



**Validation report form for post-registration changes 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	Daegu Bangcheon-Ri Landfill gas CDM Project (Ref. 0851)
Process track	<input checked="" type="checkbox"/> Prior approval <input type="checkbox"/> Issuance <input type="checkbox"/> Renewal of crediting period
Version number of the validation report on PRCs	1.0
Completion date of the validation report on PRCs	16/07/2018
Type(s) of PRCs	<input type="checkbox"/> Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines <input checked="" type="checkbox"/> Corrections <input type="checkbox"/> Changes to the start date of the crediting period <input type="checkbox"/> Inclusion of a monitoring plan <input type="checkbox"/> Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools <input checked="" type="checkbox"/> Changes to the project design <input type="checkbox"/> Changes specific to afforestation and reforestation project activities
Version number of PDD to which this report applies	Ver. 13
Project participants	Daegu Metropolitan City Daesung Eco-energy Co., Ltd. Korea District Heating Corporation Ecoeye Co., Ltd.
Host Party	Republic of Korea
Applied methodologies and standardized baselines	Methodology : ACM0001 Flaring or use of landfill gas (Ver. 15)
Mandatory sectoral scopes linked to the applied methodology	Sectoral Scope 13: Waste Handling and Disposal
Conditional sectoral scopes linked to the applied methodologies	-

Name and UNFCCC reference number of the DOE	Korea Testing & Research Institute (Ref. E-0056)
Name, position and signature of the approver of the validation report on PRCs	CHO Seong Hun, Director <i>CHO SEONGHUN</i>

SECTION A. Executive summary

Ecoeye Co., Ltd. has commissioned Korea Testing and Research Institute (hereinafter referred to as “KTR”) to carry out the validation for post registration change of the CDM project titled “Daegu Bangcheon-Ri Landfill Gas CDM Project” (hereinafter referred to as the proposed project).

This report summarizes the findings of the validation for the post-registration changes, performed on the basis of UNFCCC criteria, as well as criteria given to provide consistent project operations, monitoring and reporting.

The objective of a validation is to provide a thorough and independent third party assessment of the post registration changes. In particular, the changes’ compliance with relevant UNFCCC criteria is validated in order to confirm that the changes meet the applicable CDM requirements and the identified criteria.

The validation consists of the following three phases:

- i) Objective review of the revised PDD and other relevant documents,
- ii) Following up interviews with PP,
- iii) Resolution of outstanding issues and issuance of the final post registration changes validation report and opinion.

The first output of the validation process is a list of Clarification Requests, Corrective Actions Requests, and Forward Actions Requests (CLs, CARs and FARs), presented in Appendix 4. Taking into account this output, the PP revised its project design document.

In summary it is KTR’s opinion that the project correctly applies the baseline and monitoring methodology ACM0001 ver.15 and meets all relevant UNFCCC requirements for the CDM. The KTR thus requests CDM-EB to approve the post-registration changes addressed for the CDM project activity.

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	Interviews	Validation findings
1.	Team Leader	IR	LEE	Bongjae	KTR	X	X	X	X
2.	Validator	IR	PARK	Hyemi	KTR	X	X	X	X

B.2. Technical reviewer and approver of the validation report on PRCs

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	KIM	Kihong	KTR
2.	Approver	IR	CHO	Seonghun	KTR

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

The revised PDD submitted by PPs and additional background documents related to the project design and monitoring plan were reviewed by using KTR internal Quality procedures. Furthermore, the validation team used additional documentation from third parties such as host party legislation, technical reports referring to the basic condition, and technical data.

C.2. On-site inspection

Duration of on-site inspection: 12/04/2018				
No.	Activity performed on-site	Site location	Date	Team member
1.	Project implementation, including change in project design	Daesung Eco-Energy Co.,Ltd & Bangcheon-ri Landfill	12/04/2018	LEE Bong-Jae PARK Hye-Mi
2.	Compliance of monitoring plan in the PDD with monitoring methodology	Daesung Eco-Energy Co.,Ltd & Bangcheon-ri Landfill	12/04/2018	LEE Bong-Jae PARK Hye-Mi

