




**Validation report form for renewal of crediting period for
CDM project activities
(Version 02.0)**

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

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Sihwa Tidal Power Plant CDM Project (0349)
Number and duration of the next crediting period	2 nd , 01/07/2018- 30/06/2025
Version number of the validation report for RCP	5.0
Completion date of the validation report for RCP	20/10/2018
Version number of PDD to which this report applies	4.0
Project participants	Korea Water Resources Corporation (K-water)
Host Party	Republic of Korea
Applied methodologies and standardized baselines	Methodology : ACM0002 – “Consolidated baseline methodology for grid-connected electricity generation from renewable sources.---version 17”
Mandatory sectoral scopes linked to the applied methodologies	01
Conditional sectoral scopes linked to the applied methodologies	--
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	251, 089 tCO ₂ e
Name and UNFCCC reference number of the DOE	E-0005: TÜV SÜD South Asia Private Limited
Name, position and signature of the approver of the validation report for RCP	 Milind Shende Manager- Certification Body TUV SUD South Asia

SECTION A. Executive summary

TÜV SÜD South Asia Pvt. Ltd. has performed the validation of renewal of crediting period of the aforementioned project activity “Sihwa Tidal Power CDM Project”. The validation is based on the currently valid documentation of the United Nations Framework Convention on Climate Change (UNFCCC).

The validation process includes three phases:

- Desk review of documents;
- Follow-up interviews with the relevant personnel;
- Resolution of outstanding issues and the issuance of final inclusion report and opinion.

Sihwa Tidal Power Plant Project will generate electricity by utilizing the sea water when it is coming into Sihwa Lake which is an artificial lake made by the tide embankment. The plant is located in Jaggungarisum which is an island in Ansan-city, Gyeonggi Province, Korea. It is equipped 10 turbine generators (25.4MW) of straight inflow bulb type to produce app. 254MW. This means that it will be expected to generate 552.7 GWh a year, and transmit the electricity of 507.629 GWh to the grid annually. The generated electricity will be transmitted to ‘Korea Electric Power Corporation South Sihwa substation’ which is 10.5 km’s distance from the plant. The spatial extent of the project boundary includes the project site and all the power plants connected physically to the electricity system of Korea Electric Power Corporation (hereinafter referred to as KEPCO).

In the 2nd renewable crediting period, the emission factor has been calculated based on the statistics of electric power from 2015-2017 following the requirement of the applied methodology ACM0002 Version. 17.

The Project Participant is Korea Water Resources Corporation (K-water). Location of the Project is Ansan-city, Gyeonggi Province, Republic of Korea, latitude of 37°18’46”N and longitude of 126°36’36”E.

The project starting date was 31/12/2004 and the first renewable crediting period (7yrs) started on 01/07/2011. Second crediting period will be started from 01/07/2018.

3 Clarification Requests (CLs) and 1 Corrective Action Requests (CARs) were raised during the course of validation process of renewable crediting period and has been successfully closed.

SECTION B. Validation team, technical reviewer and approver**B.1. Validation team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader, Validator & Technical expert	IR	Murty	Eswar	TUV SUD South Asia Pvt Ltd	✓	✓	✓	✓
2.	Country Expert	EI	Yoon	Jung-Ho	TUV SUD Korea	✓	✓	✓	

B.2. Technical reviewer and approver of the validation report for RCP

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Dutta	Supratik ¹	TUV SUD South Asia Pvt Ltd
2	Technical reviewer	EI	Meesa	Srikanth	TUV SUD South Asia Pvt Ltd
2.	Approver	IR	Shende	Milind	TUV SUD South Asia Pvt Ltd

SECTION C. Means of validation**C.1. Desk/document review**

The information presented in the PDD on the technical design has been assessed for accuracy and completeness using standard auditing techniques including:

- (a) Document review including
 - A review of data and information;
 - Cross checks between information provided in the PDD and information from sources other than those used, the DOE's sectoral or local expertise. If necessary, independent background investigations were performed.
- (b) Follow-up actions including:
 - Interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation;
 - Cross checks between information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted.
- (c) Reference to available information relating to projects or technologies similar to the proposed project activity under validation;

The name of the project participant is Korea Water Resources Corporation (K-water) is included in the request for renewal of crediting period is consistent with the name stated at UNFCCC website (<https://cdm.unfccc.int/Projects/DB/DNV-CUK1143710269.08/view>). The same has been validated by the DOE through UNFCCC website and final PDD.

