



Verification and certification report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the verification and certification report form for CDM project activities" at the end of this form.

VERIFICATION AND CERTIFICATION REPORT

Title of the project activity	Mokpo Landfill Gas Recovery Project for Electricity Generation
Reference number of the project activity	2834
Version number of the verification and certification report	Version 3.2
Completion date of the verification and certification report	20/06/2017
Monitoring period number and duration of this monitoring period	<ul style="list-style-type: none"> Monitoring period number: 7th Duration: 01/01/2016 ~ 31/12/2016(366 days)
Version number of monitoring report to which this report applies	Version 3.0
Crediting period of the project activity corresponding to this monitoring period	18/02/2010 ~ 17/02/2020 (Fixed, 10 years)
Project participant(s)	<ul style="list-style-type: none"> Hanwha Corporation: Republic of Korea Hanwha Corporation: Switzerland
Host Party	Republic of Korea
Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)	<ul style="list-style-type: none"> Sectoral scopes <ul style="list-style-type: none"> Scope 1. Energy Industry Scope 13. Waste Handling and Disposal Selected methodologies <ul style="list-style-type: none"> AMS I.D: Grid connected renewable electricity generation_ver.13.0 AMS III.G: Landfill methane recovery_ver.06
Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the registered PDD	<ul style="list-style-type: none"> Amount estimated in PDD for 2016: 26,630 tCO₂e
Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period	47,163 tCO _{2-eq}
Name of DOE	Korean Foundation for Quality (KFQ)
Name, position and signature of the approver of the verification and	Soon Hong YEOM Managing Director of Sustainability Management Institute

certification report	56 years
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SECTION A. Executive summary

Korean Foundation for Quality (KFQ) has performed periodic verification of the CDM project 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in Republic of Korea. UNFCCC Registration Ref. No. of this project activity is 2834 and duration of this 7th monitoring period is 01/01/2016 ~ 31/12/2016. This report contains the findings from the verification and a certification statement for the certified emission reductions.

Verification objective

Verification is the periodic, thorough and independent assessment and ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period. Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' for the period in accordance with paragraph 62 of CDM modalities and procedures.

Verification scope

The scope of the verification is to verify that:

- The project activity has been implemented and operated in accordance with the registered PDD or any approved revised PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place.
- 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 monitoring plan complies with the monitoring methodology and the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology including applicable tools and compliance with any guidance provided by the Board regarding deviations from the provisions of a registered plan and/or methodology.
- Data is recorded and stored as per the monitoring methodology AMS I.D (version 13), AMS III.G (version 06) and the calculation of GHG emission reductions have been assessed to correctly support the emission reductions being claimed.

Furthermore, it was KFQ's objective to identify any concerns related to the conformity of the actual project activity and its operation with the registered project design document and determine whether any deviation or proposed or actual changes in the implementation or operation of the project activity comply with the requirements of the Project Standard.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified. The verification is incorporating both quantitative and qualitative information on emission reductions.

Verification process

KFQ has made publicly available the monitoring report received from the project participants. Only verification activities after the publication of the MR on the UNFCCC CDM website have been used as a basis for conclusion of verification.

The verification process includes desk review of the MR published (and any updated versions, if available), emission reduction calculation spreadsheets and other supporting documents and data. Further, onsite assessments and interviews with those involved in project management and operations are conducted. This is followed by preparation of draft verification report summarizing desk review and on-site assessment findings (i.e. CARs, CLs, and FARs). Upon successful closing of the CARs and CLs raised (if any), the draft verification report is prepared. The draft verification report reviewed by a technical reviewer according to KFQ's internal quality assurance procedures.

The data presented in the MR were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel at Hanwha Corporation and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, as well as to verify the correct application of the approved monitoring methodology. Furthermore, this has enabled the verification team to assess and determine that the implementation and operation of the project activity as well as the steps taken to report emission reductions in compliance with the CDM criteria and relevant guidance provided by the Board.

In addition, all parameters, as required (and as applicable) by the monitoring methodology AMS I.D (version 13) and AMS III.G(version 06) as well as the monitoring plan and the management system were assessed during the site visit.

Description of the project activity

Title of project activity:	Mokpo Landfill Gas Recovery Project for Electricity Generation	
UNFCCC Registration Number:	2834	
Project Parties:	Republic of Korea (Host) Switzerland	
Project Participants:	<ul style="list-style-type: none"> Hanwha Corporation. (Korea) Hanwha Corporation (Switzerland) 	
Baseline and monitoring methodology:	AMS I.D: Grid connected renewable electricity generation (version 13) AMS IIIG: Landfill methane recovery (version 06)	
Location of the project activity:	Address	Daeyang-dong, Mokpo City, Jeollanam-do, Republic of Korea
	GPS Coordinates:	Longitude : 126.4096 °E Latitude : 34.8328°N
Registration Date:	18/02/2010	
Crediting Period:	18/02/2010 ~ 17/02/2020	
PDD	<ul style="list-style-type: none"> Registration version: 05 dated 29 November 2013(approved 06 March 2014) Revised version: 12 June 2017(revised from above mentioned registered PDD since PRC underwent during this 7th verification) 	
Monitoring period of this verification	01/01/2016~31/12/2016	

Mokpo Landfill Gas Recovery Project for Electricity Generation is developed by Hanwha Corporation in the Republic of Korea. Mokpo Landfill was constructed in 1995 as a municipal solid waste (MSW) landfill and total area of it is 290,490 m².

The purpose of this project is to collect and utilize CH₄ (as a renewable energy) for electricity generating at the landfill site. Two generators are installed with a total capacity of 2.123 MW (1.065MW and 1.058MW) and the generating electricity from the project is exporting to a Grid.

After registration of the project activity on 18 February 2010 under UNFCCC Ref.No.2834, request of post registration changes (ref PRC-2834-001) with revised PDD(version 05 dated 06/03/2014) was approved and new watt hour meter for measuring exported electricity was additionally installed for second generator as per national regulation.

During this 7th monitoring period (01/01/2016~31/12/2016), there were 2 types of post-registration changes and there were identified during on-site inspection. The post registration changes in the design of the project and correction were assessed as per Appendix 1 of CDM Project Standard and VVS and validation opinion has been provided. The PRC change is in line with Appendix 1 of Project Standard and hence DOE not require prior approval from EB. Thus an approval of PRC is requested under the issuance track. The detail of PRC is as below:

- 1) Correction
: Engine type of each engine installed at the project site was correct due to topographical error in the registered PDD
- 2) Changes to the project design of a registered project activity
: Number of components of LFG collecting system

Thus, the physical components including the equipment for collecting LFG, generating electricity, measuring LFG, generated electricity and emission reduction calculation were confirmed as per the PDD which is revised from the registered PDD (Version 05, approved 06 March 2014) since PRC underwent during this 7th verification (version 06 dated 12 June 2017, hereinafter 'revised PDD').

Conclusion

KFQ has performed periodic verification of the emission reductions reported for the project activity 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in Korea (UNFCCC Registration Ref. No. 2834) for the period 01/01/2016 to 31/12/2016.

The verification of the emission reductions gas assessed all factors and issues that constitute the basis for emission reductions from the project. All relevant records of data from the monitoring system and daily operational record have been examined and verified for the reporting period.

KFQ also confirms that the GHG emission reductions are calculated without material misstatements. Our opinion refers to the project's GHG emissions and resulting GHG emission reductions reported, both determined using the valid revised project's baseline, its monitoring plan and its associated documents.

The implementation of the project resulted in 47,163 tCO₂e of emission reductions during the period from 01/01/2016 to 31/12/2016 which is within the fixed crediting period from 18/20/2010 to 17/20/2020. In our opinion, the GHG emission reductions reported for the project in the MR (Version 3.0) are fairly stated. The GHG emission reductions were calculated correctly on the

basis of the approved monitoring methodology AMS I.D (version 13), AMS III.G (version 06) and the monitoring plan contained in the revised PDD.

KFQ is able to certify that the emission reductions from the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in Korea during the period from 01/01/2016 to 31/12/2016 amount to 47,163 tons of CO₂e.

SECTION B. Verification team, technical reviewer and approver**B.1. Verification 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 review	On-site inspection	Interview(s)	Verification findings
1	Team Leader(*)	IR	LEE	Mi Jung	KFQ	√	√	√	√
2	Verifier	IR	CHO	Jin Seok	KFQ	√	√	√	√

(*) means a personnel with technical expertise in technical area 13.1.

B.2. Technical reviewer and approver of the verification and certification report

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	PARK	Sang Yeon	KFQ
2	Approver	IR	YEOM	Soon Hong	KFQ

Please refer to Appendix 2 below for demonstration of how the team meets the competence required for the verification.

SECTION C. Application of materiality**C.1. Consideration of materiality in planning the verification**

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1	Number of Monitoring parameters	L	The project activity does not involve large number of monitoring parameters.	In response of that risk, the KFQ verification team nevertheless included two verifiers in total and conduct on-site inspection in order to cover/review all monitoring parameters in a complete and detailed manner.
2	Error rate in Monitoring report	L	Expert organization is involved in compilation of MR as well as calculation	In response of that risk, the KFQ verification team focused on systematic consistency and error checks
3	Familiarity with Monitoring system	L	This is 7 th monitoring period. Expert organization is involved in the periodic inspection of monitoring equipment	In response of that risk, as part of the verification of KFQ in this project, the KFQ verification team will independently check the existence of monitoring

				<i>instruments as well as their valid calibration.</i>
4	QA/QC	L	<i>Stable QA/QC system has been implemented.</i>	<i>In response to that risk, focus on crosschecking between raw data from data recording system. Review monitoring manual and relevant procedures, for example, emergency procedures.</i>
5	Data flow	M	<i>Mainly transferred to the spreadsheet automatically</i>	<i>In response to that risk, the KFQ verification team crosschecks raw data with spread sheet on a random sampling basis to ensure the functioning of transferring system.</i>
6	Recalculation	M	<i>Calculation is performed in excel spreadsheet applying formulae. However, recalculation is done manually.</i>	<i>In response to that risk, the KFQ verification team firstly checked on the existence of omissions of events for recalculations and secondly reviewed all recalculations in detail.</i>

KFQ's verification plan draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate them. KFQ planned the verification by obtaining evidence and other information and explanations that KFQ considers necessary to give reasonable assurance on the reported GHG emission reductions on the basis of risk level identified and materiality concept in accordance with "Guideline on application of materiality in verifications" (ver. 02).

C.2. Consideration of materiality in conducting the verification

Some of the detected findings has influenced on the amount of emission reductions, but occurred in isolation and is immaterial. As the finding could be considered as simple error, not systematic reoccurring error, the verification team decided that no additional audit procedures need to be conducted in order to reach a reasonable level of assurance and that the claimed emission reductions in the MR are free from material error, omission or misstatement. Accordingly, verification and sampling plan were not revised.

SECTION D. Means of verification

D.1. Desk review

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KFQ's verification is based on the monitoring documentation provided by the PP especially the monitoring report, (Version 1 dated 16/02/2017, published on 21/02/2017) and the ER calculation spreadsheets. Furthermore, the registered PDD and validation report were reviewed as well as the monitoring plan, previous verification reports, the applied baseline and monitoring methodology and any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, etc.).

A complete list of all documents reviewed is shown in Appendix 3 of this verification report. KFQ's verification process takes into consideration all the CDM Rules and guidance applicable to the project activity, e.g. Clean Development Mechanism Validation and Verification Standard, Clean Development Mechanism Project Standard, Clean Development Mechanism Project Cycle Procedure, Post Registration Changes and Request for Issuance: Completeness checklist, Post Registration Changes and Request for Issuance: Information and reporting checklist and relevant decisions, clarifications and guidance from the CMP and the CDM EB.

During the desk review, KFQ has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- Verify the compliance of the MR with the guidance for completing the monitoring report form;
- Verify the completeness of the data and the information presented;
- Review the monitoring plan contained in the registered PDD and monitoring methodology. Check the compliance of the MR with respect to the monitoring plan and verify that the applied methodology was carried out. Particular attention to coverage of all monitoring parameters, the frequency of measurements, the quality of the metering equipment including calibration requirements and the quality assurance and quality control procedures was paid;
- Review the calculations and assumptions used to obtain GHG data and ER
- Evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

D.2. On-site inspection

Detailed verification of all data contained in the MR was performed during the site visit at project site on 14/03/2017. During the site visit, the personnel were interviewed or assisted the verification team. KFQ has applied standard auditing techniques to assess the quality of information provided.

