



**Verification and certification report form for  
CDM project activities  
(Version 03.0)**

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

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the project activity</b>	<ul style="list-style-type: none"> <li>Title: Mokpo Landfill Gas Recovery Project for Electricity Generation</li> <li>Reference number: 2834</li> </ul>
<b>Scale of the project activity</b>	<input type="checkbox"/> Large-scale <input checked="" type="checkbox"/> Small-scale
<b>Version number of the verification and certification report</b>	Version 2.2
<b>Completion date of the verification and certification report</b>	04/08/2019
<b>Monitoring period number and duration of this monitoring period</b>	<ul style="list-style-type: none"> <li>Monitoring period number : 9<sup>th</sup></li> <li>Duration : 01/01/2018 – 31/12/2018</li> </ul>
<b>Version number of the monitoring report to which this report applies</b>	Version 3.0
<b>Crediting period of the project activity corresponding to this monitoring period</b>	From 18/02/2010 to 17/02/2020
<b>Project participants</b>	<ul style="list-style-type: none"> <li>Hanwha Corporation (Republic of Korea)</li> <li>Hanwha Corporation (Switzerland)</li> </ul>
<b>Host Party</b>	<ul style="list-style-type: none"> <li>Republic of Korea</li> </ul>
<b>Applied methodologies and standardized baselines</b>	<ul style="list-style-type: none"> <li>Applied methodology : AMS-I.D (Version 13), AMS-III.G (Version 06.0)</li> <li>No standardized baseline(s) applicable</li> </ul>
<b>Mandatory sectoral scopes</b>	<ul style="list-style-type: none"> <li>Sectoral scope: 1-Energy Industry 13-Waste handling and Disposal</li> </ul>
<b>Conditional sectoral scopes, if applicable</b>	<ul style="list-style-type: none"> <li>No conditional sectoral scope(s) linked to the applied methodology</li> </ul>
<b>Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD</b>	<ul style="list-style-type: none"> <li>Amount estimated in PDD for 2018 : 26,874 tCO<sub>2</sub>e</li> </ul>
<b>Certified amount of GHG emission reductions or GHG removals for this monitoring period</b>	33,646 tCO <sub>2</sub> e
<b>Name and UNFCCC reference number of the DOE</b>	<ul style="list-style-type: none"> <li>Name: Korean Foundation for Quality (KFQ)</li> <li>Reference number: E-0025</li> </ul>
<b>Name, position and signature of the approver of the verification and certification report</b>	YU SHIM JEONG  Managing Director of Sustainability management institute

## **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 9<sup>th</sup> monitoring period is 01/01/2018 ~ 31/12/2018. 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 from 01/01/2018 to 31/12/2018 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 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 participant. 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 spread sheets 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. If no further findings are raised the final verification report is prepared and reviewed once again.

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 Reference Number	2834
Project Parties	Republic of Korea (Host) Switzerland
Project Participants	Hanwha Corporation. (Republic of Korea) Hanwha Corporation. (Switzerland)
Baseline and monitoring methodology	AMS-I.D: Grid connected renewable electricity generation (Version 13) AMS-III.G: 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 to 17/02/2020
Period verified in this verification	01/01/2018 to 31/12/2018

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 m<sup>2</sup>.

The purpose of this project is to collect and utilize CH<sub>4</sub> (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.

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 (Version 6.0, 12/06/2017).

**Conclusion**

KFQ has performed the verification of the emission reductions reported for the project activity 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in the republic of Korea (UNFCCC Registration Ref. No. 2834) for the period from 01/01/2018 to 31/12/2018.

The verification of the emission reductions has 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.

The verification team has during its preparations identified the key reporting risks and used the assessment to determine to which extent the project operator's control systems were adequate for mitigation of these key reporting risks. In addition, other areas that can have an impact on reported emission reductions have also undergone detailed audit testing.

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 and registered project's baseline, its monitoring plan and its associated documents.

The implementation of the project resulted in 33,646 tCO<sub>2</sub>e of emission reductions during the period from 01/01/2018 to 31/12/2018 which is within the fixed crediting period from 18/02/2010 to 17/02/2020. 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 registered PDD (Version 6.0, 12/06/2017).