¹ Left the Organization but was part of the initial TR team when submitting first request

In opinion of TÜV SÜD the project description, as included in the PDD, is accurate and complete; and it provides a correct understanding of the proposed project activity.

A complete list of all documents reviewed is attached as Appendix 3 to this report.

C.2. On-site inspection

Duration of on-site inspection: 31/01/2018- 01/02/2018				
No.	Activity performed on-site	Site location	Date	Team member
1.	Plant Visit to validate the project description, baseline, equipment, implementation and monitoring.	Sihwa Tidal Power plant, Ansan city, Korea	31/01/2018	Eswar Murty & Jung Ho Yoon
2	Validity of the original baseline-impact of new relevant national and/or sectoral policies and circumstances on the baseline, correctness of the application of the approved methodologies - EF values assessment	Plant office	31/01/2018	Eswar Murty & Jung Ho Yoon
3	Monitoring plan updates, Document review and check of all supporting documentation, ER calculations and PDD review.	Plant office	01/02/2018	Eswar Murty & Jung Ho Yoon

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Kim	Deog-je	K-water	31/01/2018	1. Validity of the original baseline-impact of new relevant national and/or sectoral policies and circumstances on the baseline, correctness of the application of the approved methodologies - EF values assessment 2. Monitoring plan updates, Document review and check of all supporting documentation, ER calculations and PDD review	Eswar Murty & Jung Ho Yoon
2	Kim	Min Jin	K-water	31/01/2018	1. Validity of the original baseline-impact of new relevant national and/or sectoral policies and circumstances on the baseline, correctness of the application of the approved methodologies - EF values assessment 2. Monitoring plan	Eswar Murty & Jung Ho Yoon

					updates, Document review and check of all supporting documentation, ER calculations and PDD review	
3	Han	Sang Woo	Consulting	01/02/2018	Monitoring plan updates, Document review and check of all supporting documentation, ER calculations and PDD review	Eswar Murty & Jung Ho Yoon

C.4. Sampling approach

Not Applicable.

C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Area of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form			
Application and selection of methodologies and standardized baselines			
Validity of original baseline or its update	3		
Estimated emission reductions or net anthropogenic removals			
Validity of monitoring plan		1	
Crediting period			
Project participants			
Post-registration changes			
Others (please specify)			
Total	3	1	0

SECTION D. Validation findings**D.1. Compliance with PDD form**

Means of validation	TUV SUD has checked the final PDD form provided by the PP against the latest version of the PDD form in order to determine, whether the PDD form is in compliance with it and confirms the following: a) The project participants are mentioned in the relevant sections of the PDD in accordance with the relevant requirements in the Project standard. The names of project participants in the updated PDD are consistent with the names of the project participants available with the UNFCCC (IRL# 1). b) The next crediting period of the registered CDM project activity commences on the day immediately after the expiration of the first crediting period (IRL# 1, 2). c) The most recent version of the PDD form is used (IRL# 3)
Findings	No CAR/CR has been raised by audit team on this section.
Conclusion	The PDD is compliant with relevant form and guidance as provided by UNFCCC according to the requirement of the project activity. Hence the DOE confirms that the project participants used a later valid version of the PDD form for the updated PDD than the version of the form of the registered PDD. The information transferred to the revised PDD is materially the same as that in the registered PDD.

D.2. Application and selection of methodologies and standardized baselines

Means of validation	DOE has verified whether the baseline and monitoring methodology applied in the project activity in accordance with the applicable requirements in the Project standard for project activities. The PP has applied the latest methodology version ACM0002 version 17 in the updated PDD.
Findings	No CAR/CR has been raised by audit team on this section.
Conclusion	TÜV SÜD confirms that the chosen baseline and monitoring methodology is applicable to the project activity.