The following aspects of the CDM project activity have been confirmed:

- The implementation and operation of the CDM project activity;
- The information flow for generating, aggregating, recording, calculation and reporting of the monitoring parameters; and
- The operational and data collection procedures and their implementation in accordance with the monitoring plan.

Further, the following activities were performed:

- A cross-check between information provided in the MR and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the monitoring plan and methodology AMS I.D (version 13) and AMS III.G(version 06)
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- Identification that quality control and quality assurance procedures are in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Duration of on-site inspection: 14/03/2017				
No.	Activity performed on-site	Site location	Date	Team member
1	Confirmation of the correct & complete implementation and operation of the Project Activity and check of all physical features as described in the PDD are in place.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO
2	Review of the complete data flow from data generation, aggregation, recording, calculation to reporting of the monitoring parameters.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO
3	Confirmation of the complete & correct implementation of procedures for the operation and data collection.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO
4	Verification of the information provided in the MR and documentation with other sources.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO
5	Check of the monitoring equipment against the PDD, the monitoring plan as well as the approved methodology, including check of calibration & maintenance, etc. in relation to that equipment.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO
6	Identification whether suitable QA/QC procedures are in place in order to prevent errors or to enable the corrections of errors and omissions in the reported parameters.	Mokpo	14/03/2017	Mi Jung LEE Jin Seok CHO

D.3. Interviews

A list of the persons interviewed during this verification activity is included in the table below.

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	LEE	Kun Hong	Hanwha Corporation	14/03/2017	General support, Facilities, instruments and analysis, QA/QC, calculation	Mi Jung LEE Jin Seok CHO
2	CHOI	Jin Young				
3	CHO	Hyun Jun				
4	PARK	Sang Hyuk	Roen Consulting Co., Ltd.		General support	
5	MOON	Seon Young			CDM coordination	
6	DO	Young Eun			QA/QC, Calculation, Reporting	
				General support		

D.4. Sampling approach

As per the requirements set out in VVS (Version 9.0), random sampling has been applied, as relevant for the present case in the Project Activity, where no sampling approach was applied by the PP.

Since automatic transferred system to the spreadsheet is in place, crosscheck for data in spreadsheet against raw data were done based on random sampling after confirming safeguard measure for raw data in DCS and server and transferring system.

Sampling plan when the verification team planned for verification has been revised as some minor omissions in the detection process of events related to emission reductions were found.

However recalculations for all events, calibrations of all measurement instruments and intervals (Measuring frequency, Reading frequency and Recording frequency) were assessed. All data recorded manually were also verified.

D.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	0	1	0
Compliance of the project implementation with the revised PDD	0	1	0
Post-registration changes	0	0	0
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline	0	0	0
Compliance of monitoring activities with the registered monitoring plan	0	0	0
Compliance with the calibration frequency requirements for measuring instruments	1	1	0
Assessment of data and calculation of emission reductions or net removals	2	2	0
Others (please specify)	0	0	0
Total	3	5	0

The objective of this phase of the verification was to resolve any issues which needed to be clarified prior to KFQ's conclusion that i) the project activity has been implemented and operated in accordance with the registered PDD or any revised PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan including any guidance provided by the Board regarding deviations from the provisions of a registered/revised plan and/or methodology and iii) the data and calculation of GHG emission reductions are correct.

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- ii. Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- iii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iv. Issues identified in a FAR during validation or previous verification(s) to be verified during next verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

All findings were satisfactorily addressed by the project participant in the monitoring report.

SECTION E. Verification findings**E.1. Compliance of the monitoring report with the monitoring report form**

Means of verification	KFQ has checked the MR provided by the PP against the latest monitoring report form in order to determine, whether the MR is in compliance with it.
Findings	The PP submitted the MR (version 1.0 of 16 February 2017) to DOE applying the Monitoring Report Form Version 05.1. It is identified during document review that the MR has no blank section. However, according to the paragraph 245 of CDM PS (Version 09.0) and 'Instruction for filling out the monitoring report form', PP shall indicate whether any request for prior approval by the Board of changes to the revised CDM project activity has been submitted. PDD of this project activity was approved on 6 March 2014 through the PRC but it was not indicated in the monitoring report version 1.0./ Refer to CAR 01
Conclusion	<p>In the final version (version 3.0 dated of 14 June 2017) of monitoring report, previous request for prior approval by the Board of changes to the revised CDM project activity was described in B.2.5. During 4th verification PRC with prior approval CDM EB was requested and it was approved on 06 March 2014(PRC-2834-001). It is clearly described in the final version of monitoring report as well as PRC identified during this monitoring period which request approval under issuance track.</p> <p>Thus verification team concluded that the monitoring report (version 3.0) is in compliance with the latest Monitoring Report Form (version 05.1) and instruction therein.</p> <p>The raised CAR 01 has been completely resolved.</p>

E.2. Remaining forward action requests from validation and/or previous verification

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During the validation the validating DOE might have raised issues that could not be closed or resolved during the validation stage. For this purpose FARs might have been raised. Likewise FARs might have been raised in the course of previous verifications.

In the course of this verification the latest version of the PDD and the previous verification report, where applicable, have been checked in order to identify any remaining forward action requests. For the current monitoring period the following applies:

- i) Open issues from validation
 - There were no open issues which have been addressed in the latest version of the validation report.
- ii) Open issues from previous verifications
 - There were no open issues which have been addressed in the previous verification report.

E.3. Compliance of the project implementation with the registered project design document

Means of verification	<p><u>Physical project implementation</u></p> <p>During the on-site visit, the KFQ verification team visually inspected the installations of the project activity as well as all instrumentations necessary for the monitoring of the emission reductions and checked whether all physical features of the CDM Project activity, including the data collection systems and storage against the revised PDD (Version 06, 12 June 2017) and the monitoring plan. Also, the KFQ verification team reviewed the documentation in respect of start-up and operation of the systems, monitoring instrument specifications including containing details such as instrument history and measuring ranges.</p> <p><u>Project operation</u></p> <p>The verification team checked raw data of LFG flow rate and methane fraction</p>
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	<p>recorded in every 8 seconds, records of daily/weekly/monthly electricity export, monthly bills of electricity import, maintenance & calibration history, and event log files. In addition to this, verification team interviewed relevant plant staff to check out actual operation especially events occurred such as maintenance and error in monitoring system to understand operational status during this monitoring period.</p>
Findings	<p><u>Physical project implementation</u></p> <p>The purpose of this project activity is to collect and utilize LFG for electricity generation with 1.065MW and 1.058MW generator respectively at the landfill site. As this landfill site is still reclamation, management of LFG collecting system is required to collect LFG efficiently and to maintain optimum condition to capture methane. Therefore re-location of existing wellhead/well and adding new wellhead/vertical well is very natural to operate landfill site from the point of view of verification team's expertise.</p> <p>However it was found that engine type in the monitoring report version 1.0 is not identical against the revised PDD and the name plate fixed on the engine. According to the paragraph 373(b) and 384 in VVS (version 09.0) any change was occurred, nature and extent of actual changes has to be reflected in the PDD.</p> <p>In addition to this actual number of wellhead and vertical well was increased and it is not same number described in the revised PDD thus verification team could not confirm that PP is implementing the project activity as per the revised PDD. PP shall revise PDD to reflect actual and accurate project status especially project design. <u>Refer to CAR 02 and PRC validation report.</u></p> <p><u>Project operation</u></p> <p>During this monitoring period, there was no noticeable/specific event. However there were several operational events such as maintenance of generators and error in the monitoring system. In such cases, flow rate and methane concentration data were not monitored and/or recorded so emission reduction for certain period was not claimed. Verification team checked these operational events described in the monitoring report by reviewing the daily reports, event log files and interview person in charge of operation at the project site.</p> <p>The monitoring system and data collection system were fairly operated during this monitoring period.</p> <p>However, even conservative approach is applied in emission reduction calculation for these events occurred during this monitoring period, criteria of each event should be determined as well as the ways of data adjustment regarding reduction calculation in a conservative manner. Further to this, verification team found that some events (i.e. 03/05/2016: maintenance of facilities) are omitted from the event described in the monitoring report (Table B-1: Operation events history) version 1.0 even it is precisely considered in emission reduction calculation. <u>Refer to CL 01.</u></p>
Conclusion	<p><u>Physical project implementation</u></p> <p>1) The engine type</p> <p>For electricity generation in this project activity, two engines (1.065MW and 1.058MW respectively) are under operation and verification team checked its real status during on-site inspection to confirm any changes against the information described in the revised PDD.</p> <p>Each engine type is designated according to the manufacture's designation rule. However it was found that the designated engine type was displayed differently in the revised PDD, monitoring report and the name plate fixed on each engine even it is same one. To confirm this difference is just typo error in the revised PDD, name plate fixed on the engine installed at the project site, engine purchase contract and on-site operational manual were assessed and concluded that engine installed at the project site is same as the engine described in the revised PDD.</p> <p>Thus, PP decided to request post-registration change for the correction of this permanent change and correct information on the engine type is described in the revised PDD.</p>

Engine Type	As per registered PDD	Revised PDD
Engine with capacity of 1.065MW	J 320 GS-C81	<u>JGS 320 GS-L.L</u>
Engine with capacity of 1.058MW	JGC 320 GS-L.L	<u>J 320 GS B81</u>

2) Components of LFG collecting system

As Mokpo landfill site is not a closed site and still receiving the waste, PP is adding new wells and other relevant components of LFG collecting system and replacing/re-location of existing wells in purpose of well-operation and controlling of the landfill site.

Thus, since after registration there were c

hanges in number of wells, wellheads and J-trap and this number has a possibility to change afterward. Current numbers are as below and this actual changes to the project design of a registered CDM project activity do not adversely impact any of following:

- Applicability and application of approved baseline methodology
- Compliance of the monitoring plan with applied monitoring methodology
- Additionality of the project activity
- Scale of the project activity

Items	Function	Registered PDD	Revised PDD
Vertical well	LFG capture	121	150
Wellhead	Collecting LFG from vertical gas wells	11	13
Barrel trap	Trapping the condensate from the main pipeline	15	15
J-Trap	Trapping the condensate from the vertical wells	117	120
Main Pipeline	LFG supply to the gas engine	1	1

PP decided to request post-registration change for changes to the project design of a registered project activity which do not require prior approval as per Appendix 1 of the CDM Project Standard and validation opinion has been provided. Thus an approval of PRC is requested under the issuance track. The detail of PRC is as below:

The PRC change is in line with Appendix 1 of CDM Project Standard and hence above mentioned CAR 2 was closed.

Project operation

Operational events occur due to various reasons and it influences on emission reduction calculation. There were classification criteria of those events it was well reflected in emission reduction calculation. Regarding to above mentioned CL 01, PP re-checked to confirm its approach and start/end point of each classified events and data adjustment in those event period are clearly defined in QA/QC manual.

- Maintenance of facilities
- Generator shift
- Black out
- Monitoring error including monitoring system error

Verification team checked operational events occurred during this monitoring period against daily work log and monitoring values from data server, and could confirm that operational events are well defined according to above event type including data adjustment in emission reduction calculation in a conservative manner. There is no omission to reflect in emission reduction calculation regarding occurred operational events and it is well described in the monitoring report section B.1.

The raised CL 01 has been completely resolved.

In conclusion, KFQ was able to assess all physical features (technology, project equipment, monitoring and metering equipment) of the project and found that all are in place during site visit and confirms that the implementation and operation of the project during the 7th monitoring period is consistent with the revised PDD, the information provided in the MR is also in accordance with the description of the revised PDD.

E.4. Post-registration changes**E.4.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline**

There was no temporary deviation from the registered monitoring plan or temporary deviations from monitoring methodology of standardized baseline have been submitted to the UNFCCC prior to the current monitoring period.

