
VALIDATION OPINION

On a Revision in Monitoring Plan (Rev. 2)

**"Korea East-West Power Dangjin Small
Hydro Power Plant Project (5MW)" in Korea
(UNFCCC Registration No. : 2366)**

Report No. CDM-11-007A

KSA KOREAN
STANDARDS
ASSOCIATION

Project No.	Date of first issue :	Revision No.	Revision Date
CDM-11-007A	16 Apr 2012	02	22 June 2012
Project Title : Korea East-West Power Dangjin small hydro power plant project (5MW)			

Executive Summary of the Validation Opinion on a revision in the monitoring plan

Korea East-West Power Co., Ltd has commissioned the Korean Standards Association (KSA) to carry out the validation on the revision of monitoring plan according to "Procedures for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM".

The initial monitoring plan is a part of the registered PDD "Korea East-West Power Dangjin small hydro power plant project (5MW)" (UNFCCC reference no. 2366). This revision of the monitoring plan covers the change of measurement method, QA/QC procedures and the supplement of monitoring point.

The applied requirements for validation on a revision in the monitoring plan depend on "the CDM modalities and procedures" and "the subsequent decisions by the CDM Executive Board". A risk based approach was taken to conduct the validation and corrective action request and clarifications were raised for relevant actions by the project participant.

The review of the proposed revision of the monitoring plan and the subsequent follow-up interviews have provided KSA with sufficient objective evidence to determine the fulfillment of the stated criteria.

In summary, it is that KSA's opinion on the proposed revision of monitoring plan meets all relevant UNFCCC requirements for the monitoring plan and correctly applied the monitoring methodology AMS-I.D (version 13). Hence, KSA requests the revision of the monitoring plan for the "Korea East-West Power Dangjin small hydro power plant project (5MW)"

Project Participant: Korea East-West Power Co., Ltd		Applied Methodology/Version : AMS-ID /version 13
		Scope(s) : 1 Technical Area(s) : 1.2
Team Leader Kyoo-Il Sohn Team Member Chan-Sik Yoon Observer Seong-Yong Park	Responsible Certification Body Member : Yong-Hwan Kim	First Monitoring Report Version Date of issuance: N/A Version No. : N/A Final Monitoring Report Version Date of issuance: N/A Version No. : N/A

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Appendix A Validation protocol on a revision in monitoring report.

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CL	Clarification Request
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
ER	Emission Reduction
EWP	Korea East-West Power Co., Ltd.
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KEPCO	Korea Electric Power Corporation
KPX	Korea Power Exchange
KSA	Korean Standards Association
MP	Monitoring Plan
PDD	Project Design Document
PP	Project Participants
SSC	Small-scale
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

1. INTRODUCTION

1.1 Objective

Paragraph 57 of the modalities and procedures for the CDM allow project participants to revise monitoring plans in order to improve accuracy and/or completeness of information, subject to the revision being validated by a Designated Operational Entity.

Korean Standards Association (KSA) has been commissioned by Korea East-West Power Co., Ltd to carry out the validation of the revision of registered monitoring plan according to "Procedures for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM"(EB49 Annex28, version 02) /2-06/ from the "Korea East-West Power Dangjin small hydro power plant project (5MW)" in Korea (hereafter the project). The purpose of this validation is to have an independent third party assessment for the revision of registered monitoring plan, and the conformity with the approved monitoring methodology applied to the project activity.

1.2 Scope

The scope of the validation of the revision of the registered monitoring plan is defined as an independent and objective review of the monitoring plan and the relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules, approved methodology and associated interpretations. The validation team has based on the recommendations in the Validation and Verification Manual /2-3/, and employed a risk-based approach, focusing on the identification of significant reporting risks. The validation is no meant to provide any consulting toward the project participants. However, the corrective action requests (CARs) and clarifications (CL) may have provided input for improvement of the project design.

