contract
- /16/ Wind Turbine Purchase Agreement (12 Mar. 2007)
- /17/ The approval of the construction (13/06/2007)
- /18/ The Statement for Starting Construction Work (20/08/2007)
- /19a/ Taking-Over Certificate (Phase 1) (20/11/2008)
- /19b/ Taking-Over Certificate (Phase 2) (26/12/2008)
- /20/ Starting Commercial Operation for Wind Power (28/01/2009)
- /21/ Wind Turbine Description (04/03/2005) Vestas
- /22/ Samples of actual reporting of monitoring results(daily, monthly, yearly)
- /23/ Brochure of Taegisan Wind Power Co., Ltd.
- /24/ Act on Operation of Electricity Market (June 2010)
- /25/ Law regarding Measurement Act. No.9496 (18 Mar. 2009)
- /26/ Management Review
- /27/ Record of Internal Audits

## 2nd Periodic Verification Report

### Category 2 Documents:

*List background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents should have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.*

- /31/ Revised Monitoring Plan (approved 30 Mar. 2011)
- /32/ PDD Version 05 (20 Feb. 2009)
- /33/ Validation Report (by Korean Foundation for Quality, 25/12/2009)
- /34/ Methodology ACM0002 Version 07
- /35/ UNFCCC VVM version 01.2
- /36/ 1st Periodic Verification Report (15 May, 2009 to 31 May, 2010) GR10W0018D
- /37/ Preliminary Environmental Assessment(Jan. 2007)
- /38/ Post Environmental Assessment (Nov. 2010)

### Persons interviewed:

*List persons interviewed during the initial verification, or persons contributed with other information that are not included in the documents listed above.*

- /41/ Mr. Jae-Oh Lim (Vice President, Taegisan Wind Power Co., Ltd.)
- /42/ Mr. Jin-Seon Oh (Senior Clerk, Taegisan Wind Power Co., Ltd.)
- /43/ Mr. Chan-Hee Lee (Engineer, Taegisan Wind Power Co., Ltd.)
- /44/ Ms. Eun-Young Yoo (Manager, Eurus Energy Korea Corporation.)
- /45/ Mr. Kenji Kamei (Director, Eurus Energy Korea Corporation.)
- /46/ Mr. Hee-Sung Lee (Assistant Manager, RCC Co., Ltd.)
- /47/ Mr. Young-Ho Cho (Village mayor, Sapgyo3-ri,Dunnae-myun,Hoengseong-gun)
- /48/ Mr. Hwan-Soo Yong (Village leader, Sapgyo3-ri,Dunnae-myun,Hoengseong-gun)

# Appendix 1: Verification Checklist

## 2nd Periodic Verification Checklist

for

## Taegisan Wind Power Project

Monitoring Period: 01 June, 2010 to 31 May, 2011

**Table 1: Periodic Verification Checklist**

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
<b>A. Opening Session</b>			
<b>A.1. Introduction to audits</b>	/41/ /42/ /43/ /44/ /46/	<ul style="list-style-type: none"> <li>▶ DOE explains to project participants about the purpose, scope and process of the verification at the project site of Taegisan Wind Power Co., Ltd. in Hoengseong-Gun on 16 Feb, 2012.</li> <li>▶ Participants: <ul style="list-style-type: none"> <li>- Project Participants: Eurus Energy Korea Corporation; Ms. Eun-Young Yoo, Taegisan Wind Power Co., Ltd ; Mr. Jae-Oh Lim Mr. Jin-Seon Oh, Mr. Chan-Hee Lee RCC Co., Ltd ; Mr. Hee-Sung Lee ,</li> <li>- Verification team: Mr. Yukio TAKANO, JACO CDM Lead auditor Mr. Akihide MADENOKOJI, JACO CDM auditor</li> </ul> </li> </ul>	<b>OK</b>
<b>A.2. Clarification of access to data archives, records, plans, drawings etc.</b>		Access to relevant data, archives, records, plans and drawings was provided to the verification team.	<b>OK</b>
<b>A.3. Contractors for equipment and installation works</b> Who has installed the equipment? Who was contracted for planning etc.?	/8/ /13/- /21/ /32/	<ul style="list-style-type: none"> <li>▶ Wind Turbine(V80) made by Vestas Wind System (Denmark)</li> <li>▶ Plant design: HYUNDAI Engineering Co., LTD.</li> <li>▶ Installation work by: POSCO Engineering and Construction Co., Ltd. (Korea)</li> </ul>	<b>OK</b>

## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
<b>A.4. Actual status of installation works</b> Project installation should be finished at time of 1st verification in so far as the project should be ready to generate emission reductions afterwards.	/8/ /13/ /21/ /32/	<ul style="list-style-type: none"> <li>▶ -Construction Start date: 25-07-2007</li> <li>-Commissioning date: 06-10-2008~26-12-2008</li> <li>-Completion of the Construction: 30-01-2009</li> <li>-Commercial Operation date: 28-01-2009</li> <li>▶ The date of decision as CDM project: 03-02-2006.</li> </ul>	OK
<b>A.5. Open issue by the validation or previous verification. (VVM189)</b>	/33/ /36/	<ul style="list-style-type: none"> <li>▶ Based on the validation report and the previous verification report, the verification team identified no missing steps. There is no open issue by the validation.</li> <li>▶ The project has been registered under the CDM reference number 2302, on 15 May, 2009.</li> </ul>	OK
<b>B. Implementation of the project</b> This part is covering the essential checks during the on-site inspection at the project's site, which is indispensably for 1st verification			
<b>B.1. Physical components</b> Check the installation of all required facilities and equipment as described by the PDD. (VVM196)	/13/ /21/ /32/	<ul style="list-style-type: none"> <li>▶ V80 wind turbine generators made by Vestas Wind Systems (2MW × 20units) were installed during the period of 25-07-2007 to 26-12-2008(last Commissioning date). The total capacity of project is 40MW.</li> <li>▶ As the evidences of completion of the installation, the takeover certifications were provided.</li> <li>▶ During the on-site verification, the verification team visited 6 wind turbine generators( No.1, 5, 8, 11, 14 and 18), and also checked the related meters (export and import) and checking system by PC, transformers (22.9 kV), etc. It was confirmed that all equipments were under operation and they had same capacity since the operation started. Generated electricity by the project is delivered by 22.9kV transmission line to the Grid, KEPCO Pyeongchang transformer substation.</li> <li>▶ The verification team also has confirmed that the 20 wind turbine generators are divided into 2 groups and each group has the same transmission line to the central control panel of the site.</li> <li>▶ The verification team checked the operation logs and interviewed</li> </ul>	OK



## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)										
		<p>operational staffs. The verification team confirms that the project has been operated by the PP as per the registered PDD.</p> <p>Specification of Wind Turbine Generator;</p> <table><tr><td>Type of Generator</td><td>V80</td></tr><tr><td>Generation Capacity</td><td>2MW</td></tr><tr><td>Operation data</td><td>50Hz/60Hz 690V</td></tr><tr><td>Rotator diameter</td><td>80m</td></tr><tr><td>Manufacturer</td><td>Vestas Wind System</td></tr></table>	Type of Generator	V80	Generation Capacity	2MW	Operation data	50Hz/60Hz 690V	Rotator diameter	80m	Manufacturer	Vestas Wind System	
Type of Generator	V80												
Generation Capacity	2MW												
Operation data	50Hz/60Hz 690V												
Rotator diameter	80m												
Manufacturer	Vestas Wind System												
<b>B.2. Project boundaries</b> Check whether the project boundaries are still in compliance with the ones indicated by the PDD. (VVM196)	/32/	<p>The electricity generated by the Project is supplied to Grid of KEPCO through 2 transmission lines as described in the Monitoring Report. Actual project boundary is in compliance with the condition described in the PDD.</p>	OK										
<b>B.3. On-site visit</b> Was on-site visit conducted? If not, justify the rational of decision. (VVM197)		<p>The verification team, Yukio Takano and Akihide Madenokoji of JACO visited the project site on 16th of Feb, 2012.</p> <p>During on-site visit, interview was conducted with PP and local residents.</p>	OK										
<b>B.4. Change in operation</b> Does the implementation or operation of CDM project activity in compliance with the description contained in the registered PDD? (VVM197)	<p>/8/</p> <p>/11/</p> <p>/13/-</p> <p>/21/</p> <p>/32/</p>	<p>The construction of the project started on 25 July, 2007. The first set of Wind Turbine Generator was commissioned on 6 Oct., 2008 and the last one was on 26 Dec., 2008. Commercial operation was started on 28 Jan., 2009.</p> <p>The project is operated by Taegisan Wind Power Co., Ltd. The verification team checked the operation logs and interviewed operational staffs. The verification team confirms that the project has been operated by the PP as per the registered PDD.</p> <p>During the monitoring period, no generator of WTG (Wind Turbine Generator) was replaced.</p> <p>There was no malfunction occurred on the monitoring meters during the Monitoring Period.</p> <p>The switchgear room was visited to inspect meters, and the wind turbine No. 1, 5, 8, 11, 14 and 18 were visited during on-site assessment. It was confirmed that all equipments were under operation and they had same capacity since the operation started.</p>	<p>CL1</p> <p>→Clarified</p> <p>OK</p>										

## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
		<p>There are no events or situations that occurred during this monitoring, which could impact the applicability of the applied methodology.</p> <p><b>Clarification Request 1</b>  <b>Maintenance record during this monitoring period is to be clarified during on-site assessment. It will be confirmed whether any modification of equipment was done during the monitoring period.</b></p>	
<p><b>B.5. Impacts by changes</b>  If not, what is the potential impact due to the change, according to the relevant guidelines established by the EB? (VVM197)</p>	No.		OK
<p><b>B.6. Notification or approval of changes</b>  Was a notification or request for approval of changes from the project activity as described in the registered PDD submitted prior to the conclusion of the verification/certification for the corresponding monitoring period? (VVM197)</p>	No.		OK
<p><b>C. Compliance of the Monitoring Plan</b>  Verification of the monitoring plan of the project complies with the applied monitoring methodology.</p>			
<p><b>C.1. Monitoring Plan</b>  Check whether the monitoring plan of the project in accordance with the approved methodology applied by the proposed CDM project activity. (VVM200)</p>	/1/ /31/ /32/ /34/	The verification team verified the monitoring plan of the registered PDD and revised Monitoring Plan against the methodology ACM0002 Version 07 applied by the project, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures as described in the monitoring plan, and is able to confirm that the monitoring plan of the registered PDD is in accordance with the applied methodology, ACM0002 Version 07.	OK
<p><b>C.2. Request for revision of Monitoring Plan</b>  In case if the monitoring plans of the project is not</p>	/31/ /32/	The Monitoring Plan was revised during the 1st Verification and it was approved by EB on 30 Mar, 2011.	OK

## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
in accordance with the monitoring methodology, was the request for revision of the monitoring plan done? (VVM201)			
<b>C.3 Monitoring Aspect</b> Are there any monitoring aspects of the project activity that are not specified in the methodology (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)? (VVM202)		No.	OK
<b>D. Compliance of the monitoring</b> Verification of the monitoring of the project in accordance with the registered PDD.			
<b>D.1. Monitoring plan and methodology</b> Check whether the PP implemented and followed the approved monitoring plan and applied monitoring methodology.(VVM205)	/1/ /31/ /32/ /34/	Yes. According to the document review and on-site visit, It was verified that the PP implemented and followed the approved monitoring plan of the registered PDD and applied methodology, ACM0002 Version 07. <b>Clarification Request 2</b> <b>It is to be checked by the evidences during on-site assessment, whether the monitoring is being carried out in accordance with the procedures established.</b>	CL2 →Clarified OK
<b>D.2. Project emission parameter</b> (VVM205(b))	/1/ /31/ /32/ /34/	Since the project is grid-connected electricity generation from renewable energy sources, there are no GHG emissions from the project activity, so that the project emissions ( $PE_y$ ) are zero, according to the approved methodology ACM0002 Version 07.	OK
<b>D.3. Baseline emission parameter</b> (VVM205(b))	/1/ /31/ /32/ /34/	According to the registered PDD, the annual electricity supplied by the project to the grid ( $EG_y$ ) is calculated as the Electricity delivered to the grid minus the Electricity purchased from the grid. As verified during site visit, the Electricity delivered by the project to the grid and the Electricity purchased by the project are continuously measured by KPX Meters and KEPCO Meters, they are installed on the transmission line at the project site. The KPX Backup Meters are also installed as a back up of	OK

## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
		<p>KPX Meter on the transmission line at the project site.</p> <p>The amount of electricity transmitted to the grid is measured automatically by the KPX meters, and simultaneously transferred to Taegisan central control system (PC). The data is collected and archived electronically. The person in charge of data acquisition record the electricity generated on 3<sup>rd</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 16<sup>th</sup>, 27<sup>th</sup> and last day of every month through KPX's home page. The monthly and yearly electricity generated is recorded based on the collected data. The monthly data is double checked with its receipt. The daily, monthly and yearly electricity generated is confirmed by KPX homepage.</p> <p>The amount of electricity consumed in the project site is daily checked by reading the KEPCO meter and is compared monthly with the KEPCO's invoice.</p> <p>The verifier has verified the values reported in the Monitoring Report and CER calculation spreadsheet against the Monthly Power Trading Record on this monitoring period (June 2010 to May 2011) of Taegisan Wind Power Co., Ltd. by Korea Power Exchange and the Monthly Used Electricity Amount on this monitoring period (June 2010 to May 2011) by KEPCO, and found that they are consistent with each other after excluding the impact of the transmission line loss.</p>	
<b>D.4. Leakage parameter</b> (VVM205(b))	/1/ /31/ /32/ /34/	<p>It was verified during on-site assessment that there was no energy generating equipment transferred from another activity and no existing equipment transferred to another activity. Therefore the leakage emissions are zero, <math>LE_y=0</math> according to ACM0002 (Version 07).</p>	OK
<b>E. Management and Operational System</b> In order to ensure a successful operation of a Client project and the credibility and verifiability of the ERs achieved, the project must have a well defined management and operational system. (VVM205 (b))			
<b>E.1. Reporting procedures</b> Check how reports with relevance for the later determination of emission reductions will be	/1/ /22/	<p>The responsibility of measuring, checking and reporting the amount of electricity is defined, and the qualification and training for the personnel are established and implemented.</p>	<b>CL3</b> →Clarified

## Appendix 1

### Verification Checklist of Taegisan Wind Power Project

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
generated	/31/ /32/ /34/	<p>The amount of export electricity was being reported daily, monthly and yearly in the established formats and checked by responsible persons including the president with their signatures.</p> <p>Reporting procedures have been already established in the CDM Monitoring Manual.</p> <p><b><u>Clarification Request 3</u></b></p> <p><b>It is to be checked by the evidences during on-site assessment, whether the auditing of data and system is being carried out in accordance with the procedures established.</b></p>	<b>OK</b>
<p><b>E.2. Documented instructions</b></p> <p>Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions have access and knowledge of documented instructions, forming a part of the project's management system.</p>	/2/	<p>The organization chart, detail responsibility, qualification of CDM operational staff and procedure are stipulated in the CDM Monitoring Manual.</p> <p>The personnel training have been established for CDM monitoring operation.</p>	<b>OK</b>
<p><b>E.3. Documentation</b></p> <p>The system should be documented by manuals and instructions for all procedures and routines with relevance to the quality of emission reductions. The accessibility of such documentations to persons working on the project has to be secured.</p>	/2/	<p>The Monitoring Manual has been established in detail based on the PDD and implemented regarding the main subject (1)Definition of Monitoring,(2) Purpose of Monitoring, (3) Organization for Monitoring, (4) Monitoring equipment, (5)Power Transmission, (6)Data acquisition and Storage, (7)Internal data verifying procedure, (8)Quality Assurance / Quality Control,(9)Audit, (10)Taking action against emergency, (11)Monitoring report, (12) Calibration, (13)Training. All the data and documents are kept in archives by the project manager.</p> <p>The simplified Manual is easy to be accessed by the persons working on the project.</p>	<b>OK.</b>
<p><b>E.4. Qualification and training</b></p> <p>The system should describe the requirements on qualification and the need of training programs for all persons working on the emission reduction</p>	/1/ /2/ /12/ /31/	<p>The qualification and training for the personnel are established and implemented. It was confirmed that the reporting was being conducted in accordance with the CDM Monitoring Manual of established based on the approved revised Monitoring Plan and the PDD.</p>	<p><b>CL4</b></p> <p><b>→Clarified</b></p> <p><b>OK</b></p>

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OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
project. Performed training programs and certificates should be archived by the system.	/32/	<b>Clarification Request 4</b> <b>It is to be checked by the evidences during on-site assessment, whether the qualification and training for personnel are carried out in accordance with the procedures established.</b>	
<b>E.5. Allocation of responsibilities</b> The allocation of responsibilities should be documented in written manner.	/1/ /2/ /31/ /32/	Roles and responsibilities are clearly stipulated in the Manual of CDM Monitoring and the Monitoring Report Section C. They are in line with the Monitoring Plan of the registered PDD.	OK
<b>E.6. Emergency procedures</b> The system should contain procedures which provide emergency concepts in case of unexpected problems with data access and/or data quality.	/1/ /2/ /31/ /32/	<ul style="list-style-type: none"> <li>▶ The Emergency procedures has been established in the Monitoring Manual ( Taking action against emergency).</li> <li>▶ If stoppage of monitoring process occurs because of need for calibration, every detailed replacement procedures must be recorded in log sheet. (This sheet includes precise record of stoppage time and the reason of the stoppage (based on DD-MMM-YYYY, HH:MM format)).</li> <li>▶ Follow regulation on electric operation, when the data is omitted from project facility failure, calibration, measuring meters failure.</li> <li>▶ Responsible person is described in “3. Organization for monitoring”</li> </ul>	OK
<b>E.7. Data archiving</b> The system should provide routines for the archiving of all data which is required for verifying the project's performance in the context of consecutive verifications.	/1/ /2/ /31/ /32/	<ul style="list-style-type: none"> <li>▶ The system of archiving the relevant data has been established in the Monitoring Manual (Data acquisition and Storage, QA/QC).</li> <li>▶ Six times a month, monthly data are stored in the folder in charge of data analysis.</li> <li>▶ Six times a month, monthly data are copied from the computer in charge of data analysis and stored continuously for backup.</li> <li>▶ Taegisan Wind Power Co. records the electricity supplied to the grid six times a month. The recorded data is double checked with the receipt of it.</li> <li>▶ The monthly and yearly electricity consumed is recorded in excel sheet and managed by Taegisan Wind Power Co. The electricity consumed is double checked with the receipt of it.</li> </ul>	CL5 →Clarified OK
		<b>Clarification Request 5</b>	