E.4.2. Corrections

The following corrections were identified as a part of PRC during this 7th verification period which do not require prior approval by the Executive Board as per Appendix 1 of project standard. Thus an approval of PRC is requested under the issuance track. The detail of PRC is as below:

Correction of each engine type as there is a typographical error in the registered PDD

Due to this correction, minor formatting changes in the revised PDD either as a consequence of using the latest PDD template or representing the correct information at various places in the revised PDD.

E.4.3. Changes to the start date of the crediting period

There were no changes to the start date of the crediting period identified by verification team during this verification.

E.4.4. Inclusion of a monitoring plan to a registered project activity

Not applicable as this monitoring plan was part of the registered PDD.

E.4.5. Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline

There were no permanent changes from registered monitoring plan, monitoring methodology or standardized baseline identified by verification team during this verification.

However permanent change from registered monitoring plan has been applied for addition of new watt hour meter to measure exported electricity for second generator as per national regulation, 'Act on the promotion of the development, use and diffusion of new and renewable energy', and it was approved on 06 March 2014(ref. PRC-2834-001).

E.4.6. Changes to the project design of a registered project activity

There has been change in design of the project activity as number of components of LFG collecting system is changed and it was found during on-site inspection of this 7th verification.

It has been found that due to the change in design of the registered project, the following have no impact in the project:

- a) Applicability and application of approved baseline methodology

- : Change in number of vertical wells, wellheads and J-trap does not impact to the applicability and application of approved baseline methodology
- b) Compliance of the monitoring plan with applied monitoring methodology
- : The changes occurred does not impact to the monitoring plan or any monitored parameter.
- c) Additionality of the project activity
- : Revenue from this project activity is only generating by electricity exported to the Grid. Even the number of vertical wells and wellheads are increased after registration, actual electricity exported to the Grid is smaller than the expected electricity export described in the registered PDD. Also the expectation of electricity generation was calculated under assumption of simultaneous operation of two generator but these engines are operating in rotation at present. Thus, actual electricity generation never exceed estimated electricity generation. Hence it is confirmed that this change do not affect to the additionality of the project activity and the project activity still remains additional.
- d) Scale of the project activity
- : With reference to eligibility of small scale project activity in paragraph 99(a) of PS version 09.0 that for renewable energy project activities with a maximum output capacity of 15MW, the change in number of vertical wells and wellheads do not affect to the 'output' of engine or generator. Hence the maximum output capacity remains unchanged.
- e) The Eligibility criteria of the registered CDM PoA
- : This project activity is not CDM PoA.

Considering the above, the change in design is as per paragraph 6 of Appendix 1 of project standard and hence does not require prior approval from EB. Thus an approval of PRC is requested under the issuance track. The detail of PRC is as below:

E.4.7. Types of changes specific to afforestation and reforestation project activities

N/A

E.5. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

Means of verification	The KFQ verification team reviewed the monitoring plan contained in the revised PDD, version 6.0 dated 12/06/2017 against the approved methodology applied by the project activity, AMS I. D (version 13) and AMS III.G (version 06).
Findings	The KFQ verification team found that there were no incompliance between the monitoring plan contained in the revised PDD, the applied methodology AMS I. D (version 13) and AMS III.G (version 06). Furthermore it was found that there was no standardized baseline applied in the project activity.
Conclusion	KFQ confirms that the monitoring plan is in accordance with the approved methodology applied by the project activity, AMS I. D (version 13) and AMS III.G (version 06).

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	'Data and parameters fixed ex-ante' listed in the MR have been crosschecked & reviewed against – as applicable – the monitoring plan contained in the revised PDD as well as applied methodology AMS I. D (version 13) and AMS III.G (version 06) and other relevant CDM related documentation.
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Findings	Detailed assessment on 'Data and parameters fixed en-ante' is as below:			
	Data/parameter (description, unit)	Source of data	Value(s) applied	KFQ Findings
	EF _{OM} : Operation Margin Emission Factor - Unit: ton CO _{2e} /MWh - The generation-weighted average CO ₂ emission per electricity unit generated by the existing grid-connected power plants	PDD(version 06) - it was originally adopted form the 'Statistics of Electric Power in Korea'.	0.6817	Crosscheck of the value with the revised PDD & Monitoring plan and the applied methodology
	EF _{BM} : Build Margin Emission Factor - Unit: ton CO _{2e} /MWh The generation-weighted average CO ₂ emission per electricity unit generated by the additionally constructed power plants	PDD(version 06) - it was originally adopted form the 'Statistics of Electric Power in Korea'.	0.3933	Crosscheck of the value with the revised PDD & Monitoring plan and the applied methodology
	CEF _{electricity} : CO ₂ emission intensity of the electricity displaced - Unit: ton CO _{2e} /MWh The weighted average of EF _{OM} and EF _{BM}	PDD(version 06) - it was originally adopted form the 'Statistics of Electric Power in Korea'.	0.5375	Crosscheck of the value with the revised PDD & Monitoring plan and the applied methodology
	A complete set of data covering the monitoring period has been provided to KFQ and been reviewed during verification.			
Conclusion	KFQ confirms that all data and parameters fixed ex ante such as EF _{OM} , EF _{BM} : CEF _{electricity} are explicitly mentioned in the MR and have been correctly and consistently applied. All values are in compliance with relevant documentation such as the monitoring plan and the revised PDD, applied methodology AMS I. D (version 13) and AMS III.G (version 06) and other relevant CDM related documentation where applicable.			

E.6.2. Data and parameters monitored

Information flow & data collection system

Means of verification	<p>The KFQ verification team assessed the information flow and data collection system and by means of physical inspection of all major components of the information flow & data collection system as well as related documentation. Interviews with relevant staff were held in order to experience the system in action. Furthermore, the verification of the information flow (where applicable) for all monitoring parameters was successfully done by means of following documents and cross checks:</p> <p><i>Data generation and aggregation:</i></p> <ul style="list-style-type: none"> • Calibration records and certificates • Certificate of analysis of the standard test gas for analyzer calibration • Intervals (measuring frequency, reading frequency, recording frequency) of instruments for each instrument are also verified through display panel on-site and DCS generated <p><i>Aggregation to recording:</i></p> <ul style="list-style-type: none"> • Daily and monthly exported electricity generation(From KPX website) • Monthly bills of electricity imported (From KEPCO) • Data cross check between values from monitoring meters and values in control room & data cross check between data server and daily work log. <p><i>Calculation and reporting:</i></p>
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	<ul style="list-style-type: none"> • Crosscheck of implemented calculations in Excel sheets against the PDD formulae • Data cross check between monthly report generated by PP and Excel Sheets
Findings	<p>As stated in the MR and verified by the KFQ verification team, common data flow systems are used in the project activity for the following parameters:</p> <ul style="list-style-type: none"> • Amount of landfill gas combusted in power plant ($LFG_{\text{electricity}, y}$) • Methane fraction in LFG ($W_{CH_4, y}$) • Total amount of exported electricity out of the project ($EL_{EXP, PJT, Y}$) • Total amount of imported electricity to meet project requirement ($EL_{IMP, PJT, Y}$) <p>For the amount of landfill gas combusted in the power plants, there are 3 flow meters.</p> <ul style="list-style-type: none"> • Main flow meter to measure total flow rate: F_a • Flow meter for generator 1: F_b • Flow meter for generator 2: F_c <p>Each flow meter sends signals continuously to the data server and the accumulated data are registered in electronic file continuously. As the type of flow meter is thermal mass flow meter, reading flow rate is automatically converting to normalized cubic meters.</p> <p>While the flow data is transferring to the server, data lag is occasionally occurring. In this case, spot data is not transmitting from the flow meter to the data server, thus flow data is not recording. However as there is a main meter to measure total flow, PP could read/measure total flow rate during certain time period of data lag as it measures accumulated flow rate.</p> <p>In case of methane fraction in LFG, gas analyzer sends signals continuously to the data server (centralized monitoring system) and it records in the data server with the same recording frequency of the LFG flow. As explained as above data lag is also occasionally occurring. In that case, PP takes conservative approach to adopt CH_4 concentration with a lower value comparing with measured data with previous measure data in every recording time. Furthermore in case of CH_4 concentration data was not transferred to the data server due to data server malfunction or maintenance of monitoring system, PP manually records the CH_4 concentration data every hour according to the emergency procedure in operating manual.</p> <p>Lastly, for the electricity, amount of exported electricity is measuring by watt-hour meters connected to Korea Power Exchange (KPX) and imported electricity is measuring by watt-hour meter controlled by Korea Electric Power Corporation (KEPCO).</p> <p>It was found by the KFQ verification team, that the information flow & data collection system are fully functional during whole verification period covered under this verification. Respective documents and results were made available to KFQ for verification.</p>
Conclusion	<p>The KFQ verification team confirms that the information flow & data collection system meets the requirements of the revised PDD and its monitoring plan as per the applied and approved methodology, AMS I.D (Version 13) and AMS III.G (Version 06) Intervals (measuring frequency, reading frequency and recording frequency) are applied in accordance with the applied methodology and the monitoring plan.</p>

Assessment on data/ parameters

The table out of the CDM-VCR-FORM has been used for the assessment, following rows as needed have been added: Data/Parameter, Unit, Description, Source of data used, Value(s).

Data/Parameter	F
Data Unit	Not applied
Description	Fraction of methane captured at the SWDS and flared, combusted or used in

	another manner
Source of data used	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value(s)	0
Means of verification	The verification team checked whether there were changes in the landfill management plan of the site and facilities for LFG treatment against revised PDD through waste management status data published by Ministry of Environment and physical site inspection.
Findings	The verification team confirms that there were no changes for LFG management and any fraction of methane captured and flared, combusted or use in another manner during this monitoring period. Thus, value for this factor is zero during this monitoring period
Conclusion	Through the interview plant operator and PP as well as physical site inspection, verification could confirm that there was no changes in LFG management manner during this monitoring period thus it is correct and reasonable to treat F as '0'.

Data/Parameter	GWP_{CH₄}
Data Unit	tCO _{2e} /tCH ₄
Description	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used	Decisions under UNFCCC and the Kyoto Protocol
Value(s)	25 (to be applied for the second commitment period of the Kyoto Protocol)
Means of verification	Verification team crosschecked GWP of CH ₄ used in emission reduction calculation with it in the 'Application of the global warming potentials to clean development mechanism project activities and programme of activities for the second commitment period of the Kyoto Protocol. .
Findings	No findings
Conclusion	KFQ confirms that PP applied 25 for GWP of CH ₄ in emission reduction calculation for this monitoring period correctly.