KFQ is able to certify that the emission reductions from the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' in Republic of Korea during the period from 01/01/2018 to 31/12/2018 amount to 33,646 tCO<sub>2</sub>e.

**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/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader(*)	IR	LEE	Mi Jung	KFQ	√	√	√	√
2.	Verifier	IR	PARK	Su Hyun	KFQ	√	√	√	√
3.	Verifier	IR	LEE	Ji Yu	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	KANG	Yeong Gyeong	KFQ
2.	Approver	IR	JEONG	Yu Shim	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.	<i>Number of Monitoring parameters</i>	L	<i>Methodology and tool require a rather low number of monitoring parameter.</i>	<i>In response of that risk, the KFQ verification team included three verifiers in total and visited on-site in order to cover/review all monitoring parameters in a complete and detailed manner.</i>
2.	<i>Error rate in Monitoring report</i>	L	<i>Expert organization is involved in compilation of MR as well as calculation.</i>	<i>In response of that risk, the KFQ verification team focused on systematic consistency and error checks.</i>
3.	<i>Familiarity with Monitoring system</i>	L	<i>This is 9<sup>th</sup> monitoring period Expert organization is involved in the periodic inspection of monitoring equipment</i>	<i>In response to that risk, the KFQ verification team checked the existence of any and all monitoring instruments as well as their valid calibration, independently from the fact that the PP would be familiar with the monitoring system.</i>
4.	<i>QA/QC</i>	L	<i>Stable QA/QC system has been implemented.</i>	<i>In response to that risk, the KFQ verification team focused on periodic calibration and QA/QC activities performed as well as on plausibility check in order to ensure data quality.</i>
5.	<i>Data flow</i>	M	<i>Transmitted to the spread sheet automatically</i>	<i>In response to that risk, the KFQ verification team checked the safeguard measures for raw data and crosschecked raw data with the MS Excel spreadsheets on a random sampling basis, in an extent to ensure the functioning of the transferring system.</i>
6.	<i>Recalculation</i>	M	<i>Calculation is performed in excel spread sheet 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 the application of materiality in verifications (Version 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/document review**

KFQ's verification is based on the monitoring documentation provided by the PP especially the MR (Version 01.0 dated 25/02/2019, published on 05/03/2019) and the ER calculation spread sheets. 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. CDM Validation and Verification Standard for Project Activities, CDM Project Standard, CDM Project Cycle Procedure, Checklist for requests for post-registration changes to project activities and Checklist for requests for issuance for project activities 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 16/04/2019. During the site visit, the personnel were interviewed or assisted the verification team. During the on-site assessment, 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 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
- An 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: 16/04/2019				
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	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE
2.	Review of the complete data flow from data generation, aggregation, recording, calculation to reporting of the monitoring parameters.	Mokpo	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE
3.	Confirmation of the complete & correct implementation of procedures for the operation and data collection.	Mokpo	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE
4.	Verification of the information provided in the MR and documentation with other sources	Mokpo	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE
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	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE
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	16/04/2019	Mi Jung LEE Su Hyun PARK Ji Yu LEE

### D.3. Interviews

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

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	LEE	Kun Hong	Hanwha Corporation	16/04/2019	General support, Facilities, instruments and analysis, QA/QC, calculation	Mi Jung LEE Su Hyun PARK Ji Yu LEE

2	KIM	Yae Won	Roent Consulting Co., Ltd.		QA/QC, Calculation, Reporting and general support	
3	PARK	Sang hyeok				

#### D.4. Sampling approach

As per the requirements set out in CDM Validation and Verification Standard for Project Activity (Version 02.0), 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 spread sheet is in place, crosscheck for data in spread sheet 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 needed not to be revised as no omissions in the detection process of events related to emission reductions were found.