1.3 Description of the Project Activity

Korea East-West Power Dangjin small hydro power plant project (5MW) (hereafter called "the project activity") was registered 07 August 2009 under CDM methodology AMS-I.D version 13. Description of the project activity are as shown in the Table 1.

Table 1 Description of the project activity.

Project (Host) Parties	Republic of Korea
Title of project activity	Korea East-West Power Dangjin small hydro power plant project (5MW)
Project Size	Small Scale
Applied Methodology	AMS-I.D (Version 13, dated 14 December 2007)

UNFCCC registration No.:	2366
Project Entity:	Korea East-West Power Co., Ltd Samsung-dong, Gangnam-gu, Seoul, Republic of Korea Contact Person : Jong-Shin Choi Telephone: +82 2 3456 8381
Location of the Project Activity:	The project activity are located at Gyoro-Ri, Seogmun-Myeon, Dangjin-Gun, Chungcheongnam-Do, Korea (126.506114°E, 37.057190°N)
CDM Project Registration date	07 August 2009
Project's crediting period:	01 January 2010 to 31 December 2019

1.4 Verification Team

The validation team consists of the following personnel:

Role/Qualification	Name	Document Review	Site Visit	Follow-up Actions	Reporting	Technical Review
team leader CDM Verifier	Mr Kyoo-II Sohn	✓	✓	✓	✓	
team Member CDM Verifier	Mr Chan-Sik Yoon	✓	✓	✓	✓	
Observer	Mr Seong-Yong Park	✓	✓	✓	✓	
Technical Review	Mr SeungKeun Choi					✓

2. VALIDATION METHODOLOGY

2.1 Desk Review

The following documents are primarily reviewed to validate the revision of monitoring plan as follows:

- Registered project design document (version 13, dated 05 June 2009) /1-01/
- Revised Monitoring Plan (track change version) /1-02/
- Revised Monitoring Plan (clean version) /1-03/
- Monitoring Plan revision list /1-04/
- Relevant regulation in the host country /1-05/ & /1-06/
- Single Diagram of electric power system /1-07/
- the validation report /2-01/
- the applied methodology (AMS-I.D. version 13) /2-02/
- the relevant EB Guidance and meeting report /2-4/, /2-5/ and /2-6/

2.2 Site Visits

On-site visit was carried out on 06 July and 11 Nov 2011 and assessed for followings:

- to verify the actual implementation and operation of the monitoring as described in the revised monitoring plan.
- to check the instruments used for monitoring in the locations and the related calibration certificates.
- to verify the QA/QC activity for the proposed project activity.
- etc.

During the site visit, the KSA validation team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

2.3 Reporting of Findings

As the result of the validation process, the validation team can raise Corrective Action Request (CAR) and Clarification (CL) and any other outstanding issues that needed to be clarified for KSA's positive conclusion on a revision in the monitoring plan. CARs and CLs require the project participants to modify the revised monitoring plan or to provide adequate additional explanations or evidence. Criteria for CARs, CLs and FARs are as follows and are based on the "Clean Development Mechanism Validation and Verification Manual (EB 55 Annex 1) /2-03/".

Corrective Action Request (CAR) is issued where one of following occurs;

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

Clarification (CL) is issued if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A Forward Action Requests (FAR) may be issued for action if the monitoring and reporting requires attention and/or adjustment for the next verification period.

2.4 Internal Technical Review

The final validation opinion including the validation findings were reviewed by a technical reviewer (Mr. SeungKeun Choi) prior to the submission of the validation opinion to the project participant and prior to requesting the revision of the monitoring plan of the CDM project activity. Also a technical reviewer is qualified by KSA's qualification scheme for CDM validation and verification.

As a result of the internal technical review process, the validation opinion and the topic specific assessments as prepared by the validation team leader may be confirmed or revised. Furthermore reporting improvement might be achieved.