Data/Parameter	LFG _{electricity, y}			
Data Unit	Nm ³ /y			
Description	Amount of landfill gas combusted in power plant			
Source of data used	Gas flow meters			
Value(s)		Measured LFG _{electricity, y} (Nm ³)		
	Data	F _b	F _c	F _{b+c}
	01/01/2016~ 18/01/2016	236,841.200	0.000	236,841.200
	19/01/2016~ 18/02/2016	350,116.300	44,128.600	394,244.900
	19/02/2016~ 18/03/2016	369,295.900	11,176.800	380,472.700
	19/03/2016~ 18/04/2016	288,112.700	95,475.900	383,588.600
	19/04/2016~ 18/05/2016	188,896.100	144,189.400	333,085.500
	19/05/2016~ 18/06/2016	399,846.200	11,666.325	411,512.525
	19/06/2016~ 18/07/2016	364,030.900	8,522.400	372,553.300
	19/07/2016~ 18/08/2016	350,997.200	43,619.600	394,616.800
	19/08/2016~ 18/09/2016	396,319.000	30,100.300	426,419.300
	19/09/2016~	345,214.200	29,116.200	374,330.400

	18/10/2016			
	19/10/2016~ 18/11/2016	381,359.900	18,602.500	399,962.400
	19/11/2016~ 18/12/2016	339,555.600	0.000	339,555.600
	19/12/2016~ 31/12/2016	164,690.100	10.200	164,700.300
	01/01/2016~ 31/12/2016	4,175,275.300	436,608.225	4,611,883.525
Means of verification	<p>The validation team checked whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device and related equipment for data generation, aggregation, recording and reporting procedures. Furthermore, the KFQ verification team performed data crosscheck between daily raw data downloaded from the server and the spreadsheet for emission reduction calculation.</p> <p>All results have been verified against the requirements out of monitoring plan and the applied methodology.</p> <p>Procedures and records on calibration, maintenance and QA/QC activities have been reviewed and checked against the requirements out of the monitoring plan and the applied methodology.</p>			
Findings	<p>Each flow meter (Fa: main meter, Fb: for 1st generator, Fc: 2nd generator) is reading flow rate (as the type of flow meter is thermal mass flow meter, reading flow rate is automatically converting to normalized cubic meters) every 8~10 seconds on average and sends signals continuously to the data server. And this data is recording in electronic file continuously.</p> <p>While the flow data is transferring to the server, certain data may not be transmit to the data server from the flow meter due to data recording lag thus flow data could not be recorded. In this case PP read total flow during this time period and it is possible because the figure read by flow meter is accumulated flow data.</p> <p>During this monitoring period, data recording lag was occurred. Verification team checked data lag period and reviewed whether manually recorded data is correctly applied in the baseline emission calculation.</p> <p>Also when the generator for the project was not operated in case of equipment maintenance or error in monitoring system, the PP applied measured flow data as '0'. In addition to this, when the generator shifts to other generator the flow rate was applied as '0' due to measurement error. Verification team checked each event described as above and checked whether flow rate '0' is correctly applied to exclude it in baseline emission calculation.</p> <p>Such events explained in above are well displayed in Section B (See Table B-1), Implementation of project activity, of the Monitoring Report Version 1.0.</p> <p>Daily data of 'F_b + F_c' and 'F_a' are also compared. The differences between these two reading data could not be exceeding maximum error range (1,728 Nm³/day: theoretical calculation with each flow meter's accuracy) according to internal QA/QC procedures. However it is identified that data was not correctly adjusted for the events which exceeding maximum error range in June 2016./Refer to CAR 03.</p>			
Conclusion	<p>The differences between 'F_b + F_c' and 'F_a' were re-checked through daily data and found that there were 3 times during this monitoring period, 04 June 2016, 07 June 2016 and 13 June 2016. Thus according to the internal QA/QC procedure, PP applied smaller value between 'F_b + F_c' and 'F_a' in baseline emission calculation for conservative approach.</p> <p>Verification team checked the daily work log, the operating manual, spread sheet of 'Mokpo_7th MR_2834_Emission Reduction' and raw data sheet of 'LFG flow rates & CH4 fraction (Mokpo LFG plant)_data' and confirmed that all data applied to BE calculation are consistent and correct.</p>			

	<p>The raised CAR 03 has been completely resolved.</p> <p>KFQ confirms:</p> <ul style="list-style-type: none"> - the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. - monitoring results of this parameter are consistently recorded as per the approved frequency - equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below. - QA/QC procedures are suitable and have been applied in accordance with the monitoring plan.
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Data/Parameter	W_{CH₄,v}
Data Unit	%
Description	Methane fraction in LFG
Source of data used	Methane analyzer
Value(s)	53.214
Means of verification	<p>The measured methane fraction is monitoring automatically and continuously by gas analyzer.</p> <p>The validation team checked whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device and related equipment for data generation, aggregation, recording and reporting. Furthermore, the KFQ verification team performed data crosscheck between daily raw data downloaded from the server and the spreadsheet for emission reduction calculation.</p> <p>All results have been verified against the requirements out of monitoring plan and the applied methodology.</p> <p>Procedures and records on calibration, maintenance and QA/QC activities have been reviewed and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	<p>In case of methane fraction in LFG, gas analyzer sends signals continuously to the data server (centralized monitoring system) and it records in the data server with the same recording frequency of the LFG flow.</p> <p>While transferring reading data from monitoring meter to the data server, data recording lag is occasionally occurred. In that case, PP takes conservative approach to adopt CH₄ concentration with a lower value comparing with measured data with previous measure data in every recording time. Verification team reviewed 'LFG flow rates & CH₄ fraction (Mokpo LFG plant ERP data)' to confirm whether this approach is conservative and applied correct value in baseline emission calculation.</p> <p>In case of CH₄ concentration data was not transferred to the data server due to data server malfunction or maintenance of monitoring system, PP manually records the CH₄ concentration data every hour according to the emergency procedure in operating manual. Thus verification team reviewed CH₄ concentration recorded hourly for such events to confirm methane analyzer functioned properly at that time through daily work log.</p> <p>Also during generator shifts, CH₄ concentration may not available due to measurement error. In that event PP applied CH₄ concentration as '0%' for emission reduction in a conservative manner.</p> <p>Entire events related to the description above are well in Section B (See Table B-1), Implementation of project activity, of the Monitoring Report Version 1.0 and verification team checked it through 'LFG flow rates & CH₄ fraction (Mokpo LFG plant ERP data), daily work log. Also verification team checked that methane</p>

	<p>fraction in LFG is calculated as weighted average CH₄ concentration based on confirmed raw data to calculate baseline.</p> <p>However, verification team found that methane concentration on 27 December 2016 was applied as '0' even it was under normal operation thus methane concentration in LFG during 01/01/2016~31/12/2106 should be re-calculated/<u>Refer to CL 02.</u></p>
Conclusion	<p>Methane fraction in LFG is measuring by methane analyser continuously and it is sending to the data server. The measured data is recording in electronic file continuously at 8~10 seconds interval.</p> <p>Verification team re-checked daily log sheet with ER calculation sheet and could confirmed that 53.214% is correctly calculated. Regarding to CL 02, PP included methane fraction measured on 27 December 2016 to calculate W_{CH₄,y} and previous W_{CH₄,y} is in the monitoring report version 01(published version) became 53.214%.</p> <p>KFQ verification team confirmed that 53.214% is correctly calculated based on reliable raw data and applied in the baseline emission calculation and calculation process was checked.</p> <p>The raised CL 02 has been completely resolved.</p> <p>KFQ confirms:</p> <ul style="list-style-type: none"> - the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. - monitoring results of this parameter are consistently recorded as per the approved frequency - equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below. - QA/QC procedures are suitable and have been applied in accordance with the monitoring plan.

Data/Parameter	EL _{EXP,PJT,Y}																																																															
Data Unit	MWh																																																															
Description	Total amount of exported electricity out of the project																																																															
Source of data used	Watt-hour meter																																																															
Value(s)	<table><tr><th>Date</th><th>Wa</th><th>Wc</th><th>Total EL_{EXP} (MWh)</th></tr><tr><td>01/01/2016~18/01/2016</td><td>308.620</td><td>0.000</td><td>308.620</td></tr><tr><td>19/01/2016~18/02/2016</td><td>451.486</td><td>54.551</td><td>506.037</td></tr><tr><td>19/02/2016~18/03/2016</td><td>478.790</td><td>13.311</td><td>492.101</td></tr><tr><td>19/03/2016~18/04/2016</td><td>364.707</td><td>115.604</td><td>480.311</td></tr><tr><td>19/04/2016~18/05/2016</td><td>252.087</td><td>183.566</td><td>435.654</td></tr><tr><td>19/05/2016~18/06/2016</td><td>509.411</td><td>13.232</td><td>522.643</td></tr><tr><td>19/06/2016~18/07/2016</td><td>494.992</td><td>14.243</td><td>509.235</td></tr><tr><td>19/07/2016~18/08/2016</td><td>443.996</td><td>50.507</td><td>494.503</td></tr><tr><td>19/08/2016~18/09/2016</td><td>479.491</td><td>37.810</td><td>517.301</td></tr><tr><td>19/09/2016~18/10/2016</td><td>459.198</td><td>41.145</td><td>500.343</td></tr><tr><td>19/10/2016~18/11/2016</td><td>497.284</td><td>26.994</td><td>524.278</td></tr><tr><td>19/11/2016~18/12/2016</td><td>418.134</td><td>0.000</td><td>418.134</td></tr><tr><td>19/12/2016~31/12/2016</td><td>219.097</td><td>0.000</td><td>219.097</td></tr><tr><td>01/01/2016~31/12/2016</td><td>5,377.294</td><td>550.962</td><td>5,928.256</td></tr></table>				Date	Wa	Wc	Total EL _{EXP} (MWh)	01/01/2016~18/01/2016	308.620	0.000	308.620	19/01/2016~18/02/2016	451.486	54.551	506.037	19/02/2016~18/03/2016	478.790	13.311	492.101	19/03/2016~18/04/2016	364.707	115.604	480.311	19/04/2016~18/05/2016	252.087	183.566	435.654	19/05/2016~18/06/2016	509.411	13.232	522.643	19/06/2016~18/07/2016	494.992	14.243	509.235	19/07/2016~18/08/2016	443.996	50.507	494.503	19/08/2016~18/09/2016	479.491	37.810	517.301	19/09/2016~18/10/2016	459.198	41.145	500.343	19/10/2016~18/11/2016	497.284	26.994	524.278	19/11/2016~18/12/2016	418.134	0.000	418.134	19/12/2016~31/12/2016	219.097	0.000	219.097	01/01/2016~31/12/2016	5,377.294	550.962	5,928.256
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01/01/2016~31/12/2016	5,377.294	550.962	5,928.256																																																													
Means of verification	The total amount of exported electricity out of project is measured automatically by certified 2 watt-hour meters and measured figures are automatically transferring to the KPX.																																																															

	<p>The validation team checked whether the monitoring activities in relation to this parameter comply with the monitoring plan by physical inspecting to see measuring device and related equipment for data generation, aggregation, recording and reporting. Furthermore, the KFQ verification team performed data crosscheck between the meter readings against monthly sales receipts provided by KPX.</p> <p>All results have been verified against the requirements out of monitoring plan and the applied methodology.</p> <p>Procedures and records on calibration, maintenance and QA/QC activities have been reviewed and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	<p>There are two Watt-hour meters, Wa and Wc, as described in the revised PDD. Wa measures generated electricity from 1st and 2nd generators, and Wc measures electricity generated by 2nd generator.</p> <p>Amount of electricity exported is automatically monitored by these two meters connected to Korea Power Exchange (KPX). Verification team checked meter reading (monthly data: it is aggregated data from daily and weekly reading) by these meters against monthly sales receipts provided by KPX.</p> <p>While checking sales receipts of electricity provided by KPX, exported electricity to KPX from the project in February and May 2016 described in the monitoring report version 1.0 and emission reduction calculation spreadsheet is not consistent with the evidence. /Refer to CAR 04.</p>
Conclusion	<p>According to the evidence, monthly sales receipts provided by KPX, monthly amount of exported electricity out of the project has been corrected and total amount of electricity exported during this monitoring period was correctly applied in ER calculation.</p> <p>The raised CAR 04 has been completely resolved.</p> <p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>Also, KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM EB. Details on calibration are given in section E.7.below.</p>

Data/Parameter	EL_{IMP,PJT,Y}
Data Unit	MWh
Description	Total amount of imported electricity to meet project requirement
Source of data used	Watt-hour meter