Whereas recalculations for all events, the locations, 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 (CLs), corrective action requests (CARs) and forward action requests (FARs) 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	0	0
Compliance of the project implementation and operation with the registered PDD	1	0	0
Post-registration changes	0	0	0
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	0	0	0
Compliance of monitoring activities with the registered monitoring plan	0	0	0
Compliance with the calibration frequency requirements for measuring instruments	0	1	0
Assessment of data and calculation of emission reductions or net removals	2	1	0
Assessment of reported sustainable development co-benefits	0	0	0
Global stakeholder consultation	0	0	0
Others (please specify)	0	0	0
<b>Total</b>	<b>3</b>	<b>2</b>	<b>0</b>

The objective of this phase of the verification was to resolve any issues which were 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 approved 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 and 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 impact the quantity 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 rules and 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.

3 CLs and 2 CARs were raised for this monitoring period, which were closed successfully after PP have submitted MR Version 3.0.

## SECTION E. Verification findings

### E.1. Compliance of the monitoring report with the monitoring report form

<b>Means of verification</b>	KFQ has checked the MR provided by the PP against the latest MR form in order to determine, whether the MR is in compliance with it.
<b>Findings</b>	At the time of publication of MR (Version 1.0, 25/02/2019), the latest version of monitoring report form was version 06.0 but new version 07.0 was released on 31/05/2019 by UNFCCC EB and it is mandatory as on 14/06/2019. Thus PP revised MR with the latest version of MR. It was found that there are no deviations between the MR and the latest monitoring report form (Version 07.0).
<b>Conclusion</b>	The verification team concludes that the MR (Version 3.0) is in compliance with the latest monitoring report form (Version 07.0) and the instructions therein.

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

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 and operation with the registered project design document

<b>Means of verification</b>	<b>Physical project implementation</b> During the on-site visit, the KFQ verification team visually inspected the installations of the project activity as well as instrumentations necessary for the
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	<p>monitoring of the emission reductions and checked, whether all physical features of the CDM Project activity, including the data collection systems and storage, have been implemented in accordance with the registered PDD (Version 6.0 dated 12/06/2017). 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><b><u>Project operation</u></b> The verification team checked raw data of LFG flow rate and methane fraction recorded in every 8~10 seconds, records daily/weekly/monthly electricity export, monthly bills of electricity import, maintenance &amp; calibration history, and event log files. In addition to this, verification team interviewed relevant plant staff to check actual operation especially events occurred such as maintenance and error in monitoring system as indicated in the MR to understand operational status during this monitoring period.</p> <p><b><u>Management system and quality control and quality assurance</u></b> The operation procedures and QA/QC procedures and respective reports have been reviewed and crosschecked by the KFQ verification team. Furthermore, the latest organizational arrangements were checked by means of interviews with relevant staff from Hanwha Corporation.</p> <p><b><u>Consecutive monitoring period</u></b> The verification team checked monitoring period of previous verifications through interviews with staff from Hanwha Corporation as well as history of requests for issuance provided by UNFCCC website to confirm consecutive monitoring periods of this project activity.</p>
<b>Findings</b>	<p><b><u>Physical project implementation</u></b> The purpose of this project activity is to collect and utilize LFG for electricity generation with 1.065 MW and 1.058 MW 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. However, in this monitoring period, there was no change in location and number of existing wellhead/well and no additional wellhead/well compare to the last verification and the registered PDD. Through site-visit and review of relevant document, verification team could not identify any changes were occurred during this monitoring period against the registered PDD.</p> <p><b><u>Project operation</u></b> Operation of the monitoring system &amp; data collection system were operational during the monitoring period - the maintenance/calibration periods of the monitoring instruments performed during the monitoring period and as described in the MR are complete, respective re-calculation of emission reductions during times of observations (if applicable) were done correctly in the project spreadsheets and in accordance with the registered PDD and the applied methodology.</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 or used the values from the daily work log. To check events during this monitoring period especially that related to ER calculation, verification team reviewed daily work log to identify number of events, type of event, reason of event occurrence and timeslot of each events. After this, to check exact start and end time of each event, verification team crosscheck it with daily raw data which show methane fraction of measured LFG at an interval of 8~10 seconds. Additionally, to prevent any omission of events that shall be considered in ER calculation, verification team also checked observation record reported by site operator hourly in daily work log. Finally all of events identified through above mentioned process were cross-checked against the event listed in monitoring report and ER</p>