3. VALIDATION FINDINGS

In the following sections the findings of the validation are stated. The Corrective Action Requests (CARs), the Clarification Requests (CLs) and Forward Action requests (FARs) are stated, where applicable, in the following section and are further documented in the Validation Protocol in the Appendix A.

3.1 Reason for requesting for revision in monitoring plan

The revision of monitoring plan is carried out to enhance the level of accuracy and completeness in the monitoring and verification process as per paragraph 202 of the VVM (version 1.2). According to the monitoring plan in the registered PDD, data and parameters monitored (B.7.1) is described only EGy - 'net electricity supplied to the grid by the project activity in year y. During the initial and 1st verification period (01/01/2010 to 31/03/2011), it was noticed that there are 3 watt-hour meters involved in the monitoring system of the project activity as see "Figure 1 Measuring system diagram", namely one for the export electricity and two for the import electricity as follows;

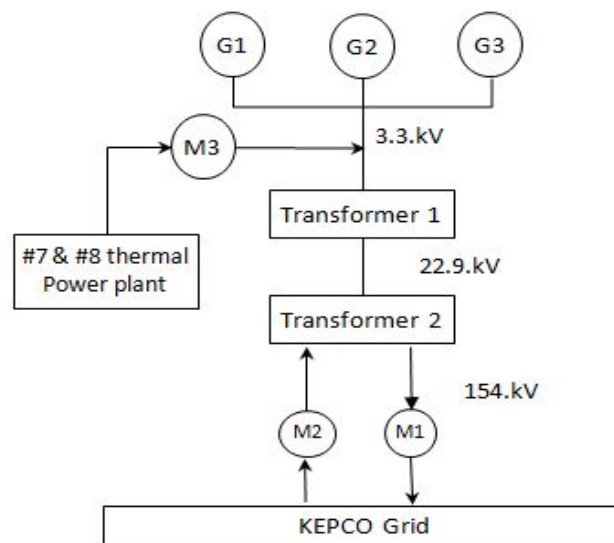


Figure 1 Measuring System Diagram

- Transmission electricity (EG_{out} , M1) is measured by the export watt-hour-meter which the accuracy of the equipment is 0.5S ($\pm 0.5\%$) under KPX (Korea Power exchange) control.
- One import electricity ($EG_{in,1}$, M2) is measured by the import watt-hour-meter which the accuracy of the equipment is 1.0S ($\pm 1.0\%$) under KEPCO (Korea Electric Power Corporation) control.
- The other import electricity ($EG_{in,2}$, M3) is measured by the import watt-hour-meter which the

accuracy of the equipment is 1.0S ($\pm 1.0\%$) under the project participant's (Korea East-West Electric Power Corporation) control. This import electricity ($EG_{in,2}$) will not be supplied into the project activity from #7 and #8 thermal power plants in the ordinary situation and will be used only emergency situation when KEPCO could not supplied to the project activity due to unpredictable situation. But this monitoring point (M3) was not stated in monitoring plan of the registered PDD.

And also monitoring plan including metering system as well as the quality of monitoring equipment (eg. accuracy, calibration requirements) are not concretely described in the monitoring plan of the registered PDD.

Thus KSA has concluded that the project activity is required to revise the monitoring plan to enhance the accuracy and completeness in the monitoring and verification process.

3.2 Summary of the revision in Monitoring Plan

(1) Section B.7.1

① Data/Parameter

Monitoring plan in the registered PDD	Revised monitoring plan
EG_y	EG_y , EG_{out} , $EG_{in,1}$ and $EG_{in,2}$ are separately assorted.

② Source of data to be used

Monitoring plan in the registered PDD	Revised monitoring plan
Electrical Data	Calculated : $EG_y = EG_{out} - EG_{in,1}$

③ Description of Measurement Source of data to be used

- Redefine the source of data and information used to calculate the net electricity supplied to the grid by the project activity (EG_y).
- Make a definition for the parameter as EG_{out} for the electricity exported to the grid and $EG_{in,1}$ imported from the grid by the project activity.
- Make a new definition for the parameter as $EG_{in,2}$ for the electricity imported from #7 and #8 thermal power plant by the project activity. Because this source of electricity is not the grid, the PP defined it as project emission source, applying different emission factor.