D.3. Validity of original baseline or its update

Means of validation	<p>DOE has assessed the validity of the baseline of the project activity as per below. Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period</p> <p>According to the Methodological tool of “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)”, the stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period are as follows:</p> <p>Step 1: Assess the validity of the current baseline for the next crediting period</p> <p>According to the “CHECKLIST FOR REQUESTS FOR RENEWAL OF CREDITING PERIOD OF PROJECT ACTIVITIES” approved by the CDM Executive Board, updated PDD is required to incorporate the impact of national and/or sectoral policies and circumstances existing at the time of requesting for renewal of the crediting period on the current baseline emissions, except for the case where the project activity applies the valid version of an applicable standardized baseline that standardizes baseline scenario. The validity of the current baseline is assessed using the following Sub-steps:</p> <p>Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies</p> <p>In assessing the continued validity of the baseline, it has been assessed that there is no relevant mandatory national and/or sectoral policies that should be considered to define a new baseline scenario for this renewal of crediting period of the proposed project. In the renewable energy sector in Korea, the “Act on the Promotion of the Development, Use, and Diffusion of New and Renewable Energy (amended on January 2004)” was valid policy during the 1st crediting period. The policy has been amended several times and “Act on the Promotion of the Development, Use, and Diffusion of New and Renewable Energy (amended on March 2017)” is currently valid for the proposed project.</p> <p>However, the Act (amended on March 2017) does not affect the current baseline of the proposed project. Therefore, there are no relevant mandatory national and/or sectoral policies and the current baseline of the proposed project complies with existing policies.</p> <p>Step 1.2: Assess the impact of circumstances</p> <p>As per requirement of the sub-step, it has been assessed that there is no impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions. As per the 2017</p>
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Statistics of Electric Power in Korea - December 2017 (published on June 2018) by KEPCO, although diffusion of the new and renewable energy has been encouraged, the new and renewable resource accounts for only 5.63% of total grid generation in KEPCO in 2017. Hence in the absence of the proposed project, electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the KEPCO grid.

Also project participant has updated the emission factor and estimation of the baseline emissions for the 2nd crediting period in line with the methodology ACM0002 (Version 17.0) and the "Tool to calculate the emission factor for an electricity system (Version 06.0)".

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

In the absence of the proposed project, the amount of electricity would have been generated by the KEPCO grid. Thus, this sub-step is not applicable to the proposed project.

Step 1.4: Assessment of the validity of the data and parameters

Some parameters fixed ex-ante, which were determined at the start of the 1st crediting period, are not valid anymore. Therefore, the current baseline has been updated for the 2nd crediting period according to the "Tool to calculate the emission factor for an electricity system" (Version 06.0).

This update includes CO₂ emission factor of fossil fuel and all values used in its calculation (including OM and BM). In case of CO₂ emission factor of fossil fuel, the value for the 1st crediting period was derived from IPCC default value as provided in the 1996 IPCC Guidelines but current value for renewal of crediting period is derived from national official data of "Guideline for the greenhouse gas and energy target management operations(30.12.2016.)" according to the methodology ACM0002(Version 17.0) and "Tool to calculate the emission factor for an electricity system(Version 06.0)". In monitoring methodology in "Tool to calculate the emission factor for an electricity system(Version 06.0)", it is stated that national average default values can be used for calculation of emission factor. Therefore, the current baseline needs to be updated and Step 2 is applied.

Step2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

As per the Step 1 above, the current baseline scenario is still valid as per the methodology ACM0002 (Version 17.0). The identified baseline scenario of the proposed project is as follows: • The electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

Also, the baseline emissions for the 2nd crediting period have been updated, without reassessing the baseline scenario. This update was applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period. Further information for the updated baseline emissions for the 2nd crediting