	<p>calculation spreadsheet.</p> <p>However, verification team identified that the description of events on 30/01/2018, 27/06/2018, 26/06/2018 and 29/12/2018 in the MR (version 1.0, table B-1) is not consistent with evidence (i.e daily work log) of its events. <b><u>(Refer to Appendix 4/Table 2/CL ID 01)</u></b>. Verification team checked above mentioned operational events during this monitoring period against internal record such as daily work log and event log files. Based on those evidence and interview with plant manager during on-site assessment, verification team confirmed that description provided in MR version 3.0 is correct and it is classified according to the 'Operational manual-Mokpo LFG power plant (version 27)'. Verification team also checked ER calculation process and couldn't find any error related to this event in ER calculation.</p> <p>In conclusion, verification team confirmed that all the events to be considered in ER calculation spreadsheet especially excluding data are well reflected in ER calculation spreadsheet without any omission.</p> <p>The monitoring system and data collection system were fairly operated during this monitoring period.</p> <p><b><u>Management system and Quality assurance</u></b></p> <p>KFQ found that the project is operated and monitored by Hanwha Corporation, supported for checking &amp; reporting of data under the CDM activity has been contracted to Roen Consulting Co., Ltd. The procedures &amp; responsibilities are described in the MR and are considered and applied in full. With respect to quality control and quality assurance, the KFQ verification team found that the monitoring systems are designed as an automatic process, so the involvement of the personnel during normal operation is minimized. In case of any deficiency, appropriate procedures are in place.</p> <p>KFQ found that the quality assurance and quality control procedures in terms of equipment operation, maintenance, calibration as well as data reporting are covered by project operator's management system and found to be valid during the whole monitoring period. Hanwha Corporation covers all CDM activities in the internal, external audit and management reviews.</p> <p><b><u>Consecutive monitoring period</u></b></p> <p>This is the 9<sup>th</sup> monitoring period since registration of this project activity. Previous monitoring reports were already published on the UNFCCC CDM website in a consecutive manner and completed verification of their respective monitoring periods. Thus, the verification team of this monitoring period confirms monitoring periods of this project have been consecutive.</p>
<b>Conclusion</b>	<p>KFQ confirms that the project has been implemented according to the description in the registered PDD.</p> <p>The verification team specifically confirms that</p> <ul style="list-style-type: none"> <li>• All physical features of the proposed CDM project activity including data collection systems and storage are in place and in accordance with the registered PDD; and</li> <li>• All other relevant information provided in the MR is fully in accordance with respective information stated in the registered PDD; and</li> <li>• The information on project operation, the management system and quality assurance are complete, correct and in accordance with the registered PDD; and</li> <li>• The management system and quality assurance and related procedures have implemented as described in the MR and in accordance with the registered PDD.</li> <li>• The monitoring periods of this project have been consecutive.</li> </ul>

**E.4. Post-registration changes****E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents<sup>1</sup>**

There were no temporary deviations applied to this monitoring period.

**E.4.2. Corrections**

There were no post registration changes identified by verification team during this verification.

However, there was correction during 7<sup>th</sup> verification as below and it was approved on 07/09/2017 (PRC-2834-002):

- Each engine type installed at the project site due to typo in the registered PDD.

Please kindly refer to registered PDD (Version 6.0, 12/06/2017) for above corrections.

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

There were no post registration changes identified by verification team during this verification.

**E.4.4. Inclusion of a monitoring plan**

There were no post registration changes identified by verification team during this verification.

**E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents**

There were no post registration changes identified by verification team during this verification.

However, there was correction during 4<sup>th</sup> verification as below and it was approved on 06/03/2014 (PRC-2834-001):

- 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.'

Please kindly refer to registered PDD (Version 6.0, 12/06/2017) for above permanent changes.

**E.4.6. Changes to the project design**

There were no post registration changes identified by verification team during this verification.

However, there was correction during 4<sup>th</sup> verification as below and it was approved on 06/03/2014 (PRC-2834-001):

- 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.'