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OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
		<b>Archiving condition of CDM related data is to be verified during on-site assessment.</b>	
<b>E.8. Monitoring report</b> The system includes procedures for the calculation of emission reductions and the preparation of the monitoring report.	/1/ /2/ /31/ /32/	▶ The procedures of Monitoring report has been established in the Monitoring Manual (Monitoring report). ▶ CDM monitoring report is written by a person in charge of it and the writing frequency rely on given conditions. 'Issued date', 'Revised version', 'Monitoring period' should be properly recorded every time. The written monitoring report should be confirmed and approved by both of Shareholders.	<b>OK</b>
<b>E.9. Internal audits and management review</b> The system includes internal control procedures, which allow the identification and solution of problems at an early stage.	/1/ /2/ /26/ /27/	▶ The Internal audit system is established and documented in the Monitoring Manual (Audit)and implemented. ▶ The Management Review (monitoring verification ) is established, documented in the Monitoring Manual (Monitoring report ) and implemented. <b>Clarification Request 6</b> <b>Records of the Internal Audit and the Management Review are to be provided.</b>	<b>CL6</b> <b>→Clarified</b> <b>OK</b>
<b>F. Accuracy of equipment</b> The accuracy of equipment used for monitoring is in accordance with the relevant guidance provided by the CDM Executive Board and is controlled and calibrated in accordance with the monitoring plan (VVM205 (c))			
<b>F.1. Monitoring and metering systems</b> Check whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.	/1/ /2/ /6/ /7/	As verified during site visit, the Electricity delivered by the project to the grid and the Electricity purchased by the project are continuously measured by KPX Meters and KEPCO Meters, they are installed on the transmission line at the project site. The KPX Backup Meters are also installed as a back up of KPX Meter on the transmission line at the project site. The frequency of meter calibration is every 3.5 year (+/- 6 month) in accordance with standard of "Act on operation of electricity market". Therefore there is no need to do additional calibrations for KPX meters and KEPCO meters during this monitoring period (01/06/2010~31/05/2011). Detail information of the meters	<b>OK</b>

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OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)																																																				
		<p>is as below.</p> <table><thead><tr><th rowspan="2">KPX Meter</th><th colspan="2">A and B Line Meters</th><th colspan="2">C and D Line Meters</th></tr><tr><th>Main</th><th>Backup</th><th>Main</th><th>Backup</th></tr></thead><tbody><tr><td>Model</td><td>SCE8711</td><td>SCE8711</td><td>SCE8711</td><td>SCE8711</td></tr><tr><td>Class</td><td>0.5S</td><td>0.5S</td><td>0.5S</td><td>0.5S</td></tr><tr><td>Serial No.</td><td>46026112</td><td>46026111</td><td>46026114</td><td>46026113</td></tr><tr><td>Calibration Date</td><td>10 Sept. 2008</td><td>10 Sept. 2008</td><td>10 Sept. 2008</td><td>10 Sept. 2008</td></tr><tr><td>Manufacturer</td><td>Seochang Electric Communication Co., Ltd.</td><td>Seochang Electric Communication Co., Ltd.</td><td>Seochang Electric Communication Co., Ltd.</td><td>Seochang Electric Communication Co., Ltd.</td></tr></tbody></table> <table><thead><tr><th>KEPCO Meter</th><th>A and B Line Meter</th><th>C and D Line Meter</th></tr></thead><tbody><tr><td>Model</td><td>LGRW34-05</td><td>LGRW34-05</td></tr><tr><td>Class</td><td>0.5S</td><td>0.5S</td></tr><tr><td>Serial No.</td><td>0067477</td><td>0067467</td></tr><tr><td>Calibration Date</td><td>10 Sept. 2008</td><td>10 Sept. 2008</td></tr><tr><td>Manufacturer</td><td>LS Industrial Systems Co., Ltd.</td><td>LS Industrial Systems Co., Ltd.</td></tr></tbody></table>	KPX Meter	A and B Line Meters		C and D Line Meters		Main	Backup	Main	Backup	Model	SCE8711	SCE8711	SCE8711	SCE8711	Class	0.5S	0.5S	0.5S	0.5S	Serial No.	46026112	46026111	46026114	46026113	Calibration Date	10 Sept. 2008	10 Sept. 2008	10 Sept. 2008	10 Sept. 2008	Manufacturer	Seochang Electric Communication Co., Ltd.	Seochang Electric Communication Co., Ltd.	Seochang Electric Communication Co., Ltd.	Seochang Electric Communication Co., Ltd.	KEPCO Meter	A and B Line Meter	C and D Line Meter	Model	LGRW34-05	LGRW34-05	Class	0.5S	0.5S	Serial No.	0067477	0067467	Calibration Date	10 Sept. 2008	10 Sept. 2008	Manufacturer	LS Industrial Systems Co., Ltd.	LS Industrial Systems Co., Ltd.	
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<b>F.2. Data uncertainty</b> How will data uncertainty be determined for later calculations of emission reductions? Is this in compliance with monitoring and metering equipment?	/1/ /2/ /3/ /4/	<ul style="list-style-type: none"><li>▶ KPX meters for export electricity with error class of 0.5(main meter) and 0.5(sub-meter) as well as KEPCO meters for import with error class of 0.5 are installed in the Taegisan Site.</li><li>▶ The amount of export electricity measured by KPX meter is also transferred automatically to Taegisan central control system(PC) and archived in</li></ul>	<b>OK</b>																																																				