	<p>period can be seen in the PDD.</p> <p>Step 2.2: Update the data and parameters</p> <p>As stated in Step 1.4 above, all parameters regarding the grid emission factor calculation have been updated for the 2nd crediting period.</p> <ol style="list-style-type: none"> 1. PP has used the most recently updated data to revise the EF. There were new publications of KEPCO "2017 Statistics of electric power in Korea('18.6)" and KPX "2017 Status of generation facility('18.7)" and the newly published data have more specific generation data compared to the statistics of previous year. 2. Group energy is low-cost/must run power plants in Korea because electricity supplied to the grid by Group energy is preferentially purchased at the electricity market. ("Electric utility act" article 31). 3. PP has used Option A to calculate OM factor because the data on the net electricity generation and a CO₂ emission factor of each power units are available in KEPCO "2017 Statistics of electric power in Korea('18.6)". 4. Since only the total power generation is available for some plants composed of plural units, the net electricity generation of the plants was allocated to the units in proportion of capacity. 5. If electricity generation(EG) in fuel cell and renewable(excluding solar) power plants is not available(no data source), it has been calculated by plant capacity and plant utilization factor of each units based on 2017 Status of Generation Facility (KPX) and Plant utilization factor : 2017 Statistics of Electric Power in Korea (KEPCO). 6. If generation and fuel consumption data of each units are available, the emission factor is determined as Option A1. However, if generation and only the fuel type used each units are available, PP has determined the emission factor as Option A2. The CO₂ emission factor of each fuel type $i(EF_{CO_2,i,y})$ is quoted from "Guideline for the greenhouse gas and energy target management operation(2016.12.30, Korea) and the parameter η(average net energy conversion efficiency) is quoted from the default values provided in Table2, Appendix of TOOL 09 ;"Determining the baseline efficiency of thermal or electric energy generation systems 7. PP has revised "completion date" to "commissioning date". PP has used "2017 Status of Generation facility(2018)" of KPX for the start date to supply electricity to grid. Those data are officially and independently published every year by the third party, KPX. <p>With regard to the OM, For the proposed project, $NCV_{i,y}$ and CO₂ emission factor provided by national official data of Korea are used. Simple OM factor during 3 years (2015~2017) is 0.7043 t CO₂/MWh and this value is fixed along the credit period.</p>
Findings	<p>CL 1 was raised as it was observed from the data that there is some difference with respect to the emission factor calculations (OM, BM) as some of the data pertaining to power plants is not considered. In response to the CL, the PP has clarified that this is due to the fact that some of the power plants data is not included in the calculations and hence there is</p>

	<p>some discrepancy in the OM and BM calculations. Subsequently the PP has revised the EF calculations to include the data of all power plants.</p> <p>CL 3 has been raised based on the incompleteness issues raised by UNFCCC and subsequently the issues have been addressed by the PP based on the latest statistics available in Korea.</p>
Conclusion	TÜV SÜD confirms that baseline of the project activity has been assessed and it is as per <i>"Tool to assess the validity of the original / current baseline and to update the baseline at the renewal of a crediting period"</i> (version.3.0.1) and also paragraph 407 (b) of CDM VVS PA 1.0

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	DOE has assessed the calculation of GHG emission of the project activity complies with the applied methodology and requirement of the project standard.
Findings	No CAR/CR has been raised by audit team on this section.
Conclusion	The GHG emission calculation of the project activity are as per the applied methodology ACM0002 version 17.

D.5. Validity of monitoring plan

Means of validation	<p>The project applies the approved monitoring methodology within ACM0002. (version 17) The original monitoring plan following the requirements of the CDM methodology was updated based on requirements of the applied methodology.</p> <p>The monitoring plan presented in the PDD complies with the requirements of the applicable methodology. The assessment team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found. PP has appropriately mentioned the maintenance and calibration frequency of monitoring equipment and monitoring frequency against each monitoring parameter.</p> <p>The procedures have been reviewed by the assessment team through document review and/or interviews with the relevant personnel. The information provided has allowed the assessment team to confirm that the proposed monitoring plan is feasible within the project design. The relevant points of monitoring plan have been discussed with the PPs. Specifically; these points include the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project.</p>
Findings	CAR1 has been raised since the monitoring parameter relevant to the project is TEGy where as in the PDD, it is mentioned as EG PJ,facility,y. PP has revised the PDD to be in line with the methodology.
Conclusion	TÜV SÜD confirms that the PP is able to implement the monitoring plan and the achieved emission reductions can be reported ex-post and verified.