In the revised PDD, net electricity supplied to the grid by the project activity (EG_y) will be calculated considering the export electricity (EG_{out}) and import electricity ($EG_{in,1}$). The modification

is based on the actual project status and in compliance with the AMS-I.D (version 13).

Monitoring plan in the registered PDD	Revised monitoring plan
Directly measured by metering system installed.	<p>Net electricity supplied to the grid by the project activity (EG_y) is calculated as follows;</p> $EG_y = EG_{out} - EG_{in,1}$ <p>Where</p> <p>EG_{out}: Total electricity supplied to the grid in year y.</p> <p>$EG_{in,1}$: Electricity supplied from the grid in year y.</p>
<p>The recording frequency will be and monthly recorded.</p> <p>The data will be archived electronically and kept during the crediting period and 2 years after.</p>	<p>The transmission electricity data (M1) will be continuously measured and electronically archived hourly by KPX. The transmission electricity data (M1) will be double checked with the electricity sales receipt. The imported electricity data (M2) will be continuously measured and archived monthly by KEPCO. The imported electricity data (M2) will be double checked with the electricity bill. The other imported data (M3) will be continuously measured and archived monthly by PP.</p> <p>The proportion of data to be monitored are 100% and the data will be archived and kept at least two years after end of the last crediting period.</p>

Re-stipulate the measurement method for the watt-hour meter (EG_{out} , $EG_{in,1}$ and $EG_{in,2}$) in the revised monitoring plan. The modification is based on the actual project status and in compliance with the paragraph 17 of "General guidelines to SSC CDM methodologies (version 17)/2-05/.

④ QA/QC procedures

Describe the accuracy (maximum permissible error) for each watt-hour meter (EG_{out} , $EG_{in,1}$ and $EG_{in,2}$)

Monitoring plan in the registered PDD	Revised monitoring plan
<p>□ Uncertainty of data is low.</p>	<p>The allowable error range for the watt-hour meters</p> <p>EG_{out}(M1) : 0.5S (±0.5%)</p> <p>$EG_{in,1}$(M2) : 1.0S (±1.0%)</p> <p>$EG_{in,2}$(M3) : 1.0S (±1.0%)</p>

The modification is based on the actual project status and in compliance with the paragraph 9 of "General guidelines to SSC CDM methodologies (version 17) /2-05/.

⑤ Emission factor for Dangjin #7 & #8 thermal power plant

Monitoring plan in the registered PDD	Revised monitoring plan
$EF_{CO_2, thermalpower}$ was not considered.	$EF_{CO_2, thermalpower}$ is considered in the revised monitoring plan. The emission from consumption of electricity by M3 is determined based on the emission factor ($EF_{CO_2, thermalpower}$) of 1.3 tCO ₂ /MWh as a very conservative simplification as per "Tool to calculate baseline, project and/or leakage emission from electricity consumption".

Emission factor for Dangjin #7 & #8 thermal power plant ($EF_{CO_2, thermalpower}$) is considered in the revised monitoring plan as per "Tool to calculate baseline, project and/or leakage emission from electricity consumption" and in compliance with the paragraph 17 (b) of "General guidelines to SSC CDM methodologies (version 17) /2-05/.

(2) Section B.7.2 (Calibration Frequency)

Re-stipulate the calibration frequency for the watt-hour meter (EG_{out} , $EG_{in,1}$ and $EG_{in,2}$) as per paragraph 17 (c) of "General guidelines to SSC CDM methodologies"/2-05/.