Value(s)	<table border="1"> <thead> <tr> <th>Date</th><th>Measured EL_{IMP} (MWh)</th></tr> </thead> <tbody> <tr><td>01/01/2016~18/01/2016</td><td>0.096</td></tr> <tr><td>19/01/2016~18/02/2016</td><td>0.288</td></tr> <tr><td>19/02/2016~18/03/2016</td><td>0.072</td></tr> <tr><td>19/03/2016~18/04/2016</td><td>0.264</td></tr> <tr><td>19/04/2016~18/05/2016</td><td>0.360</td></tr> <tr><td>19/05/2016~18/06/2016</td><td>0.314</td></tr> <tr><td>19/06/2016~18/07/2016</td><td>0.072</td></tr> <tr><td>19/07/2016~18/08/2016</td><td>0.362</td></tr> <tr><td>19/08/2016~18/09/2016</td><td>0.168</td></tr> <tr><td>19/09/2016~18/10/2016</td><td>0.168</td></tr> <tr><td>19/10/2016~18/11/2016</td><td>0.096</td></tr> <tr><td>19/11/2016~18/12/2016</td><td>0.036</td></tr> <tr><td>19/12/2016~31/12/2016</td><td>0.240</td></tr> <tr><td>01/01/2016~31/12/2016</td><td>2.860</td></tr> </tbody> </table>	Date	Measured EL _{IMP} (MWh)	01/01/2016~18/01/2016	0.096	19/01/2016~18/02/2016	0.288	19/02/2016~18/03/2016	0.072	19/03/2016~18/04/2016	0.264	19/04/2016~18/05/2016	0.360	19/05/2016~18/06/2016	0.314	19/06/2016~18/07/2016	0.072	19/07/2016~18/08/2016	0.362	19/08/2016~18/09/2016	0.168	19/09/2016~18/10/2016	0.168	19/10/2016~18/11/2016	0.096	19/11/2016~18/12/2016	0.036	19/12/2016~31/12/2016	0.240	01/01/2016~31/12/2016	2.860
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19/07/2016~18/08/2016	0.362																														
19/08/2016~18/09/2016	0.168																														
19/09/2016~18/10/2016	0.168																														
19/10/2016~18/11/2016	0.096																														
19/11/2016~18/12/2016	0.036																														
19/12/2016~31/12/2016	0.240																														
01/01/2016~31/12/2016	2.860																														
Means of verification	<p>The total amount of imported electricity from outside of the project site is measured automatically by a certified watt-hour meter.</p> <p>The validation team checked whether the monitoring activities in relation to this parameter comply with the monitoring plan by physical inspecting to see measuring device and related equipment for data generation, aggregation, recording and reporting. Furthermore, the KFQ verification team performed data crosscheck between the amounts of imported electricity in the monitoring report against monthly bills provided by KEPCO.</p> <p>All results have been verified against the requirements out of monitoring plan and the applied methodology.</p> <p>Procedures and records on calibration, maintenance and QA/QC activities have been reviewed and checked against the requirements out of the monitoring plan and the applied methodology.</p>																														
Findings	<p>The amount of imported electricity is measured automatically by certified watt-hour meter (W_b) and monthly bills of imported electricity are issued by KEPCO.</p> <p>The verification team checked the monthly bills from KEPCO on total amount of electricity imported from the Grid to the project activity during this monitoring period against the values provided in the monitoring report, and these two figures are consistent.</p> <p>However, it is identified that there was a delayed calibration occurred on EL_{IMP,PJT,Y} but the measured data was not adjusted as per the requirement of VVS ver 9.0. /Refer to CAR 05.</p>																														
Conclusion	<p>According to the evidence, monthly bill provided by KEPCO, monthly amount of imported electricity to the project site has been monitored and total amount of electricity imported during this monitoring period was correctly applied in ER calculation.</p> <p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>As CAR 05 is successfully closed, KFQ confirms that the measured values during the delayed calibration periods are correctly adjusted by applying the maximum permissible error of the instrument as per the requirement of VVS (ver.09.0.) and it is presented correctly in the final monitoring report and well reflected in emission reduction calculation. (Details on calibration are given in section E.7 below.</p>																														

E.6.3. Implementation of sampling plan

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.7. Compliance with the calibration frequency requirements for measuring instruments

General statement

Means of verification	The means of verification in relation to the specific instruments are stated in detail in the tables further below.
Findings	The findings in relation to the specific instruments are stated in detail in the tables further below.
Conclusion	KFQ confirms that the calibration of the measuring equipment has been conducted as per manufacturer's specifications, applied methodology and the monitoring plan. KFQ confirms, if applicable, that the measured values during the delayed calibration periods are correctly adjusted by applying the maximum permissible error of the instrument as per the requirement of VVS (ver.09.0.).

The table of the CDM-VCR-FORM has been used for the assessment, following rows as needed have been added: Data/Parameter, Data Unit, Description, TAG / Serial Number, Type, Accuracy level, Calibration entity, Calibration frequency, Previous calibration (when applicable), Latest calibration, Applied period of max. permissible error (when applicable). Some parameters involve several instruments, table rows have been added as needed accordingly.

Data/Parameter	LFG _{electrivity, y}			
Data Unit	Nm ³ /y			
Description	Amount of landfill gas combusted in power plant			
TAG Number / Serial Number	<ul style="list-style-type: none"> F_a(Main flow meter): GR-160994 F_b(Flow meter for 1st generator): GR-160995 F_c(Flow meter for 2nd generator): 906044A 			
Type	Thermal mass flow meter			
Accuracy level	- 0.5 % for F _a and F _b - 1% for F _c			
Calibration entity	Golden Rules Co., Ltd. for F _a and F _b Flow Technology Co., Ltd. for F _c			
Calibration frequency	3 years			
Previous calibration (if applicable)		F _a (Main flow meter)	F _b (Flow meter for 1 st generator):	F _c (Flow meter for 2 nd generator):
	Date	31/03/2015~ 01/04/2015	31/03/2015~ 01/04/2015	02/04/2012~ 03/04/2012
	Validity	30/03/2018	30/03/2018	01/04/2015
Latest calibration		F _a (Main flow meter)	F _b (Flow meter for 1 st generator):	F _c (Flow meter for 2 nd generator):
	Date	02/09/2016	02/09/2016	31/03/2015~ 01/04/2015
	Validity	01/09/2019	01/09/2019	30/03/2018
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)			
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records &			

	instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	<p>For the F_c (Flow meter for 2nd generator: S/N 906044A), it was found that the monitoring device (= flow meter) as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was also found that it has been calibrated regularly according to the calibration frequency described in the revised PDD. No delay of calibration has been observed. Thus F_c had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.</p> <p>However, even previous flow meter (F_a: Main flow meter and F_b: Flow meter for 1st generator) is valid until 30 March 2018, the F_a (Main flow meter) and F_b (Flow meter for 1st generator) was replaced to new meters on 8 September 2016 but it was not reflected in the monitoring report./Refer to CL 3.</p>
Conclusion	<p>Regarding to CL 2, serial number, date of latest calibration date, calibration result for new flow meter of F_a and F_b were checked through calibration report and verification team confirmed its information are correctly presented in the final monitoring report. Also, verification team checked those flow meters are physically exists.</p> <p>Thus, verification team confirms that accuracy level and calibration interval of the monitoring equipment are controlled and calibrated in accordance with the revised PDD and applied methodology. All 3 flow meters were valid to measure the amount of landfill gas combusted in power plant during this monitoring period.</p> <p>The raised CL 3 has been completely resolved.</p>

Data/Parameter	$W_{CH_4,y}$				
Data Unit	%				
Description	Methane fraction in LFG				
TAG Number / Serial Number	A8M7282T				
Type	Infrared gas analyzer				
Accuracy level	<ul style="list-style-type: none"> Linearity: 1% Repeatability: 0.5% 				
Calibration entity	National Metrology Institute				
Calibration frequency	3 years				
Previous calibration (if applicable)	<table border="1"> <tr> <td>Date</td><td>02/04/2012</td></tr> <tr> <td>Validity</td><td>01/04/2015</td></tr> </table>	Date	02/04/2012	Validity	01/04/2015
Date	02/04/2012				
Validity	01/04/2015				
Latest calibration	<table border="1"> <tr> <td>Date</td><td>26/03/2015</td></tr> <tr> <td>Validity</td><td>25/03/2018</td></tr> </table>	Date	26/03/2015	Validity	25/03/2018
Date	26/03/2015				
Validity	25/03/2018				
Applied period of max. permissible error (when applicable)	N/A (No calibration delay)				
Means of verification	The KFQ verification team has visually checked the physical existence of the gas analyzer at the project site. The KFQ validation team also has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.				
Findings	<p>According to the monitoring plan in the registered PDD, calibration frequency of gas analyzer is 3 years, and accuracy level of linearity and repeatability is 1% and 0.5% respectively.</p> <p>Last calibration was performed on 26 March 2015 thus previous and latest calibration result is valid to covers this 7th monitoring period.</p>				

	Verification team checked the latest calibration report and crosschecked the serial number of gas analyzer in the calibration report against monitoring report and flow meters installed at the project site.
Conclusion	The verification confirms that accuracy level and the calibration interval of the monitoring equipment are controlled and calibrated in accordance with the revised monitoring plan and applied methodology. The gas analyzer was valid to use in calculation of weighted-average of methane fraction as well as baseline emission calculation during this monitoring period.

Data/Parameter	EL _{EXP, PJT, y}		
Data Unit	MWh		
Description	Total amount of exported electricity out of the project		
TAG Number / Serial Number	· W _a (Measuring exported electricity by 1 st and 2 nd generator): 95246742 · W _c (Measuring exported electricity by 2 nd generator): 50339836		
Type	Watt-hour meter		
Accuracy level	0.5s		
Calibration entity	Korea Testing Certification (KTC)		
Calibration frequency	At least once in 2 years		
Previous calibration (if applicable)		W _a	W _c
	Date	20/08/2014~26/08/2014	20/08/2014~26/08/2014
	Validity	19/08/2016	19/08/2016
Latest calibration		W _a	W _c
	Date	17/08/2016~19/08/2016	17/08/2016~19/08/2016
	Validity	16/08/2018	16/08/2018
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)		
Means of verification	The KFQ verification team has visually checked the physical existence of the 2 electricity meters to measure EL_{EXP, PJT, y} . The KFQ validation team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.		
Findings	According to the monitoring plan in the revised PDD, calibration shall be performed at least once in every 2 years.		
	For the W _a , previous calibration was performed during 20 August 2014 ~26 August 2014 and it was valid until 19 August 2016. Thus calibration of this meter was performed during 17 August 2016~19 August 2016 and it is valid until 16 August 2018.		
	In case of W _c , previous calibrated was done during 20 August 2014 ~ 26 August 2014 and it was valid until 19 August 2016. Following calibration was carried out during 17/08/2016~19/08/2016 and validity of this calibration is until 16 August 2018.		
	Verification team checked the previous and latest calibration report and confirmed that there was no delay of calibration. Verification team also checked serial number of Watt-hour meters (W _a and W _c) in the calibration report against monitoring report and meters installed at the project site.		
Conclusion	According to the previous and latest calibration report, verification team could confirm that accuracy level and calibration interval is well controlled according to the monitoring plan by PP. Also Watt-hour meters were valid to monitor electricity exported during this monitoring period. Therefore, value used in baseline emission calculation is valid.		

Data/Parameter	EL_{IMP, PJT, y}
Data Unit	MWh

Description	Total amount of imported electricity to meet project requirement						
TAG Number / Serial Number	24142000332						
Type	Watt-hour meter						
Accuracy level	0.5s						
Calibration entity	Korea Testing Certification (KTC)						
Calibration frequency	Once in 2 years						
Previous calibration (if applicable)	<table border="1"> <tr> <td>S/N</td><td>24142000332</td></tr> <tr> <td>Date</td><td>17/06/2014</td></tr> <tr> <td>Validity</td><td>16/06/2016</td></tr> </table>	S/N	24142000332	Date	17/06/2014	Validity	16/06/2016
S/N	24142000332						
Date	17/06/2014						
Validity	16/06/2016						
Latest calibration	<table border="1"> <tr> <td>S/N</td><td>24142000332</td></tr> <tr> <td>Date</td><td>17/08/2016~19/08/2016</td></tr> <tr> <td>Validity</td><td>16/08/2018</td></tr> </table>	S/N	24142000332	Date	17/08/2016~19/08/2016	Validity	16/08/2018
S/N	24142000332						
Date	17/08/2016~19/08/2016						
Validity	16/08/2018						
Applied period of max. permissible error (when applicable)	For the June 2016~ August 2016						
Means of verification	The KFQ verification team has visually checked the physical existence of the electricity meter to measure $EL_{IMP,PJT,y}$. The KFQ validation team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.						
Findings	<p>It was found that the instrument, as stated in the MR, physically exists and could be identified by the serial number at the project site</p> <p>Verification team checked the previous and latest calibration report, and also checked serial number of Watt-hour meters in the calibration report against monitoring report and meter installs at the project site.</p> <p>However it is identified that there was a delayed calibration occurred on $EL_{IMP,PJT,y}$. As previous calibration of this electricity meter was performed on 17th June 2014 with 3 years of calibration interval, following calibration should be done by 16th June 2016 but it was done during 17/08/2016~19/08/2016. As a result calibration delay period is 16 June 2016~19 August 2016 but measured data was not adjusted as per the requirement of VVS version 9.0/Refer to CAR 06.</p>						
Conclusion	<p>Result of delayed calibration is smaller than the maximum permissible error (0.5%), thus, the PP adjusted the measured values by applying the maximum permissible error of the instrument during the delayed calibration period (16 June 2016 ~19 August 2016). Even the delayed calibration period is 16 June 2016~19 August 2016, PP adjusted the measured data for 19 May 2016~18 August 2016 as monthly bill from KEPCO is period of previous month 15th through 15th of current month. The verification team confirms that the measured values of '$EL_{IMP,PJT,y}$' during delayed calibration period are correctly recalculated as per the requirement of VVS (version 09.0). During all other hours it was found that the instrument had a valid calibration and was working within the specified error ranges as per available, suitable certificates.</p> <p>Thus, the raised CAR 06 has been completely resolved.</p> <p>KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.</p>						