D.6. Crediting period

Means of validation	<p>The purpose of a validation related to the duration or day of renewal of the crediting period of a project is an assessment according to the VVS PA 1.0 and includes an assessment of an updated PDD in accordance with the relevant sections of the PS related to the duration of renewal of crediting period and in particular to the next crediting period of the registered CDM project activity.</p> <p>The project has been registered on 18/06/2006 and the first renewable crediting period has been started on 01/07/2011 same day and end date is 30/06/2018 (IRL# 01, 2). As per the project standard procedure, the PPs have notified to UNFCCC on 20/12/2017 about their intention to renew the</p>
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	crediting period within nine to six months prior to the date of expiration of the current crediting period. UNFCCC has confirmed the receipt, the formal notification requirements for a directly adjacent 2 nd crediting period are considered to be met for this project activity (IRL# 2). It is also been verified that the next crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period.
Findings	No CAR/CR has been raised by audit team on this section.
Conclusion	TUV SUD confirms that the start date and the length of the crediting period are in compliance with the project standard.

D.7. Project participants

Means of validation	TUV SUD performed interviews, telephone conferences with project stakeholders to confirm relevant information and to resolve issues identified in the first document review. A list of all persons interviewed in this process is presented in Section C.3 to this report. The name of the project participant K-water included in the request for renewal of crediting period is consistent with the name stated at UNFCCC website (https://cdm.unfccc.int/Projects/DB/DNV-CUK1143710269.08/view). The same has been validated by the DOE through UNFCCC website, revised MOC and final PDD.
Findings	No CAR/CR has been raised by audit team on this section.
Conclusion	The name of the project participant(s) included in the request for renewal of crediting period is consistent with the name stated at UNFCCC website, the same has been validated by the DOE through UNFCCC website and final PDD.

D.8. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines	N		
Corrections	N		
Change to the start date of the crediting period of the project activity	N		
Inclusion of a monitoring plan	N		
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools	Y	2.0	08/03/2018
Changes to the project design	N		
Changes specific to afforestation and reforestation project activities	N		

SECTION E. Internal quality control

Internal quality control within the team is assured by means of a technical review process that takes place after the on-site assessment and after closure of findings. The internal quality control in the verification process is given by the final decision made by the Certification Body.

SECTION F. Validation opinion

TÜV SÜD has performed a validation of the request for renewal of the crediting period of the aforementioned existing CDM project activity. Standard auditing techniques have been used for the validation process. The validation has been performed following the requirements of the latest version of the CDM VVS for PA version 1.0.

The review of the project design documentation, subsequent follow-up interviews, and further verification and validation of references have provided TÜV SÜD with sufficient evidence to determine the validity of the original baseline and to confirm that the estimated emission reductions are in line with the applied methodology. In our opinion, the project meets all relevant UNFCCC requirements and hence TÜV SÜD recommends the renewal of the crediting period of this project. Considering that the project is implemented as designed, the project is likely to achieve the estimated amount of annual emission reductions of 251,089 tCO₂e and a total estimated of 1,757,623 tCO₂e as specified within the final PDD version for the second crediting period. The findings raised during this validation have been closed satisfactorily.

The single purpose of this report is its use during the registration process as part of the CDM project cycle. Based on the work described in this report, nothing has come to our attention that causes us to believe that any project component or issue has not been covered by the validation process.

Appendix 1. Abbreviations

Abbreviations	Full texts
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board
CER	Certified Emission Reduction
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO₂e	Carbon dioxide equivalent
K-water	Korea Water Resources Corporation
KEPCO	Korea Electric Power Corporation
KPX	Korea Power Exchange
CR / CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA / EA	Environmental Impact Assessment / Environmental Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IRL	Information Reference List
KP	Kyoto Protocol
MP	Monitoring Plan
MR	Monitoring Report
OM	Operational Margin
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
RCP	Renewable Crediting Period
TÜV SÜD	TÜV SÜD South Asia Pvt. Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VVS	CDM Validation And Verification Standard for Project Activities

Appendix 2. Competence of team members and technical reviewers



South Asia

CERTIFICATE OF APPOINTMENT

Mr. Murty, Eswar fulfills the requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Qualification as						
Status	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	1.1, 1.2, 3.1, 4.1, 13.1					

Country Expertise						
Region	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area
1.1_Thermal Energy Generation
1.2_Renewables
3.1_Energy demand
4.1_Cement and lime production
13.1_Solid waste and wastewater

This appointment is valid until 31.05.2019 and is bound by internal requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0031/009.