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OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
	/22/	<p>electronic way (daily, weekly, monthly).</p> <ul style="list-style-type: none"> <li>▶ The collected variables transferred to Taegisan central control system are compared with those of KPX shown on its website. If the two variables compared are different, the electricity meters and other related equipments shall be checked. The results will be reported to the CDM project manager. The causes of differences are not found, the electricity supplied to the grid is decided by discussing with KPX.</li> <li>▶ The amount of import electricity is daily recorded and examined the KEPCO's invoices of the records against the data in six times a month. And the amount of import electricity is compared monthly with the KEPCO's invoice.</li> </ul> <p>During this monitoring period, the meters operated normally and no emergency occurred.</p>	
<p><b>F.3. Calibration and quality assurance</b></p> <p>Check how monitoring and metering systems are subject to calibration and quality assurance routines</p> <p>a) with installation</p> <p>b) during future operation</p>	<p>/1/</p> <p>/2/</p> <p>/6/</p> <p>/7/</p> <p>/24/</p>	<p>According to the revised Monitoring Plan approved by EB on 30 Mar, 2011, calibration should be done in accordance with the Korean laws.</p> <p>The actual calibration of the KPX Meters and the KEPCO Meters were conducted based on the "Act on operation of electricity market", which requires 3 years 6 months ± 6 months (3 years to 4 years) interval of calibration for watt-hour meter for capacity of larger than 1 MW.</p> <p>The last calibration of the KPX Meters and the KEPCO Meters were conducted on 10 Sep, 2008, therefore this monitoring period was covered.</p> <p>The calibration records of KPX main and backup meters and the calibration records of KEPCO meters were provided for verification.</p>	OK
<p><b>F.4. Data acquisition and data processing systems</b></p> <p>Check the eligibility of used systems.</p>	<p>/1/</p> <p>/2/</p> <p>/3/</p> <p>/4/</p> <p>/22/</p>	<ul style="list-style-type: none"> <li>▶ The system is established in the Monitoring Manual.</li> <li>▶ The amount of export electricity measured by KPX meter is also transferred automatically to Taegisan central control system(PC) and archived in electronic way.</li> <li>▶ The electricity generated is recorded six times a month by Taegisan Wind Power. The person in charge of data acquisition record the electricity generated on 3<sup>rd</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 16<sup>th</sup>, 27<sup>th</sup> and last day of every month through KPX's home page.</li> <li>▶ The monthly and yearly electricity generated is recorded based on the</li> </ul>	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
		<p>collected data.</p> <ul style="list-style-type: none"> <li>▶ The monthly data is double checked with its receipt.</li> <li>▶ The daily, monthly and yearly electricity generated is confirmed by KPX homepage.</li> <li>▶ The amount of import electricity is daily recorded by reading the KEPCO meter and is compared with the KEPCO's invoices.</li> </ul>	
<p><b>G. Internal Data</b></p> <p>Identifying the internal GHG data sources and ways in which the data have been collected, calculated, processed, aggregated and stored should be part of verification to assess accuracy and reliability of the internal GHG data. (VVM205(b))</p>			
<p><b>G.1. Type and sources of internal data</b></p> <p>Acquire information on type and source of internal GHG data, which is used in calculations of emission reductions. e.g.. "continuous direct measurements", "site-specific correlations", "periodic direct measurements", "use of models" and/or "use of default emissions factors".</p>	<p>/1/ /2/ /5/ /9/ /31/ /32/ /34/</p>	<p>According to the methodology ACM0002 (Version 07) and registered PDD, emission reductions of the project are calculated by:</p> $ER_y = BE_y - PE_y - LE_y$ <p>Where:</p> <p><math>ER_y</math> is emission reductions by the project activity in year y;</p> <p><math>BE_y</math> is baseline emissions in year y;</p> <p><math>PE_y</math> is project emissions in year y;</p> <p><math>LE_y</math> is leakage in year y.</p> <p>The baseline emission is calculated by:</p> $BE_y = EG_y \times EF_y = [(Electricity\ supplied\ in\ year\ y) - (Electricity\ purchased\ in\ year\ y)] \times EF_y$ <p>Where:</p> <p><math>EG_y</math> is net electricity supplied to the grid during the monitoring period(MWh);</p> <p><math>EF_y</math> is baseline emission factor of Korea, calculated ex-ante and fixed during the crediting period, the value is 0.6426tCO<sub>2</sub>e/MWh.</p>	OK

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		<p>The 22.9kV Substation owned by KEPCO between the project and the grid is located in Gangwon, east of the project site. The whole transmission lines reach 33km(underground 8km and overhead 25km).The watt-hour meters are installed in the Taegisan Wind Park and not in the interface substation. Therefore in order to determine accurate amount of net electricity supplied to the grid, transmission loss between the project site and the substation was considered.</p> <p><math>kWh \text{ Loss} = I^2 R_3 \times T</math></p> <p><math>kW \text{ Loss} = I^2 R_3</math></p> <p><math>I = I_p / PF</math></p> <p><math>I_p = P / (1.732 \times 22.9 \times T)</math></p> <p>Where:</p> <p><b>P</b> : Electricity generation (kWh) (measured)</p> <p><b>T</b> : Time period = 24 x days</p> <p><b>I</b> : Current on the transmission line (A)</p> <p><b>PF</b> : Power Factor (%)=97</p> <p><b>R<sub>1</sub></b> : the phase resistance (Ω)=3.4402 (one phase resistance)</p> <p><b>R<sub>3</sub></b> : the phase resistance (Ω) of three transmission lines</p> <p><math>R_3 = 3 \times R_1</math></p> <p>22.9 : the voltage of power line from Taegisan Wind Park to the Substation (kV)</p> <p>There was no missing data for the emission reductions calculation for the monitoring period.</p>	
<p><b>G.2. Quality assurance</b></p> <p>Does internal data collection underlie sufficient quality assurance routines?</p>	<p>/1/</p> <p>/2/</p> <p>/3/</p>	<p>► The amount of export electricity monitored by the calibrated KPX meters (main meter and sub-meter) and simultaneously transferred to Taegisan central control system is compared with those of KPX shown on its website. If the two variables compared are different, KPX checks its data</p>	OK