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	LEE	Yong Sang	Daesung Eco-Energy CO., Ltd.	12/04/2018	Implementation and operation of the project	LEE Bong-Jae PARK Hye-Mi
2.	HA	Tae Sang	Ecoeye CO.,Ltd	12/04/2018	Provide the revised PDD	LEE Bong-Jae PARK Hye-Mi
3.	SEO	Ju Hwan	Daegu Metropolitan City	12/04/2018	Review the revised PDD	LEE Bong-Jae PARK Hye-Mi
4	HONG	Ki O	Daegu Metropolitan City	12/04/2018	Review the revised PDD	LEE Bong-Jae PARK Hye-Mi

C.4. Sampling approach

No sampling is used as the validation team visited on-site to confirm the proposed facilities in the project and reviewed the related documents.

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

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form	0	0	0
Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines	0	0	0
Corrections	0	0	0
Changes to the start date of the crediting period	0	0	0
Inclusion of a monitoring plan	0	0	0
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools	0	0	0
Changes to the project design	0	0	0
Changes specific to afforestation and reforestation project activities	0	0	0
Others (please specify)	0	0	0
Total	0	0	0

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

Means of validation	The validation team has determined whether the PDD has been completed using the valid version of the applicable PDD form. The validation team has checked whether all the sections of the PDD follow the guidelines provided in the template itself.
Findings	There is no CAR/CL raised in this section.
Conclusion	The validation team conducted the document review on the following document to validate whether the revised PDD ^{/3/} is compliance with the PDD form. The validation team confirmed the PDD is completed using the valid version of PDD form (ver. 10.1) ^{/4/} , all the information has been correctly transferred from the registered PDD (ver. 13) ^{/3/} and both clean and track change versions of the PDD are submitted for validation. The validation team has concluded that the PDD has been completed using the valid version of the applicable PDD form and that the guidelines given in the template itself has been properly followed.

D.2. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

Means of validation	NA
Findings	NA
Conclusion	NA

D.3. Corrections

Means of validation	The validation team checked corrections to the project information have been validated by document review, on-site inspection and review of revised PDD.																							
Findings	There is no CAR/CL raised in this section.																							
Conclusion	<p>There are two types of corrections identified for the revised PDD^{/3/} as follows:</p> <p><u>1. Correction (=additional written) to changes of the valid version of PDD form (ver. 10.1)</u></p> <p>In accordance with attachment 'Instruction for completing this form', the PP added confirmation and declaration that the proposed CDM project activity meets all conditions for registration in A.6 of the revised PDD^{/3/}. The validation team confirmed the proposed CDM project activity is neither registered as a CDM project activity nor deregistered through the interview with PP and CDM website.</p> <p><u>2. Correction to the contact information of PPs</u></p> <p>It is identified that the contact information of PPs has changed in Appendix 1 of the revised PDD. The validation team checked out the contact information through the organizational chart^{/6/7/}, PP's website and on-site inspection. And it is confirmed that the contact information of PPs has been precisely corrected in the revised PDD according to the actual responsible person.</p> <p>The corrected information is as follow;</p> <table border="1"> <thead> <tr> <th></th><th colspan="2">PDD (ver.12)</th><th colspan="2">PDD (ver.13)</th></tr> </thead> <tbody> <tr> <td>Organization name</td><td>Daegu Metropolitan City</td><td>Korea District Heating Corp</td><td>Daegu Metropolitan City</td><td>Korea District Heating Corp</td></tr> <tr> <td>E-mail</td><td>hskim@daegu.go.kr</td><td>cdm@kdhc.co.kr</td><td>dgkim@daegu.go.kr</td><td>cdm@kdhc.co.kr</td></tr> <tr> <td>Contact person</td><td>Bumil KIM</td><td>Sung Hei KIM</td><td>Donggyeom KIM</td><td>Tae Sop Song</td></tr> </tbody> </table> <p>In conclusion, the corrections to the project information mentioned above reflects actual project information, and affect neither the estimated ER nor the design of project activity.</p>					PDD (ver.12)		PDD (ver.13)		Organization name	Daegu Metropolitan City	Korea District Heating Corp	Daegu Metropolitan City	Korea District Heating Corp	E-mail	hskim@daegu.go.kr	cdm@kdhc.co.kr	dgkim@daegu.go.kr	cdm@kdhc.co.kr	Contact person	Bumil KIM	Sung Hei KIM	Donggyeom KIM	Tae Sop Song
	PDD (ver.12)		PDD (ver.13)																					
Organization name	Daegu Metropolitan City	Korea District Heating Corp	Daegu Metropolitan City	Korea District Heating Corp																				
E-mail	hskim@daegu.go.kr	cdm@kdhc.co.kr	dgkim@daegu.go.kr	cdm@kdhc.co.kr																				
Contact person	Bumil KIM	Sung Hei KIM	Donggyeom KIM	Tae Sop Song																				