Date	Signature
01/06/2018	

IS-CMS-CB-POG-01/05, version 03

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South Asia

CERTIFICATE OF APPOINTMENT

Mr. Meesa, Srikanth fulfills the requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Qualification as						
Status	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	1.2, 3.1, 7.1, 13.1					

Country Expertise						
Region	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area
1.2_Renewables
3.1_Energy demand
7.1_Transport
13.1_Solid waste and wastewater

This appointment is valid until 31.05.2019 and is bound by internal requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0096/005.

Date	Signature
01/03/2018	

IS-CMS-CB-POG-01/05, version 03

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South Asia

CERTIFICATE OF APPOINTMENT

Mr. Yoon, Jung-Ho fulfills the requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Qualification as						
Status	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	5.1, 5.2, 11.1, 11.2					

Country Expertise						
Region	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area
5.1_Chemical Industry, 5.2_Caprolactam, nitric and adipic acid
11.1_Emissions of fluorinated gases, 11.2_Refrigerant gas production

This appointment is valid until 28.05.2018 and is bound by internal requirements of the Certification Body 'Environment and Energy' of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0053/007.

Date	Signature
01/03/2017	

IS-CMS-CB-POG-01/05, version 03

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Appendix 3. Documents reviewed or referenced

No.	Author	Title	Reference s to the document	Provider
1	UNFCCC	https://cdm.unfccc.int/Projects/DB/DNV-CUK1143710269.08/view Methodology ACM0002 version 17	Project web page	
2	UNFCCC	Registered PDD	Version 5.2 04/09/2014	
3	K-water	PDD for the 2 nd Crediting period	Version 03 08/05/2018	
4	K-water	Emission factor Calculations sheet	Version 03 08/05/2018	
5	K-water	Emission reduction Calculation sheet	Version 03 08/05/2018	
6		Measures Act No. 14661	Sep 2017	
7	Korea Power Exchange (KPX)	Rules on the operation of Electricity meter	Dec 2017	
8	Ministry of Environment	Guideline for the greenhouse gas and energy target management operation	01/01/2017	
9		Status of the Generation facility		
10	KEPCO	Sustainability Report	2016	
11	K-water	Commissioning Certificate of Sihwa Tidal Power Plant		
12	KEPCO	Statistics of Electric Power in Korea (2016, 2017, 2018)" (KEPCO)	2015, 2016, 2017	
13	K-water	Final PDD	Version 04 20/09/2018	
14	K-water	Emission factor Calculations sheet	Version 04 20/09/2018	
15	K-water	Emission reduction Calculation sheet	Version 04 20/09/2018	

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. CL from this validation

CL ID	01	Section no.		Date: 01/02/2018
Description of CL				
It was observed from the data that there is some difference with respect to the emission factor calculations (OM, BM) as some of the data pertaining to power plants is not considered. PP is requested to clarify the same with the correct information.				
Project participant response				Date:
The EF has been recalculated based on the latest statistics available and accordingly all the plants were considered.				
Documentation provided by project participant				
The revised EF calculation sheet(ver. 04) was submitted to the DOE.				
DOE assessment				Date:
The EF calculation sheet has been revised by the PP. Hence the issue is closed.				

CL ID	02	Section no.		Date: 27/04/2018
Description of CL				
In the calculation of OM and BM, many plants were not considered for the calculation. PP to clarify and make the necessary revision.				
Project participant response				Date:
PP revised the BM sheet and included the power plant units for the calculation of BM factor by using Option A2 whose amount of fuel consumption was not reported but the fuel type is available.				
In regard to the Issue 2, PP already used Option A for the calculation of OM factor in the submitted PDD, so the PP revised the OM sheet by using the Statistics of Electric Power in Korea (KEPCO, 2015.5, 2016.6, 2017.6).				
Documentation provided by project participant				
The revised EF calculation sheet(ver. 04) was submitted to the DOE.				
DOE assessment				Date:
The EF calculation sheet has been revised by the PP. Hence the issue is closed.				