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OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs)
	/4/ /22/	<p>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 result will be 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 will be used in the first place according to "Act on operation of electricity market".</p> <ul style="list-style-type: none"> <li>▶ In case of main meter problems (malfunction/inspection and repair works), sub-meter reading will be used according to the Monitoring plan .</li> <li>▶ The amount of import electricity is daily checked by reading the KEPCO meter and is compared monthly with the KEPCO's invoice.</li> <li>▶ If the two variables are different, internal investigation and corrective actions are taken [Monitoring plan].</li> <li>▶ The meters were authorized through the formal process to have the allowable error of data within <math>\pm 0.5\%</math> (for main meter) and <math>\pm 0.5\%</math>(for sub-meter) required by the legal regulation. And the meters were calibrated as frequently as required by the related laws and the regulation of KPX (Monitoring plan).</li> <li>▶ The amount of export electricity is being reported daily, monthly and yearly in the established formats and checked by responsible persons including the president with their signatures.</li> </ul>	
<p><b>G.3. Significance and reporting risks</b></p> <p>Assess the significance and reporting risks related to the different internal data sources. Potential reporting risks may be related to the calculation methods, accuracy of data sources and data collection and/or the information systems from which data is obtained. The significance of and risks associated with the data source indicate the level of verification effort required at a later stage.</p>	/1/ /2/ /3/ /4/ /22/	<p>The potential reporting risks are considered to be small based on the facts described in G.2. above.</p>	OK
<b>H. External Data</b>			

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Especially for data of baseline emissions there might be the necessity to include external data sources. The access to such data and a proof of data quality should be part of verification. If it is deemed to be necessary, an entity delivering such data should be audited. (VVM205(b))			
<b>H.1. Type and sources of external data</b> Acquire information on type and source of external data, which is used in calculations of emission reductions	/1/ /2/ /9/ /31/ /32/	<p><b>EF<sub>y</sub></b>: Baseline Emission Factor of Korea is calculated ex-ante and fixed during the crediting period. The value is 0.6426tCO<sub>2</sub>e/MWh;</p> <p><b>R<sub>1</sub></b> : The Wire Resistance of transmission line is based on the transmission cable test report by manufacturers, COSMOLINK Co., Ltd., Daeil wire Co., Ltd. and TAIHAN ELECTRIC WIRE Co., Ltd.</p> <p>1) Underground Transmission Line:            Cable Length: 8km (parallel)            Test Result of Resistance (per km): 0.07215            Total Resistance for underground T/L: 0.07215* 8/2 = 0.2886</p> <p>2) Overhead Transmission Line:            Cable Length: 22km            Test Result of Resistance (per km): 0.1183            Total Resistance for overhead T/L: 0.1183 * 22 =2.6026</p> <p>3) Overhead Transmission Line:            Cable Length: 3km            Test Result of Resistance (per km): 0.183            Total Resistance for overhead T/L: 0.183 * 3 =0.549</p> <p>Thus overall resistance is calculated sum of underground transmission line resistance and 2 overhead transmission line resistances, which is 0.2886 + 2.6026 + 0.549 = 3.4402</p> <p><b>R<sub>3</sub></b> : The Wire Resistance of 3 transmission line (3 phase)  <b>R<sub>3</sub></b> = 3 x <b>R<sub>1</sub></b> = 10.3206</p>	
<b>H.2. Access to external data</b> How is data transferred? How can reproducibility of data set be ensured?	/1/ /2/ /9/ /31/ /32/	<p><b>EF<sub>y</sub></b> has been determined and fixed for the crediting period in the registered PDD.</p> <p><b>R<sub>3</sub></b> has been determined based on the test report of the transmission cable by the manufacturer and fixed for the crediting period.</p>	OK

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<b>H.3. Quality assurance</b> Does external data underlie any quality assurance routines?	/1/ /2/ /3/ /4/ /31/ /32/	<ul style="list-style-type: none"> <li>▶ The amount of export electricity monitored by the calibrated KPX meters (main meter and sub-meter) and simultaneously transferred to Taegisan central control system is compared with those of KPX shown on its website. 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 result will be 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 will be used in the first place according to "Act on operation of electricity market".</li> <li>▶ In case of main meter problems (malfunction/inspection and repair works), sub-meter reading will be used according to the Monitoring plan .</li> <li>▶ The amount of import electricity is daily checked by reading the KEPCO meter and is compared monthly with the KEPCO's invoice.</li> <li>▶ If the two variables are different, internal investigation and corrective actions are taken [Monitoring plan].</li> <li>▶ The meters were authorized through the formal process to have the allowable error of data within <math>\pm 0.5\%</math> (for main meter) and <math>\pm 0.5\%</math>(for sub-meter) required by the legal regulation. And the meters were calibrated as frequently as required by the related laws and the regulation of KPX (Monitoring plan).</li> <li>▶ The amount of export electricity is being reported daily, monthly and yearly in the established formats and checked by responsible persons including the president with their signatures.</li> </ul> <p>Receipt of sales of delivered electricity by KPX and Invoice of electricity consumption by KEPCO were provided before on-site assessment.</p>	OK
<b>H.4. Emergency procedures</b> Are there any procedures which will be applicable if	/1/ /2/	<p>The procedures applicable in the case of emergency of the KXP meters, KEPCO meter, etc. are established in the Monitoring Manual.</p>	OK