D.4. Changes to the start date of the crediting period

Means of validation	NA
Findings	NA
Conclusion	NA

D.5. Inclusion of a monitoring plan

Means of validation	NA
Findings	NA
Conclusion	NA

D.6. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

Means of validation	NA
Findings	NA
Conclusion	NA

D.7. Changes to the project design

Means of validation	The validation team checked changes to project design of project activities have been validated by document review, on-site inspection and review of revised PDD.
Findings	<p>There are changes to project design of PDD^{/3/}, identified as follows.</p> <p><u>1. Description of the changes to the project design</u></p> <p>(1) Installation of additional flare stacks (2 units)</p> <p>As for the project, two flare stacks with a capacity of 4,200 Nm³/h (open type, 2,100 Nm³*2 units) were initially installed on 13/10/2006. However, there was an additional flare stacks (enclosed type, 2,000 Nm³*2 units) installed on 31/05/2018. Therefore, the list of facilities, systems and equipment described in the PDD has changed due to the addition of two flare stacks (enclosed type, 2,000 Nm³*2 units) and the actual implementation of 8,200 Nm³(2,100 Nm³*2 units, 2,000 Nm³*2 units).</p> <p><u>2. Assessment on the changes to the project design</u></p> <p>(1) Assessment on the reason of the changes and description of the baseline scenario:</p> <p>The changes to the project design is mainly due to the addition of flare stacks (enclosed type, 2,000 Nm³*2 units). The additional unit was installed on 31/05/2018 and it was checked through the completion inspection report of flare stacks and on-site inspection. The reason of change is that the residents around the landfill increased their complaints due to odor in every summer season. Accordingly, it was decided to install additional flare stacks in order to reduce odor. It was checked through installation approval of waste disposal facility^{/8/} and the approval of designing documents (layout, outline drawing, cross-section, P&ID) for additional flare stacks^{/9/} issued in Jan 2018. Therefore, it is applicable to the baseline scenario presented in the methodology ACM0001(ver.15) and there is no impact for current baseline scenario due to this changes to the project design.</p> <p>(2) Assessment on invest analysis for demonstration of additionality</p> <p>The Investment analysis for this project is based on the cost of the project (construction and other cost) and income from LFG sales as the original PDD (ver.12). In these changes to the project design, there is no additional revenue. But construction cost and O&M cost for installation of newly two flare stacks were additionally reflected by previous economic analysis data.</p> <ul style="list-style-type: none"> - Additional construction cost (building flare stack, pipeline replacement, foundation construction): 566 million won in 2018