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	KFQ has reviewed all data, parameters and calculations with respect to calculation of the baseline GHG emissions and checked them against the requirements of the
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	<p>applied methodology AMS.I.D (Version 13) and AMS III.G (Version 06) as well as relevant tools applied.</p> <p>KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations. Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements. KFQ has also further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.</p>																														
Findings	<p>The baseline GHG emissions have been found to be 47,164.894 tCO_{2e} for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable. The calculation was found to be correct as well as carried out in accordance with the formulae and methods described in the monitoring methodology AMS I.D (version 13), AMS III.G (version 06) and the revised PDD (version 06, 12 June 2017).</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the monitoring report and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions.</p> <p>It was also found that the spreadsheets, including corresponding re-calculations of data during events as described in the monitoring report, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the revised PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively.</p> <p>All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable), such as raw data generated in the data server, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above.</p> <table><tr><th>Parameter</th><th>Formula</th><th>Value</th></tr><tr><td>BE_y</td><td>= (MD_y - MD_{reg,y}) + EL_{EXP,PJT,y} x CEF</td><td>47,164.894 tCO_{2e}</td></tr><tr><td>MD_y</td><td>= LFG_{electricity, y} x W_{CH4,y} x D_{CH4,y} x GWP_{CH4}</td><td>43,978.457 tCO_{2e}</td></tr><tr><td>MD_{reg,y}</td><td></td><td>0</td></tr><tr><td>EL_{EXP,PJT,y}</td><td></td><td>5,928.256 MWh</td></tr><tr><td>CEF</td><td></td><td>0.5375 tCO₂/MWh</td></tr><tr><td>LFG_{electricity, y}</td><td></td><td>4,611,883.5 Nm³</td></tr><tr><td>W_{CH4,y}</td><td></td><td>53.214%</td></tr><tr><td>D_{CH4,y}</td><td></td><td>0.0007168 t/Nm³</td></tr><tr><td>GWP_{CH4}</td><td></td><td>25</td></tr></table>	Parameter	Formula	Value	BE _y	= (MD _y - MD _{reg,y}) + EL _{EXP,PJT,y} x CEF	47,164.894 tCO _{2e}	MD _y	= LFG _{electricity, y} x W _{CH4,y} x D _{CH4,y} x GWP _{CH4}	43,978.457 tCO _{2e}	MD _{reg,y}		0	EL _{EXP,PJT,y}		5,928.256 MWh	CEF		0.5375 tCO ₂ /MWh	LFG _{electricity, y}		4,611,883.5 Nm ³	W _{CH4,y}		53.214%	D _{CH4,y}		0.0007168 t/Nm ³	GWP _{CH4}		25
Parameter	Formula	Value																													
BE _y	= (MD _y - MD _{reg,y}) + EL _{EXP,PJT,y} x CEF	47,164.894 tCO _{2e}																													
MD _y	= LFG _{electricity, y} x W _{CH4,y} x D _{CH4,y} x GWP _{CH4}	43,978.457 tCO _{2e}																													
MD _{reg,y}		0																													
EL _{EXP,PJT,y}		5,928.256 MWh																													
CEF		0.5375 tCO ₂ /MWh																													
LFG _{electricity, y}		4,611,883.5 Nm ³																													
W _{CH4,y}		53.214%																													
D _{CH4,y}		0.0007168 t/Nm ³																													
GWP _{CH4}		25																													
Conclusion	<p>KFQ confirms that all required data for calculation of the baseline emissions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters. KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PP has followed appropriate methods and formulae for calculating baseline emissions have been followed. KFQ confirms that any emission factors, GWPs and default values and reference values-as applicable- that were applied in the calculation have been justified and correctly applied. No assumptions were used. KFQ confirms that the calculation of baseline emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p>																														

E.8.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	KFQ has reviewed all data, parameters and calculations with respect to calculation of the project GHG emissions and checked them against the requirements in applied methodology AMS I.D (Version 13), AMS III.G (Version 06) and the revised PDD (Version 06, 12 June 2017) as well as relevant tools applied. KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations. Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements. KFQ has further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.												
Findings	<p>The project GHG emissions have been found to be 1.537tCO_{2e} for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable. The calculation was found to be correct as well as carried out in accordance with the formulae and methods described in the monitoring methodology AMS I.D(version 13), AMS III.G(version 06) and the revised PDD.</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the monitoring report and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions.</p> <p>It was found that the spreadsheets, including corresponding re-calculations of data during events as described in the monitoring report, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the revised PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively.</p> <p>All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable), such as raw data generated in the data server, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above.</p> <table><tr><th>Parameter</th><th>Formula</th><th>Value</th></tr><tr><td>PE_y</td><td>= EL_{IMP,PJT,y} X CEF</td><td>1.537 tCO_{2e}</td></tr><tr><td>EL_{IMP,PJT,y}</td><td></td><td>2.860 MWh</td></tr><tr><td>CEF</td><td></td><td>0.5375 tCO₂/MWh</td></tr></table>	Parameter	Formula	Value	PE _y	= EL _{IMP,PJT,y} X CEF	1.537 tCO _{2e}	EL _{IMP,PJT,y}		2.860 MWh	CEF		0.5375 tCO ₂ /MWh
Parameter	Formula	Value											
PE _y	= EL _{IMP,PJT,y} X CEF	1.537 tCO _{2e}											
EL _{IMP,PJT,y}		2.860 MWh											
CEF		0.5375 tCO ₂ /MWh											
Conclusion	<p>KFQ confirms that all required data for calculation of the project emissions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters. KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PPs have followed appropriate methods and formulae for calculating project emissions have been followed. KFQ confirms that any emission factors, GWPs and default values and reference values– as applicable – that were applied in the calculation have been justified and correctly applied. No assumptions were used. KFQ confirms that the calculation of the project emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p>												

E.8.3. Calculation of leakage GHG emissions

Means of verification	KFQ has checked, whether leakage emissions (if any) were determined by the PPs in accordance with the applied methodology, the PDD and the monitoring plan.
Findings	KFQ has found that the approach applied by the PPs that leakage emissions need not to be considered (i.e. being considered zero, consequently) is in accordance to the applied methodology AMS I.D (Version 13) and AMS III.G (Version 06).
Conclusion	KFQ confirms that the PPs approach with regard to leakage GHG emissions is correct and that no leakage GHG emissions need to be considered in the project based on the applied methodology.

E.8.4. Summary of calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	<p>KFQ has reviewed all data, parameters and calculations with respect to calculation of the GHG emission reductions and checked them against the requirements out of the applied methodology AMS I.D(version 13), AMS III.G(version 06) and the revised PDD (Version 05, 29 November 2013) as well as relevant tools applied.</p> <p>KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations.</p> <p>Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements.</p> <p>KFQ has further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.</p> <p>Means of verification in respect of baseline GHG emissions, project GHG emissions and leakage that form the basis for calculation of the GHG emission reductions, are stated in detail in sections E.8.1., E.8.2. and E.8.3. above</p>
Findings	<p>The emission reductions have been found to be 47,163 tCO_{2e} for the verification period. It was found that the first day in which CERs are being claimed in this verification period has been correctly specified by the PPs, being 01/01/2016</p> <p>It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable.</p> <p>The calculation was found to be correct as well as carried out in accordance with the formulae and methods described in the monitoring methodology AMS I.D(version 13), AMS III.G(version 06) and the PDD (Version 06, dated on 12 June 2017) as well as relevant tools applied.</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the monitoring report and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions. It was found that all parameters are automatically collected by the data server. It was found that there is no uncertainty related to manual transfer of data used in the calculation of emission reduction since the monitored parameters are automatically collected. All actions performed at the computer station are logged and the log file is available for KFQ. It was found that the spreadsheets, including corresponding re-calculations of data during events as described in the monitoring report, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the revised PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively. All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable),</p>

	<p>such as raw data generated in the data server, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above. Findings in respect of baseline GHG emissions, project GHG emissions and leakage GHG emissions, that form the basis for calculation of the GHG emission reductions, are stated in detail in sections E.8.1., E.8.2. and E.8.3. above.</p>
Conclusion	<p>KFQ confirms that all required data for calculation of the calculation of GHG emission reductions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters. KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PPs have followed appropriate methods and formulae for calculating GHG emission reductions have been followed.</p> <p>KFQ confirms that any emission factors, GWPs and default values and reference values— as applicable – that were applied in the calculation have been justified and correctly applied. No assumptions were used.</p> <p>KFQ confirms that the calculation of the baseline GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p> <p>KFQ finally confirms, that the amount of emission reductions claimed by the PPs for the verification period from 01/01/2016 to 31/12/2016, amounting to 47,163tCO₂e, is correctly determined and calculated.</p>

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	KFQ compared the ex-ante estimation of emission reductions in the registered PDD with the emission reductions reported by the PPs in the MR.
Findings	<p>KFQ found that the emission reductions in the PDD were estimated as 26,630 tonnes of CO₂ equivalents during the 366 days of the monitoring period. The emission reductions reported by the PPs during the same period were 47,163tCO₂e.</p> <p>It was found, that the PPs have correctly described the situation in the monitoring report as well.</p>
Conclusion	KFQ confirms that the reported emission reductions in the monitoring report version 3.0 is higher than estimated in the PDD. KFQ also confirms that the emission reductions claimed by the PP are reasonable.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	As determined in section E.8.5 above, the emission reductions of the project activity during the verification period are slightly higher than emissions reductions estimated ex-ante in the PDD, KFQ has checked the respective explanation offered by the PPs in the monitoring period.
Findings	<p>The reported emission reductions in the monitoring report during 7th monitoring period is approximately 77% higher than the ex-ante estimation in the PDD, and reason of this increasing is could be explained as below.</p> <ul style="list-style-type: none"> • <u>Updated value of GWP_{CH4}</u> : According to the decision made at COP 17, new GWP for methane, 25 from 21 is applied for this monitoring period. . • <u>Applied conservative data to estimate annual emission reduction in the PDD</u> : While estimate annual emission reduction in the PDD, methane emission potential of a solid waste disposal site (BE_{CH4,SWDS,y}) was used in baseline emission calculation. Thus expected amount of LFG may differ from actual LFG generated at the project site. For this monitoring period average flow rate was 8.77 m³/min whereas it was 6.40 m³/min in revised PDD. • <u>Waste quantity</u> : Mokpo landfill site is still receiving waste and actual received waste until December 2015 is larger than expected amount of waste in the revised PDD even though waste received during this monitoring period is smaller than expected. Thus it may cause increasing methane contents in the LFG by its

	<p>first decay.</p> <ul style="list-style-type: none"> • <u>Concentration of methane</u> <p>: W_{CH_4} for this monitoring period is 53.214% whereas 50% was applied to estimate annual emission reduction in the PDD.</p> <p>Meanwhile, amount of actual generated electricity (5,928.256MWh) for this monitoring period is slightly smaller than it's expectation in the revised PDD (6,713 MWh). 6,713MWh was estimated simply by considering only capacity of generator and expected operating hour. Thus it is not comparable one-on-one. In a point of additionality, increasing of amount of LFG is not a factor to influence income of the project activity as exported electricity is the only factor for revenue. Due to decreasing of electricity exporting to the Grid, there is no issue to be considered for additionality of this project activity.</p>
Conclusion	<p>KFQ confirms that the explanation for the emission reductions of the project activity during the verification period is reasonable and that there are no non-conservative aspects associated with it.</p> <p>Besides, KFQ confirms that there is no information on data and variables in the MR that is different from the revised PDD and would cause an increase in estimates of the emission reductions in the current monitoring period or in future monitoring periods.</p>

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	<p>The emission reductions reported in the MR are 47,163tCO_{2e}. As described in detail in <i>Section E</i> of this report, all relevant aspects of the project activity have been assessed in order to determine, whether the claimed emission reductions by the PPs are correctly determined, reasonable and fairly stated and based on verifiable evidence and in accordance with the applied methodology and the revised PDD as well as applicable tools.</p>
Findings	<p>It was found that the project activity is implemented and operated according to the revised PDD and the monitoring of any and all data and parameters as well as calculation of baseline emissions, project emissions and emission reductions is complete conducted in accordance with the revised PDD, the applied methodology.</p>
Conclusion	<p>KFQ arrived at the conclusion that the emission reductions reported in the monitoring report and claimed by the PPs are correctly determined with 41,163 tCO_{2e} for the covered verification period between 01/01/2016 and 31/12/2016. This implies that 100% of the reported emission reduction in this verification period has been achieved in a period after the end of 31/12/2012, i.e. the first commitment period is untouched by this verification period.</p>

SECTION F. Internal quality control

According to KFQ's Procedure for deciding whether to proceed request for issuance, the final verification report and verification findings underwent a technical review before being submitted to the PPs for requesting issuance CERs. The technical review was performed by technical review team composed of a person qualified for this project activity in accordance with KFQ's qualification scheme for CDM project validation and verification.