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there is no access to relevant external data?	/31/ /32/		
<b>I. Assessment of data and calculation</b> GHG emission reductions achieved by/resulting from the proposed CDM project activity shall be calculated applying the selected methodology.			
<b>I.1. Complete set of data</b> Check whether the complete set of data for the specified monitoring period available. If not, was the most conservative assumption taken, or a request of deviation raised? (VVM208 (a))	/1/ /2/ /3/ /4/ /5/	Yes. A complete set of data is available, i.e. operation log, meter readings records, monthly reading records, Monthly Power Trading Record by KPX and Monthly Consumed Electricity Amount by KEPCO which can cover the monitoring period. The verification team confirmed that all data recorded is in compliance with the monitoring report. The figures in the Monitoring Report Version 02 were correct and same figure as the provided emission reductions Calculation Spreadsheet	OK
<b>I.2. Cross-check</b> Information provided in the monitoring report is to be cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis (VVM208 (b))	/1/- /5/ /11/ /2/	Yes. The information provided in the monitoring report has been crosschecked with other sources such as bill, reading records, operation log and other relevant documents and found that the information in the monitoring report is consistent with the relevant evidences.	OK
<b>I.3. Emission reduction Calculation</b> Check whether the calculations of baseline emissions, proposed CDM project activity emissions and leakage, as appropriate, have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document (VVM208 (c))	/1/- /5/ /31/ /32/ /34/	Yes. The calculation of baseline emission, project emission and leakage was carried out in accordance with the revised monitoring plan, the registered PDD and applied methodology ACM0002 Version 07. The emission reductions of the monitoring period were correctly calculated.	OK
<b>I.4. Assumptions in emission calculation</b> Justify any assumptions used in emission calculations. (VVM208 (d))		No. There is no assumption used in emission calculations.	OK
<b>I.5. Appropriate emission factor</b>	/1/	Yes.	OK

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Check whether appropriate emission factors, IPCC default values and other reference values have been correctly applied. (VVM208 (e))	/32/	The emission factor in the Monitoring Report is 0.6426tCO <sub>2</sub> e/MWh, which is the same as described in the registered PDD.	
<b>J. Environmental and Social Indicators</b> A Monitoring Plan may comprise environmental and/or social indicators which could be necessary to monitor for the success of the project activity			
<b>J.1. Implementation of measures</b> A project activity may demand for the installation of measures (e.g. filtering systems or compensation areas), which are exceeding the local legal requirements. A check of the implementation or realization of such measures should be part of the initial verification.	/32/ /37/ /38/	According to the regulation, EIA was not required. However, Preliminary Environmental Assessment (PEA) was conducted to assess the impact on environment, and aviation operation in the project region. There were no serious impacts according to the PDD.  The PEA was covered the sectors of natural environment, residential environment, and social/economical environment.  Post Environmental Assessment was also conducted. It was covered water quality, noise, vibration, Radio interference and ecosystem.  PEA was performed by an environmental impact assessment agency, Tael Environment Co., Ltd.  Post Environmental Assessment was performed by Myeong Seung Engineering Co., Ltd.  The verification team interviewed local residents who live in the nearest village from the project site (3km), and found that there was no complaining about noise from the wind turbine and other environmental related issue. The verification team confirmed that the project was contributing to the village's economy (ex. the increase of the tourists and donation from TWPC), with no significant environmental impacts.	OK
<b>J.2. Monitoring equipment</b> Check where necessary whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.	/32/ /37/ /38/	No specific stationary monitoring equipments were installed. They were not required to install. The PEA measurement was conducted by the environmental impact assessment agency, Tael Environment Co., Ltd.	OK



**Table 2: Data Management System/Controls**

The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table. A score is assigned as follows:

- Full - all best-practice expectations are implemented.
- Partial - a proportion of the best practice expectations is implemented
- Limited - this should be given if little or none of the system component is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i> )
<b>1. Defined organisational structure, responsibilities and competencies</b>		
<b>1.1. Position and roles</b> Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.	Full	CDM Monitoring Manual describes position and role of each person in the monitoring operation.  Taegisan Wind Power CEO takes a total responsibility to operate and manage the whole CDM business of Taegisan.
<b>1.2. Responsibilities</b> Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.	Full	Position and role of each person in the monitoring operation is described in the CDM Monitoring Manual.
<b>1.3. Competencies needed</b> Competencies needed for each aspect of the GHG determination process are analyzed. Personnel competencies are assessed and training program implemented as required.	Full	Personnel involved in O&M and monitoring of the project are duly trained as described in the PDD and the CDM Monitoring Manual.  <b>Clarification Request 4 same as Table.1 E.4</b>  <b>It is to be checked by the evidences during on-site assessment, whether the qualification and training for personnel are carried out in accordance with the procedures established.</b>

<b>2. Conformance with monitoring plan</b>		
<b>2.1. Reporting procedures</b> Reporting procedures should reflect the monitoring plan content. Where deviations from the Monitoring Plan occur, the impact of this on the data is estimated and the reasons justified.	Full	It was confirmed that the reporting was being conducted in accordance with the CDM Monitoring Manual which was established based on the Monitoring Plan in the PDD.
<b>2.2. Necessary Changes</b> Necessary changes to the Monitoring Plan are identified and changes are integrated in local procedures as necessary.	Full	There was no change required. The current Monitoring Plan has no discrepancy with actual operation and related local procedure.
<b>3. Application of GHG determination methods</b>		
<b>3.1. Methods used</b> There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.	Full	<p>In the Monitoring Report, the calculation of the electricity supplied to the grid is adequately defined as [export electricity – import electricity] based on the methodology ACM0002 Version 07 and calculated properly.</p> <p>Both expoer electricity and import electricity are properly recorded and used for the calculation of emission reductions based on the established CDM Monitoring Manual.</p> <p>The Watt-hour meters for electricity exported to the grid by the Project and imported by the Project are installed in the Project site. The transmission loss by 22.9kV transmission line (approx. 33km) from the site to the substation was properly calculated by using a power factor, the test data of the transmission cable provided by the cable manufacturers, voltage on the transmission line to KPX and the wind power current calculated in the CER calculation spreadsheet.</p>
<b>3.2. Information/process flow</b> An information/process flow diagram, describing the entire process from raw data to reported totals is developed.	Full	<p>Information/process flow is established in the CDM Monitoring Manual in line with the PDD.</p> <p>The roles and responsibilities for the preparation, checking and approval of the Monitoring Report are also established in the CDM Monitoring Manual.</p>