Monitoring plan in the registered PDD	Revised monitoring plan
The meters shall be calibrated them they are installed, and re-calibrated within 3 years 6 months \pm 6 months after installation.	All export watt-hour-meter (M1) and import watt-hour-meter (M3) shall be re-calibrated within 3 years after installed or calibrated as per paragraph 17 (c) of "General guidelines to SSC CDM methodologies". Another watt-hour meter(M2) shall be re-calibrated by KEPCO as per national regulation.

The modification is based on the actual project status and in compliance with the paragraph 17 (c) of "General guidelines to SSC CDM methodologies (version 17)/2-05/.

3.3 Validation on a revision in monitoring plan

- (a) Information on how the proposed revision of the monitoring plan ensures that the level of accuracy and completeness in the monitoring and verification process is not reduced as a result of the revisions.

As see section 3.1 and 3.2 above, the monitoring plan of the registered PDD were not stipulated clearly the metering system and QA/QC procedures including the quality of monitoring equipment (eg. accuracy, calibration requirements). The revised monitoring plan are re-defined or defined newly or

described clearly considering the actual project status and in compliance with the relevant EB guidance and meeting report to enhance the level of accuracy and completeness in the monitoring and verification process.

Emission factor for the electricity import from the thermal power plant Dangjin thermal #7 and #8 during emergency (power cut from KEPCO grid) is higher than the grid emission factor. However, as Dangjin thermal #7 and #8 plant are designed to supply the electricity to the project activity only during power cut from KEPCO grid, the expected annual emissions related to $EG_{in}(M3)$ is much less than 1% of the total expected annual emission reductions considering annual power cut hour from KEPCO grid (around 10 minutes per year /1-10/) and the auxiliary power consumption in the proposed project activity. Actual value which was measured by M3 for 3 years since installation was below 1 MWh/3-years (0.5tCO₂).

Moreover, the PP proposed that if annual emission from M3 exceed 1% of total emission reduction, it will be considered as project emission. In this case, different emission factor (1.3tCO₂/MWh) will be applied as a conservative approach in accordance with "tool to calculate baseline, project and/or leakage emissions from electricity consumption."

Thus, the proposed revision of the monitoring plan will not reduce the level of accuracy and completeness in the monitoring and verification process as a result of the revisions.

(b) the proposed revision of the monitoring plan is in accordance with the applied monitoring methodology.

According to the AMS-I.D (version 13)/2-02/, the main data to be monitored is the net electricity supplied to the grid. Namely, the electricity supplied to the grid should be deducted the imported electricity and generated electricity from the fossil fuels. The monitoring plan in the registered PDD had not stipulated clearly the net electricity supplied to the grid, but the revised monitoring plan has stipulated clearly the net electricity supplied to the grid to enhance the accuracy and completeness in the monitoring plan and the verification process.

Thus, the revised monitoring plan is in accordance with the revision 13 of AMS-I.D./2-02/ and does not require an amendment to the approved methodology.

(c) the findings of previous verification reports, if any, have been taken into account.

There are no previous verification report.

4. VALIDATION OPINION

Korean Standards Association (KSA) has performed the validation of the revision of monitoring plan for registered project "Korea East-West Power Dangjin small hydro power plant project (5MW) (UNFCCC reference no.: 2366)". This validation has performed on the basis of the UNFCCC criteria, the approved methodology and the relevant EB guidance and meeting reports.

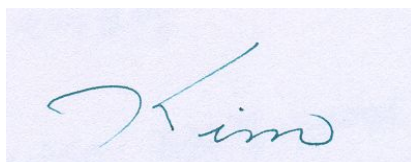
The review of the revised monitoring plan and the subsequent follow-up interviews have provided Korean Standard Association (KSA) with sufficient evidence to determine the fulfillment of stated criteria. The proposed revision of the monitoring plan can reflect the accuracy and completeness of the project information in the PDD. Furthermore, KSA can confirm the followings;

- The proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as the results of this revisions.
- The proposed revision of the monitoring plan is in accordance with the applied monitoring methodology AMS-I.D version 13.