	<ul style="list-style-type: none"> - Additional maintenance cost: operating cost – 25 million won every year, repairing expense – 30 million won every 5 years - The corporation tax was also changed according to the change of the cost sum <p>The IRR is changed from 4.754% to 4.579% by the above change. Based on result of analysis, IRR of the Project is 4.579% which is still lower than benchmark value 7.0% as original PDD.</p> <p>It was checked through operation & maintenance instruction^{/10/}, document for expected electricity charges^{/11/}. In addition, the validation team identified an Excel sheet for IRR estimation^{/12/} that accurately reflected the figure. Therefore, the validation team confirmed this project was not considered financially attractive.</p> <p><u>3. Assessment on emission reduction</u></p> <p>(1) PE_{flare,y}</p> <p>According to the tool “Project emissions from flaring (Version.02.0.0)”^{/5/}, PE_{flare,y} are calculated based on the flare efficiency ($\eta_{\text{flare,m}}$) and the mass flow of methane to the flare ($F_{\text{CH}_4,\text{RG,m}}$). And the flare efficiency ($\eta_{\text{flare,m}}$) is measured by each flame detector of flare stacks.</p> <p>The flare efficiency depends on the time that the flare is operating. There are existing two flare stacks of open type and newly installed two flare stacks of enclosed type. Although the newly installed flare stack is enclosed type, 50% default value ($\eta_{\text{flare,m}}$) is applied for conservative approach.</p> <p>As for monitoring the flare efficiency, there are one LFG flow meter and four flame detectors on the flaring system. The operation of the flame detectors is reflected in determination of the time that each flare stack controlled by each valve is operating. The newly installed two flame detectors (FD-103, 104) are the same type (UV-IR) and manufacture confirmed whether both of them work normally at the 03/07/2018. In addition, the newly installed flame detector will be replaced after 40,000 hours of use in accordance with the manufacturer's specification.</p> <p>It was checked through the approval of designing documents (layout, outline drawing, cross-section, P&ID) for additional flare stacks^{/9/} issued in Jan 2018, completion inspection report of flare stacks^{/13/}, the specifications^{/14/} and the calibration reports of flame detectors^{/15/}, and on-site inspection. Therefore, the validation team confirmed that the flare efficiency ($\eta_{\text{flare,m}}$) by the newly installed flare stacks is a conservative estimate and the flame detectors are reliable.</p>
Conclusion	<p>The assessment team confirms that the changes in project design are not adversely affecting the additionality of the project as it remains additional. The changes do not affect the scale of the project, as the project activity remains the large scale project.</p> <p>The application and applicability of the applied methodology ACM0001 (ver.15)^{/16/} is duly respected in the revised PDD.</p> <p>The other changes are in compliance with applied monitoring methodology and/or tool.</p> <p>It is further confirmed by the validation team that proposed changes include all types of changes with regard to completeness of the information.</p>

D.8. Changes specific to afforestation and reforestation project activities

Means of validation	NA
Findings	NA
Conclusion	NA

SECTION E. Internal quality control

Internal Quality control within the team is assured through a technical review process that takes place after the on site assessment and after closure of finding. The internal quality control in the validation process affects the final decision.

When performing the technical review, the reviewer ensures that;

- The validation activity has been performed by the technical team by exercising utmost diligence and complete adherence to the CDM rules and requirements.

- The review encompasses all aspects related to the project, which includes project design, baseline, additionality, MPs and emission reduction calculations, internal quality assurance systems of the PP, as well as the project activity, closure of CARs and CLs during the validation exercise, review of sample document.

The finalized validation opinion will be accepted for further processing such as uploading via the UNFCCC interface.

SECTION F. Validation opinion

KTR has performed a validation of post-registration changes of Daegu Bangchen-Ri Landfill gas CDM Project, CDM Registration Reference Number 0851.

The validation was performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation consists of the following three phases:

- i) desk review of the project related document and additional background documents for the PRC;
- ii) following-up interviews with the PPs;
- iii) resolution of outstanding issues and the issuance of the final validation report and opinion.

The review of the revised project design document, relevant additional information and the subsequent following-up interviews have provided KTR with sufficient evidence to determine the fulfilment to stated criteria. In our opinion, the post-registration changes meet all relevant UNFCCC requirements for the CDM. KTR thus requests approval of post-registration changes addressed for the project activity.

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification
CO ₂	Carbon Dioxide
DOE	Designated Operational Entity
EB	CDM Executive Board
ER	Emission Reduction
GWP	Global warming potential
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse Gas(es)
LFG	Landfill Gas
PDD	Project Design Document
PP	Project Participant(s)
PRC	Post Registration Change
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
ECOYE	Energy and Environment Consultancy Company
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

KTR

한국화학융합시험연구원

K O R E A T E S T I N G & R E S E A R C H I N S T I T U T E

Certificate of Authorization

Name : LEE, Bongjae
 Date of Birth : August 6th, 1978
 Certificate Number : 2016CDM - 002

We, KTR, hereby certify that above mentioned person is qualified for the technical areas specified below in compliance with Appendix 2 of CDM Accreditation Standard Ver 6.0 and Quality System of the KTR CDM.