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<b>3.3. Data transfer</b> Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.	Full	All data of the electricity delivered to the grid are transferred, aggregated, compared and stored electronically. And the data of imported electricity are read from the meter and recorded manually on the site and compared with the electronic data from KEPCO.
<b>3.4. Data trails</b> Requirements for documented data trails are defined and implemented and all documentation are physically available.	Full	The CDM Monitoring Manual stipulates that the each data should be kept in electronic way by day, month and year. And it should be kept during the crediting period and two years after.  The verification team confirmed that the procedures were being implemented in accordance with the Manual above.
<b>4. Identification and maintenance of key process parameters</b>		
<b>4.1. Identification of key parameters</b> The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.	Full	The key parameters for the determination of GHG emissions are the amount of electricity exported and imported measured by calibrated meters.
<b>4.2. Calibration/maintenance</b> Appropriate calibration/maintenance requirements are determined.	Full	According to the revised Monitoring Plan approved by EB on 30 Mar, 2011, calibration should be done in accordance with the Korean laws. The actual calibration of the KPX Meters and the KEPCO Meters were conducted based on the “Act on operation of electricity market”, which requires 3 years 6 months ± 6 months (3 years to 4 years) interval of calibration for watt-hour meter for capacity of larger than 1 MW. The last calibration of the KPX Meters and the KEPCO Meters were conducted on 10 Sep, 2008, therefore this monitoring period was covered.  The calibration records of KPX main and backup meters and the calibration records of KEPCO meters were provided for verification.
<b>5. GHG Calculations</b>		

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<p><b>5.1. Use of estimates and default data</b></p> <p>Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.</p>	Full	<p>The emission factor was calculated and fixed during the validation stage as a weighted sum of the OM (3 years vintage data) and BM emission factors based on the ACM0002 by using the data from KEPCO and IPCC default values as described in the PDD.</p> <p>Actual gross generated electricity was 13.6% lower than the estimation in the registered PDD, which was almost same as estimation.</p>
<p><b>5.2. Guidance on checks and reviews</b></p> <p>Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.</p>	Full	<p>Reporting procedures have been already established in the CDM Monitoring Manual and implemented with data confirmation process.</p> <p>The name of the person/organization of preparation and approval of the Monitoring Report is clearly indicated in the Monitoring Manual.</p> <p>The verification team confirmed that the amount of export electricity was being reported daily, monthly and yearly in the established formats and checked by responsible persons including the president with their signatures.</p>
<p><b>5.3. Internal verification</b></p> <p>Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.</p>	Full	<p>Internal audit and management review have been conducted and the internal review for the GHG emission reduction has been carried out.</p> <p><b>Clarification Request 6 same as Table.1 E.9</b></p> <p><b>Records of the Internal Audit and the Management Review are to be provided.</b></p>
<p><b>5.4. Internal validation</b></p> <p>Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.</p>	Full	<p>It was confirmed that the internal validation is properly conducted in the daily operation.</p>
<p><b>5.5. Data protection measures</b></p> <p>Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).</p>	Full	<p>The key parameters are being measured and recorded in the respective documents / registers in paper and electronic form. Data protection measures are adequately implemented under the Project manager.</p>
<p><b>5.6. IT systems</b></p> <p>IT systems used for GHG monitoring and reporting should be tested and documented.</p>	Full	<p>It was confirmed that the IT system used for GHG monitoring and reporting is checked.</p>

**Table 3: Resolution of Corrective Action and Forward Action Requests**

<b>Draft report clarifications and forward action request by audit team</b>	<b>Ref. to checklist Table 1 to 3</b>	<b>Summary of project owner response</b>	<b>Audit team conclusion</b>
<b><u>Clarification Request 1</u></b>  <b>Maintenance record during this monitoring period is to be clarified during on-site assessment. It will be confirmed whether any modification of equipment was done during the monitoring period.</b>	<b>Table 1</b>  <b>B.4</b>	There were no special issue in this monitoring period. The generator was not replaced. The maintenance record was provided.	The verification team confirmed the generator was not replaced and total capacity of the project remains unchanged as described in the registered PDD. Therefore there was no impact to the generation capacity. CL1 was clarified.
<b><u>Clarification Request 2</u></b>  <b>It is to be checked by the evidences during on-site assessment, whether the monitoring is being carried out in accordance with the procedures established.</b>	<b>Table 1</b>  <b>D.1</b>	Daily operation log book, monthly reading records and other CDM related records were demonstrated.	It was verified by demonstrated documents and by interview with operation staff during on-site assessment that monitoring has been implemented in their operation in accordance with the monitoring plan of the registered PDD. CL2 was clarified.
<b><u>Clarification Request 3</u></b>  <b>It is to be checked by the evidences during on-site assessment, whether the auditing of data and system is being carried out in accordance with the procedures established.</b>	<b>Table 1</b>  <b>E.1</b>	Sample of daily data sheet and monthly data sheet were provided, that had confirmation signature by management on them.	It was verified by signatures on the data records, that all data was confirmed by the person in charge in accordance with the procedure of monitoring. CL.3 was clarified

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<b><u>Clarification Request 4</u></b> <b>It is to be checked by the evidences during on-site assessment, whether the qualification and training for personnel are carried out in accordance with the procedures established.</b>	<b>Table 1</b> <b>E.4</b> <b>Table 2</b> <b>1.3</b>	The training record in this monitoring period was provided.	The verification team confirmed the training was conducted in accordance with the procedures established. CL4 clarified.
<b><u>Clarification Request 5</u></b> <b>Archiving condition of CDM related data is to be verified during on-site assessment.</b>	<b>Table 1</b> <b>E.7</b>	The electric data stored in PC had limited access, and the file of documents was kept in the office with security lock.	It was confirmed during on-site assessment that the CDM data was organized and stored under reasonable security condition. CL.5 was clarified.
<b><u>Clarification Request 6</u></b> <b>Records of the Internal Audit and the Management Review are to be provided.</b>	<b>Table 1</b> <b>E.9</b> <b>Table 2</b> <b>5.3</b>	Records of Internal Audit and the Management Review were provided.	The verification team confirmed Internal Audit was proceeded every 3 months (1/6, 1/9, 1/12/2010 and 1/3/2011) and the Management review was conducted with monthly report and summarized in the end of year. CL6 was clarified.