SECTION G. Verification opinion

Through the verification of the MR of the CDM project activity 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in accordance with VVS (version 9.0), KFQ could confirm that:

- The project activity has been implemented and operated as per the revised PDD (Version 6, 12 June 2017)

- The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately.
- The monitoring plan in Monitoring Report is as per the monitoring plan in the revised PDD.
- Monitoring plan in the revised PDD is as per the applied methodology,
- The monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan in the revised PDD, and approved methodology including applicable tool(s) and generated GHG emission reductions data.
- The GHG emission reductions in the Monitoring Report (Version 3.0) are calculated without material misstatements

KFQ's verification opinion refers to the project's GHG emissions and resulting GHG emission reductions reported both determined due to the valid and registered project's baseline, its monitoring plan and its associated documents.

Based on the information we have seen and evaluated, we confirm the followings:

Project Title	Mokpo Landfill Gas Recovery Project for Electricity Generation
UNFCCC Reference Number	2834
Date of registration	18 February 2010
Registered PDD	29 November 2013 (Version 05, approved on 06/03/2014)
Revised PDD	12 June 2017 (revised from the registered PDD due to PRC underwent during this 7 th verification)
Methodology applied	AMS I.D (Version 13) AMS III.G (Version 06)
Final version of Monitoring Report	3 (dated on 14/06/2017)
Crediting period	18/02/2010 to 17/02/2020
Monitoring period	01/01/2016 to 31/12/2016
Total GHG emission Reductions Verified	Baseline emissions: 47,164 tonnes CO ₂ e Project emissions: 1 tonnes CO ₂ e Leakage: 0 tonnes CO ₂ e Emission reductions: <u>47,163 tonnes CO₂e</u>

It is the opinion of KFQ that the amount of GHG emission reductions achieved by the project activity during this monitoring period is correct and that complies with all applicable CDM requirements.

SECTION H. Certification statement

>>

Korean Foundation for Quality has performed the periodic verification of the emission reductions that have been reported for the CDM project: 'Mokpo Landfill Gas Recovery Project for Electricity Generation' (UNFCCC Registration Ref. No. 2834) for the period from 01 January 2016 to 31 December 2016.

The project participants are responsible for the collection of data in accordance with the revised PDD and the reporting of GHG emissions reductions from the project. It is KFQ's responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

KFQ conducted the verification on the basis of the monitoring methodologies, AMS I.D (version 13) and AMS III.G (version 06), the revised Project Design Document of 12 June 2017 (version 06), the validation report (dated 17 February 2010) and the monitoring report (version 3) dated 14 June 2017.

KFQ's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. KFQ planned and performed the verification by obtaining evidence and other information and explanations that KFQ considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.


In our opinion the GHG emissions reductions of the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' (UNFCCC Registration Ref. No. 2834) for the period 01 January 2016 to 31 December 2016 are fairly stated in the monitoring report (version 3.0).

The data generation, aggregation, recording, calculation and reporting of GHG emission reductions were correctly conducted on the basis of the approved baseline and monitoring methodologies, AMS I.D (version 13) and AMS III.G (version 06), and the revised Project Design Document of 12 June 2017 (version 06) from the registered PDD approved by CDM EB on 06 March 2014.

Hence, KFQ is able to certify that the emission reductions from the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' during the period from period 01 January 2016 to 31 December 2016 is 47,163 tonnes of CO₂ equivalent.

Signed on behalf of the Korean Foundation for Quality

Signature :



Name : Soon Hong YEOM,

Managing Director of Sustainability Management Institute

Date : 20 June 2017

Appendix 1. Abbreviations

Abbreviations	Full texts
AMS	Approved Small Scale Methodology
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CL	Clarification Request
CMP	COP/MOP Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
	Carbon dioxide
CO ₂	Carbon dioxide equivalent
CO _{2e}	Distributive Control System
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KEPCO	Korea Electric Power Corporation
KFQ	Korean Foundation for Quality
KPX	Korea Power Exchange
LFG	Landfill Gas
MR	Monitoring Report
PDD	Project Design Document
PP	Project participant
PS	Clean Development Mechanism Project Standard
SWDS	Solid Waste Disposal Site
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers



CERTIFICATE OF COMPETENCE

Name: Mi Jung LEE

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.2 Renewables
- 3.1 Energy demand
- 11.1 Emission of Fluorinated gases
- 11.2 Refrigerant gas production
- 13.1 Solid waste and wastewater
- 13.2 Manure

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 16 May 2016

Sustainability Management Institute
Sang Yeon PARK



CERTIFICATE OF COMPETENCE

Name: Jin Seok CHO

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.1 Thermal energy generation
- 1.2 Renewables
- 13.1 Solid waste and wastewater
- 13.2 Manure

He is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 31 March 2016

Sustainability Management Institute
Sang Yeon PARK



CERTIFICATE OF COMPETENCE

Name: Sang Yeon PARK

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.2 Renewables
- 3.1 Energy demand
- 5.2 Caprolactam, nitric and adipic acid
- 13.1 Solid waste and wastewater

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 31 March 2016.

Sustainability Management Institute
Yu Shim JEONG

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Project participants	Monitoring report : 7 th monitoring report_2834_Ver 3.0 7 th monitoring report_2834_Ver 3.0	16 February 2017 14 June 2017	Hanwha Corporation
2	Project participants	ER calculation spreadsheet : Mokpo_7 th MR_2834_Emission Reduction_v3.0	14 June 2017	Hanwha Corporation
3	Project participants	CDM Project Design Document : Mokpo Landfill Gas Recovery Project for Electricity Generation: - Version 05 - Version 06	https://cdm.unfccc.int/filestorage/F/6/O/F6ODEQGWIVT8247K0UN135ABPCLYXJ/PDD%20version%2005_PRC_2834.pdf?t=Wm58b3J0bWltfDCIG2gYTSqZKvPK_E-03l3r 12/06/2017	UNFCCC Website Hanwha Corporation
4	Korean Foundation for Quality(KFQ)	PRC validation report	15/06/2017	Korean Foundation for Quality(KFQ)
5	Environmental Management Corporation (EMC)	Validation report for 'Mokpo Landfill Gas Recovery Project for Electricity Generation' (Report No. 08-001, Revision No. 08 dated as 17 February 2010)	http://cdm.unfccc.int/Projects/DB/emc1249265030.9/view	UNFCCC Website
6	Korean Foundation for Quality(KFQ)	6th verification/certification report for 'Mokpo Landfill Gas Recovery Project for Electricity Generation (Version 2.0)	https://cdm.unfccc.int/filestorage/T/O/B/TOBFXCG0IS8EKNVRZ16QHJL5WU4D7A/Verification%20report.pdf?t=SDJ8b3J0bWx6fDCIpZjy7TJ8FiUwMLINhDUM	UNFCCC Website
7	Data server	Spreadsheet of daily raw data downloaded from the data server: flow rate, methane fraction	from 01/01/2016 to 31/12/2016	Hanwha Corporation
8	Data server/ Hanwha Corporation	Event log files and daily work log recorded manually	from 01/01/2016 to 31/12/2016	Hanwha Corporation
9	Hanwha Corporation	Monthly report of waste volume in Mokpo Landfill site	from 01/01/2016 to 31/12/2016	Hanwha Corporation
10	Hanwha Corporation	Operating manual –Mokpo LFG Power Plant (Version 19)	14 April 2017	Hanwha Corporation
11	Hanwha Corporation/ KPX	Daily, weekly, monthly record for electricity export and sales receipt of it	from 01/01/2016 to 31/12/2016	Hanwha Corporation
12	KEPCO	Monthly bill for electricity imported	from 01/01/2016 to 31/12/2016	Hanwha Corporation
13	Flow Technology Co., Ltd. /Golden Rules Co., Ltd./ National Metrology Institute/Korea Testing	Calibration report: - $F_a/F_b/F_c$ - gas analyzer - Watt-hour meter (W_a/W_c) - Watt-hour meter (W_b)	from 01/01/2016 to 31/12/2016	Hanwha Corporation

	Certification/Korea Testing Certification			
14	Hanwha Corporation	Internal audit records External audit records Management review reports	2016	Hanwha Corporation
15	CDM Executive Board	<ul style="list-style-type: none"> • Clean Development Mechanism Validation and Verification Standard, version 09.0. • Clean Development Mechanism Project Standard, version 09.0. • Sampling and surveys for CDM project activity and programme of activities, version 04.1 • Clean Development Mechanism Project Cycle Procedure, version 09.0. • AMS I.D: Grid connected renewable electricity generation (version 13) • AMS III.G: Landfill methane recovery (version 06) • Standard for application of the global warming potentials to clean development mechanism project activities and programme of activities for the second commitment period of the Kyoto Protocol, version 01.0 • Guideline on the application of materiality in verifications, version 02.0 • Request for issuance and post registration changes: Completeness Checklist, version 03.0 • Monitoring report form, version 05.1 • Verification and certification report form for CDM project activities, version 010.0 	20 February 2015 20 February 2015 28 November 2013 20 February 2015 28 May 2010 14 March 2008 13 September 2012 20 February 2015 27 March 2015 04 May 2015 23 March 2015	https://cdm.unfccc.int/

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

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	-	Section no.	-	Date:	-
Description of FAR					
Not applicable					
Project participant response					Date:
.-					
Documentation provided by project participant					
-					
DOE assessment					Date:
-					

Table 2. CL from this verification

CL ID	01	Section no.	E.3	Date:	14/03/2017
Description of CL					
Even conservative approach is applied in emission reduction calculation for these events occurred during this monitoring period, criteria of each event should be determined as well as the ways of data adjustment regarding reduction calculation in a conservative manner. Further to this, verification team found that some events (i.e 03/05/2016: maintenance of facilities) are omitted from the event described in the monitoring report (Table B-1: Operation events history) version 1.0 even it is considered in emission reduction calculation.					
Project participant response					Date: 12/06/2017
Operational events during this monitoring period is re-described as monitoring report section B.1 and adjust data in emission reduction calculation					
Documentation provided by project participant					
Revised Monitoring Report (Version 3.0) Emission reduction calculation spreadsheet (Version 3.0)					
DOE assessment					Date: 15/06/2017
Operational events occur due to various reasons and it influences on emission reduction calculation. There were classification criteria of those events it was well reflected in emission reduction calculation. Regarding to above mentioned CL 01, PP re-checked to confirm its approach and start/end point of each classified events and data adjustment in those event period are clearly defined in QA/QC manual. <ul style="list-style-type: none"> - Maintenance of facilities - Generator shift - Black out - Monitoring error including monitoring system error <p>Verification team checked operational events occurred during this monitoring period against daily work log and monitoring values from data server, and could confirm that operational events are well defined according to above event type including data adjustment in emission reduction calculation in a conservative manner. There is no omission to reflect in emission reduction calculation regarding occurred operational events and it is well described in the monitoring report section B.1.</p> <p>The raised CL 01 has been completely resolved</p>					