Scope of Authorization :

CODE	TECHNICAL AREA	STATUS
1.1	Thermal energy generation	Lead Validator/Verifier
1.2	Energy generation from renewable energy sources	Lead Validator/Verifier
3.1	Energy demand	Lead Validator/Verifier
4.1	Cement and lime production	Lead Validator/Verifier
13.1	Solid waste and waste water	Lead Validator/Verifier

Valid until : July 19th, 2019

July 19th, 2016



한국화학융합시험연구원장
 Korea Testing and Research Institute





한국화학융합시험연구원

K O R E A T E S T I N G & R E S E A R C H I N S T I T U T E

Certificate of Authorization

Name : PARK, Hyemi
Date of Birth : February 15th, 1986
Certificate Number : 2016CDM - 004

We, hereby certify that above mentioned person is qualified for the technical areas specified below in compliance with Appendix 2 of CDM Accreditation Standard Ver 6.0 and Quality System of the KTR CDM.

Scope of Authorization :

CODE	TECHNICAL AREA	STATUS
1.2	Energy generation from renewable energy sources	Full-time Validator/Verifier
13.1	Waste handling and disposal	Full-time Validator/Verifier

Valid until : July 19th, 2019

July 19th, 2016



한국화학융합시험연구원장
 Korea Testing and Research Institute



KTR

한국화학융합시험연구원

K O R E A T E S T I N G & R E S E A R C H I N S T I T U T E

Certificate of Authorization

Name : KIM, Kihong
 Date of Birth : February 26th, 1979
 Certificate Number : 2017CDM - 003

We, KTR, hereby certify that above mentioned person is qualified for the technical areas specified below in compliance with Appendix 2 of CDM Accreditation Standard Ver 6.0 and Quality System of the KTR CDM.

Scope of Authorization :

CODE	TECHNICAL AREA	STATUS
1.2	Energy generation from renewable energy sources	Lead Validator/Verifier
4.1	Cement and lime production	Lead Validator/Verifier
13.1	Solid waste and waste water	Lead Validator/Verifier

Valid until : December 18th, 2020December 19th, 2017

한국화학융합시험연구원장
 Korea Testing and Research Institute



Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	PP	The previous PDD for 1st crediting period	http://cdm.unfccc.int/filestorage/O/2/8/O28U1W39CNPMG0K7V4YFBTQSADJ5LI/0851_PDD_Daegu%20Bangcheon-Ri%20LFG%20CDM_ver9_Clean.pdf?t=Rkt8b3Rxa2t3fDAbQ4vm9GcZ2AhrvgcvAsHn	PP
2	PP	The registered PDD(ver. 12) for 2 nd crediting period	http://cdm.unfccc.int/filestorage/S/W/0/SW0KEG2Z3NJ961HMDRP8ACB4O5FIQU/Ref.0851_PD_Daegu%20Bangcheon-Ri%20LFG%20CDM%20Project_Ver%2012%20%28clean%29?t=UDB8b3Rxa2xyfDB-NBxCJI2W7kIUEUa5GwhT	PP
3	PP	PDD(ver. 13)	N/A	PP
4	UNFCCC	PDD form (ver. 10.1)		Others
5	UNFCCC	Project emissions form flaring (ver. 2)	N/A	Others
6	Daegu Metropolitan City	Organizational chart	N/A	PP
7	Korea District Heating Corp	Organizational chart	N/A	PP
8	PP	Installation approval of waste disposal facility	N/A	PP
9	PP	The approval of designing documents (layout, outline drawing, cross-section, P&ID) for additional flare stacks	N/A	PP
10	PP	Operation & maintenance instruction	N/A	PP
11	PP	Document for expected electricity charges	N/A	PP
12	PP	Excel sheet for IRR estimation	N/A	PP
13	PP	Completion inspection report of flare stacks	N/A	PP
14	PP	The specifications of flame detectors	N/A	PP
15	PP	The calibration reports of flame detectors	N/A	PP
16	UNFCCC	ACM0001 (ver. 15)	N/A	Others

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	31 October 2017	Revision to align with the requirements in the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory		
Document Type: Form		
Business Function: Registration		
Keywords: post-registration change, project activities, validation report		