In KSA's opinion, the revision of the monitoring plan meets the UNFCCC criteria, the applied monitoring methodology and the relevant EB guidance and meeting reports.

Hence, KSA requests the revision of the monitoring plan for registered project "Korea East-West Power Dangjin small hydro power plant project (5MW) (UNFCCC reference no.: 2366)".

June 22nd, 2012



Yong-Hwan Kim

**Director
International Certification Division
Korean Standards Association**



Kyoo-Il Sohn

Validation Team Leader

5. REFERENCES

Category 1 Documents:

Documents provided by the Client that relate directly to the project.

- 1 - 01 The registered CDM Project Design Document : Korea East-West Power Dangjin small hydro power plant project (5MW), (version 13, dated 05/06/2009)
- 1 - 02 Revised Monitoring Plan (track change version)
- 1 - 03 Revised Monitoring Plan (clean version)
- 1 - 04 Monitoring Plan Revision List.
- 1 - 05 'Measures Act (Law regarding measurement)' in Korea, March, 2008.
- 1 - 06 Act on operation of electricity market by KPX (dated Jan 01, 2011)
- 1 - 07 Single Diagram of Electric Power System for Dangjin small hydro power plant
- 1 - 08 Korea Power Exchange (KPX) (<http://www.kpx.or.kr>)
- 1 - 09 Outline on Dangjin small hydro power plant
- 1 - 10 <http://epsis.kpx.or.kr/epsis/servlet/epsis/EKSA/EKSAController?cmd=005002>

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents.

- 2 - 01 Validation Report - KEMCO: Korea East-West Power Dangjin small hydro power plant project (5MW); Report No. AT201-200706, Revision 06, dated 24 July 2009
- 2 - 02 Approved Monitoring methodology AMS-I.D., version 13 of December 14, 2007.
- 2 - 03 CDM Validation and Verification Manual (Version 01.2 of 30 Jul 2010) EB 55 Annex 1
- 2 - 04 Guidelines for assessing compliance with the calibration frequency requirements. (version 01, dated 12 Feb 2010)
- 2 - 05 General guideline to SSC CDM methodologies (version 17, EB 61 Report Annex 21)
- 2 - 06 Procedures for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM (version 02, EB 49 Report Annex 28)

APPENDIX A

Validation Protocol on a revision in monitoring plan

Table 1. Requirements Checklist

Checklist Question	Ref.	MoV	Comments	Draft Concl.	Final Concl.
Revision in Monitoring Plan					
1. Does PP submit the revised monitoring plan in clean and track change versions including supplemental documentation ?	/EB 49 Report Annex 28/	DR	Yes, PP has submit the revised monitoring plan in clean and track change versions.	OK	OK
2. Does the revised monitoring plan comply with the approved methodology ?	/VVM/ 123	DR, I	Yes, the revised monitoring plan comply with the approved methodology, AMS-ID. version 13./2-2/	OK	OK
(a) Are all parameters required by the selected approved baseline methodology identified ?	/VVM/ 123 (a)(i)	DR, I	Yes, all data and parameters are listed in the section "B.7.1 Data and parameters monitored" of the PDD.	OK Pending	OK
Does the revised monitoring plan contain all necessary parameters ?	/VVM/ 123 (a)(ii)	DR, I	Refer to section 2 (a)	OK Pending	OK
Does the means of monitoring described in the plan comply with the requirements of the methodology ?	/VVM/ 123 (a)(ii)	DR, I	Refer to section 2 (a)	OK Pending	OK
(b) Are the monitoring arrangements described in the monitoring plan feasible within the project design ?	/VVM/ 123 (b)(i)	DR, I	N/A	OK	OK
- Are the means of implementation of the monitoring plan, including the data arrangement and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by requesting from the proposed CDM project can be reported ex post and verified ?	/VVM/ 123 (b) (ii)	DR, I	N/A	OK	OK