CL ID	02	Section no.	E.6.2	Date:	25/05/2017
Description of CL					
Verification team found that methane concentration on 27 December 2016 was applied as '0' even it was under normal operation thus methane concentration in LFG during 01/01/2016~31/12/2106 should be re-calculated/ <u>Refer to CL 02.</u>					
Project participant response					Date: 12/06/2017

PP included methane fraction measured on 27 December 2016 to calculate $W_{CH_4,y}$ and previous $W_{CH_4,y}$ is in the monitoring report version 01(published version) became 53.214%.	
Documentation provided by project participant	
Revised Monitoring Report(Version 3.0) Emission reduction calculation spreadsheet(Version 3.0)	
DOE assessment	Date: 15/06/2017
Methane fraction in LFG is measuring by methane analyser continuously and it is sending to the data server. The measured data is recording in electronic file continuously at 8~10 seconds interval.	
Verification team re-checked daily log sheet with ER calculation sheet and could confirmed that 53.214% is correctly calculated. Regarding to CL 02, PP included methane fraction measured on 27 December 2016 to calculate $W_{CH_4,y}$ and previous $W_{CH_4,y}$ is in the monitoring report version 01(published version) became 53.214%.	
KFQ verification team confirmed that 53.214% is correctly calculated based on reliable raw data and applied in the baseline emission calculation and calculation process was checked.	
The raised CL 02 has been completely resolved.	
KFQ confirms:	
<ul style="list-style-type: none"> - the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. - monitoring results of this parameter are consistently recorded as per the approved frequency - equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below. - QA/QC procedures are suitable and have been applied in accordance with the monitoring plan. 	

CL ID	03	Section no.	E.7	Date: 14/03/2017
Description of CL				
However, even previous flow meter (F_a : Main flow meter and F_b : Flow meter for 1 st generator) is valid until 30 March 2018, the F_a (Main flow meter) and F_b (Flow meter for 1 st generator) was replaced to new meters on 8 September 2016 but it was not reflected in the monitoring report./Refer to CL 3.				
Project participant response				Date: 12/06/2017
Serial number, date of latest calibration date, calibration result for new flow meter of F_a and F_b were reflected in the revised monitoring report.				
Documentation provided by project participant				
Revised Monitoring Report(Version 3.0)				
DOE assessment				Date: 15/06/2017
Regarding to CL 2, serial number, date of latest calibration date, calibration result for new flow meter of F_a and F_b were checked through calibration report and verification team confirmed its information are correctly presented in the final monitoring report. Also, verification team checked those flow meters are physically exists.				
Thus, verification team confirms that accuracy level and calibration interval of the monitoring equipment are controlled and calibrated in accordance with the revised PDD and applied methodology. All 3 flow metes were valid to measure the amount of landfill gas combusted in power plant during this monitoring period.				
The raised CL 3 has been completely resolved.				

Table 3. CAR from this verification

CAR ID	01	Section no.	E.1	Date: 20/05/2017
Description of CAR				
The PP submitted the MR (version 1.0 of 16 February 2017) to DOE applying the Monitoring Report Form Version 05.1. It is identified during document review that the MR has no blank section. However, according to the paragraph 245 of CDM PS (Version 09.0) and 'Instruction for filling out the monitoring report form', PP shall indicate whether any request for prior approval by the Board of changes to the revised CDM project activity has been submitted. PDD of this project activity was approved on 6 March 2014 through the PRC but it was not indicated in the monitoring report version 1.0				

Project participant response	Date: 12/06/2017
<i>Explained previous PRC(PRC-2834-001) in revised monitoring report (Version 3.0)</i>	
Documentation provided by project participant	
Revised version of monitoring report(version 3.0 dated of 14 June 2017)	
DOE assessment	Date: 15/06/2017
<p>In the final version (version 3.0 dated of 14 June 2017) of monitoring report, previous request for prior approval by the Board of changes to the revised CDM project activity was described in B.2.5. During 4th verification PRC with prior approval CDM EB was requested and it was approved on 06 March 2014(PRC-2834-001). It is clearly described in the final version of monitoring report as well as PRC identified during this monitoring period which request approval under issuance track.</p> <p>Thus verification team concluded that the monitoring report (version 3.0) is in compliance with the latest Monitoring Report Form (version 05.1) and instruction therein.</p> <p>The raised CAR 01 has been completely resolved.</p>	

CAR ID	02	Section no.	E.3	Date: 20/05/2017
Description of CAR				
<p>It was found that engine type in the monitoring report version 1.0 is not identical against the revised PDD and the name plate fixed on the engine. According to the paragraph 373(b) and 384 in VVS (version 09.0) any change was occurred, nature and extent of actual changes has to be reflected in the PDD.</p> <p>In addition to this actual number of wellhead and vertical well was increased and it is not same number described in the revised PDD thus verification team could not confirm that PP is implementing the project activity as per the revised PDD. PP shall revise PDD to reflect actual and accurate project status especially project design.</p>				
Project participant response				Date: 12/06/2017
Approval of PRC is requested under the issuance track. Please refer PRC validation report.				
Documentation provided by project participant				
<i>Revised PDD (Version 6.0)</i> <i>Revised Monitoring Report(Version 3.0)</i> <i>PRC validation report (Version 2.0)</i>				
DOE assessment				Date: 15/06/2017

Physical project implementation

1) The engine type

For electricity generation in this project activity, two engines (1.065MW and 1.058MW respectively) are under operation and verification team checked its real status during on-site inspection to confirm any changes against the information described in the revised PDD.

Each engine type is designated according to the manufacture's designation rule. However it was found that the designated engine type was displayed differently in the revised PDD, monitoring report and the name plate fixed on each engine even it is same one. To confirm this difference is just typo error in the revised PDD, name plate fixed on the engine installed at the project site, engine purchase contract and on-site operational manual were assessed and concluded that engine installed at the project site is same as the engine described in the revised PDD.

Thus, PP decided to request post-registration change for the correction of this permanent change and correct information on the engine type is described in the revised PDD

Engine Type	As per registered PDD	Revised PDD
Engine with capacity of 1.065MW	J 320 GS-C81	<u>JGS 320 GS-L.L</u>
Engine with capacity of 1.058MW	JGC 320 GS-L.L	<u>J 320 GS B81</u>

2) Components of LFG collecting system

As Mokpo landfill site is not a closed site and still receiving the waste, PP is adding new wells and other relevant components of LFG collecting system and replacing/re-location of existing wells in purpose of well-operation and controlling of the landfill site.

Thus, since after registration there were changes in number of wells, wellheads and J-trap and this number has a possibility to change afterward.

Current numbers are as below and this actual changes to the project design of a registered CDM project activity do not adversely impact any of following:

- Applicability and application of approved baseline methodology
- Compliance of the monitoring plan with applied monitoring methodology
- Additionality of the project activity
- Scale of the project activity

Items	Function	Registered PDD	Revised PDD
Vertical well	LFG capture	121	150
Wellhead	Collecting LFG from vertical gas wells	11	13
Barrel trap	Trapping the condensate from the main pipeline	15	15
J-Trap	Trapping the condensate from the vertical wells	117	120
Main Pipeline	LFG supply to the gas engine	1	1

PP decided to request post-registration change for changes to the project design of a registered project activity which do not require prior approval as per Appendix 1 of the CDM Project Standard and validation opinion has been provided. Thus an approval of PRC is requested under the issuance track. The detail of PRC is as below:

The PRC change is in line with Appendix 1 of CDM Project Standard and hence above mentioned CAR 02 was closed.

CAR ID	03	Section no.	E.6.2	Date: 14/03/2017
Description of CAR				
Daily data of 'F _b + F _c ' and 'F _a ' are compared. The differences between these two reading data could not be exceeding maximum error range (1,728 Nm ³ /day: theoretical calculation with each flow meter's accuracy) according to internal QA/QC procedures. However it is identified that data was not correctly adjusted for the events which exceeding maximum error range in June 2016.				
Project participant response				Date: 12/06/2017
According to the QA/QC procedure, 'F _b + F _c ' and 'F _a ' were re-checked and found that 04 June 2016, 07 June 2016 and 13 June 2016 was exceeding maximum error range thus smaller value between 'F _b + F _c ' and 'F _a ' was applied in baseline emission calculation.				
Documentation provided by project participant				

<i>Revised monitoring report(version 3.0)</i>	
<i>Emission reduction calculation spreadsheet(Version 3.0)</i>	
DOE assessment	Date: 15/06/2017
<p>The differences between '$F_b + F_c$' and 'F_a' were re-checked through daily data and found that there were 3 times during this monitoring period, 04 June 2016, 07 June 2016 and 13 June 2016. Thus according to the internal QA/QC procedure, PP applied smaller value between '$F_b + F_c$' and 'F_a' in baseline emission calculation for conservative approach.</p> <p>Verification team checked the daily work log, the operating manual, spread sheet of 'Mokpo_7th MR_2834_Emission Reduction' and raw data sheet of 'LFG flow rates & CH4 fraction (Mokpo LFG plant)_data' and confirmed that all data applied to BE calculation are consistent and correct.</p> <p>The raised CAR 03 has been completely resolved.</p> <p>KFQ confirms:</p> <ul style="list-style-type: none"> - the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. - monitoring results of this parameter are consistently recorded as per the approved frequency - equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below. - QA/QC procedures are suitable and have been applied in accordance with the monitoring plan. 	

CAR ID	04	Section no.	E.6.2	Date: 14/03/2017
Description of CAR				
While checking sales receipts of electricity provided by KPX to confirm total exported electricity to the Grid during this monitoring period, exported electricity to KPX from the project in February and May 2016 described in the monitoring report version 1.0 and emission reduction calculation spreadsheet is not consistent with the evidence				
Project participant response				Date: 12/06/2017
Applied correct amount of electricity exported to the Grid in February and May 2016 in emission reduction calculation.				
Documentation provided by project participant				
<i>Revised Monitoring report(Version 3.0)</i>				
<i>Revised Emission reduction calculation(Version 3.0)</i>				
DOE assessment				Date: 15/06/2017
<p>According to the evidence, monthly sales receipts provided by KPX, monthly amount of exported electricity out of the project has been corrected and total amount of electricity exported during this monitoring period was correctly applied in ER calculation.</p> <p>The raised CAR 04 has been completely resolved.</p> <p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>Also, KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM EB.</p>				

CAR ID	05	Section no.	E.6.2	Date: 14/03/2017
Description of CAR				
It is identified that there was a delayed calibration occurred on EL_{IMP,PJT,Y} but the measured data was not adjusted as per the requirement of VVS ver 9.0.				
Project participant response				Date: 12/06/2017
Measured values during the delayed calibration periods are correctly adjusted by applying the maximum permissible error of the instrument as per the requirement of VVS (ver.09.0.)				
Documentation provided by project participant				
<i>Revised Monitoring report(Version 3.0)</i>				
<i>Revised Emission reduction calculation(Version 3.0)</i>				
DOE assessment				Date: 15/06/2017

According to the evidence, monthly bill provided by KEPCO, monthly amount of imported electricity to the project site has been monitored and total amount of electricity imported during this monitoring period was correctly applied in ER calculation.

KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and monitoring results of this parameter are consistently recorded as per the approved frequency.

As CAR 05 is successfully closed, KFQ confirms that the measured values during the delayed calibration periods are correctly adjusted by applying the maximum permissible error of the instrument as per the requirement of VVS (ver.09.0.) and it is presented correctly in the final monitoring report and well reflected in emission reduction calculation.

Table 4. FAR from this verification

FAR ID	<i>n/a</i>	Section No.	<i>n/a</i>	Date: <i>n/a</i>
Description of FAR				
<i>n/a</i>				
Project participant response				Date: <i>n/a</i>
<i>n/a</i>				
Documentation provided by project participant				
<i>n/a</i>				
DOE assessment				Date: <i>n/a</i>
<i>n/a</i>				