CL ID	03	Section no.		Date: 02/07/2018
Description of CL				
Based on the incompleteness received, PP to clarify and revise below points				
<ol style="list-style-type: none"> 1. In Sheet "BM_factor (2016)", there are many power plants that have not been considered for BM calculation, including renewable power plants. Excluding renewable power plants or less carbon-intensive fuel power plants from the BM calculation may not be conservative. In the same sheet, the PP explained that the power units whose amount of net electricity generation was missing in the "2016 Statistics of Electric Power in Korea" were excluded from the calculation of the BM factor. However, under any options available in the "TOOL07: Tool to calculate the emission factor for an electricity system", it is required to consider the electricity generation by all power plants serving the grid (for example, see paragraphs 47, 55, 71, 76 of the Tool07). 2. In Sheet "Baseline EF (CM)", there is a discrepancy between electricity generation data in the first table and one in the second table of the same sheet. For example, 2016 net generation is 306,609,522 MWh (Cell D21) in the second table, but 352,876,505 (= G11 minus F11) in the first table. The DOE/PP are requested to clarify this difference. 3. In addition, while listing the power plants for BM calculation, the PP shall use the date of commissioning as per para 76 and 105 of the "TOOL07: Tool to calculate the emission factor for an electricity system", and not the date of completion. 				
Project participant response				Date: 22/09/2018

1.	<p>PP included renewable power plants and less carbon-intensive fuel power plants for the BM calculation by using the most recently updated data to revise the EF this time and it resulted in the increase of completeness, accuracy and conservativeness. There were new publications of KEPCO "2017 Statistics of electric power in Korea('18.6)" and KPX "2017 Status of generation facility('18.7)". And the newly published data have more specific generation data compared to the statistics of last year.</p> <p>In case generation and fuel consumption data of each units are available, the emission factor is determined as Option A1. However, if generation and only the fuel type used of each units are available, PP determined the emission factor as Option A2. The CO₂ emission factor of each fuel type i(EF_{CO2,i,y}) is quoted from "Guideline for the greenhouse gas and energy target management operation(2016.12.30, Korea) attached table #22". And the parameter η(average net energy conversion efficiency) is quoted from the default values provided in Table2, Appendix of TOOL 09 ;"Determining the baseline efficiency of thermal or electric energy generation systems"</p>
2.	<p>In Sheet "Baseline EF(CM)", electricity generation data in first table are gross generation data and one in second table are net data. So PP revised gross generation to net data in first table. And group energy is Low-cost/must run, because electricity supplied to the grid in group energy is preferentially purchased at the electricity market as prescribed in the Electric utility act article 31. In second table, net generation is not included low-cost/must run power plant/unit, it is the same as the total grid generation minus generation of low-cost/must run and private power in first table.</p>
3.	<p>PP revised "completion date" to "commissioning date". There was no truthful information of commissioning date of each generation units in Korea. PP used "2017 Status of Generation facility(2018)" of KPX for the start date to supply electricity to grid. Those data are officially and independently published every year by the third party, KPX.</p>
Documentation provided by project participant	
The revised EF calculation sheet(ver. 04), ER calculation sheet, ver 04 and the revised PDD version 04 has been submitted to the DOE.	
DOE assessment	
Date:	
The PDD, ER and EF calculation sheet has been revised by the PP by considering all the plants and the latest data as per KEPCO. So all the points in the incompleteness have been addressed by the PP. Hence the issue is closed.	

Table 2. CAR from this validation

CAR ID	01	Section no.		Date: 01/02/2018
Description of CAR				
As per the methodology ACM002 ver.17, the monitoring parameter relevant to the project is TEGy where as in the PDD, it is mentioned as EG PJ,facility,y- PP is requested to clarify and revise the same in PDD in line with the methodology.				
Project participant response				Date:
Since TEGy is the parameter used to calculate the power density of the hydro power project activity, PP changed TEGy to EGPJ,y. EGPJ,y is quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (Please refer to Methodology ACM0002 version17.0 paragraph 43, 44).				
Documentation provided by project participant				
The revised PDD was submitted to the DOE.				
DOE assessment				Date:
Hence the issue is closed.				

Table 3. FAR from this validation

No FAR has been raised.