Please kindly refer to registered PDD (Version 6.0, 12/06/2017) for above changes to the project design.

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<sup>1</sup> Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied (selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

**E.4.7. Changes specific to afforestation and reforestation project activities**

N/A

**E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents**

<b>Means of verification</b>	The KFQ verification team reviewed the monitoring plan contained in the registered PDD against the approved methodology, AMS-I. D (Version 13) and AMS-III.G (Version 06), 'Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04)' and 'Tool to calculate the emission factor for an electricity system (Version 01.1)' which is applied by the project activity.
<b>Findings</b>	The KFQ verification team found that there are no incompliance between the applicable monitoring plan, the applied methodology AMS-I. D (Version 13) and AMS-III.G (Version 06), 'Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04)' and 'Tool to calculate the emission factor for an electricity system (Version 01.1)'. Furthermore it was found that there are no standardized baselines applied in the project activity.
<b>Conclusion</b>	KFQ confirms that the monitoring plan is in accordance with the approved methodology, AMS-I. D (Version 13) and AMS-III.G (Version 06), 'Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04)' and 'Tool to calculate the emission factor for an electricity system (Version 01.1)' applied by the project activity (no standardized baselines are used in the project activity).

**E.6. Compliance of monitoring activities with the registered monitoring plan**General statement on data and parameters

<b>Means of verification</b>	The means of verification in relation to the different parts (Information flow and data collection system and monitoring parameters) are stated in detail in the section & tables further below.
<b>Findings</b>	The findings in relation to the different parts (Information flow and data collection system and monitoring parameters) are stated in detail in the section & tables further below.
<b>Conclusion</b>	<p>KFQ confirms that the monitoring is complete and has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. The monitoring plan has been properly implemented and is followed by the PP.</p> <p>KFQ confirms that all parameters stated in the monitoring plan have been monitored, including project emission parameters, baseline emission parameters (leakage is not applicable) and management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.</p> <p>KFQ confirms that the equipment used for monitoring is controlled and 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> <p>KFQ confirms that monitoring results are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that QA/QC procedures have been applied in accordance with the monitoring plan.</p> <p>KFQ confirms that the MR lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided in the MR (The information flow for each parameter is further verified in the following sections).</p> <p>KFQ confirms that the monitoring methodologies and sustaining records are sufficient to enable verification of emission reductions.</p>

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

Means of verification	Data and parameters fixed ex-ante as listed in the MR have been crosschecked & reviewed – as applicable – against the monitoring plan in the registered PDD as well as against the applied methodologies (AMS-I. D (Version 13) and AMS-III.G (Version 06)) and other relevant CDM related documentation.			
Findings	Data & Parameters fixed ex-ante and COMMONLY relevant for the project activity:			
	Data/parameter (description, unit)	Source of data	Value(s) applied	KFQ Findings
	EF <sub>OM</sub> : Operation Margin Emission Factor - Unit: ton CO <sub>2</sub> e/MWh - The generation-weighted average CO <sub>2</sub> emission per electricity unit generated by the existing grid-connected power plants	PDD (Version 06) - it was originally adopted from the ‘Statistics of Electric Power in Republic of Korea’.	0.6817	Crosscheck of the value with the revised PDD & Monitoring plan and the applied methodology
	EF <sub>BM</sub> : Build Margin Emission Factor - Unit: ton CO <sub>2</sub> e/MWh The generation-weighted average CO <sub>2</sub> emission per electricity unit generated by the additionally constructed power plants	PDD (Version 06) - it was originally adopted from the ‘Statistics of Electric Power in Republic of Korea’.	0.3933	Crosscheck of the value with the revised PDD & Monitoring plan and the applied methodology
	CEF <sub>electricity</sub> : CO <sub>2</sub> emission intensity of the electricity displaced - Unit: ton CO <sub>2</sub> e/MWh The weighted average of EF <sub>OM</sub> and EF <sub>BM</sub>	PDD (Version 06) - it was originally adopted from the ‘Statistics of Electric Power in Republic of 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 <sub>OM</sub> , EF <sub>BM</sub> , CEF <sub>electricity</sub> are explicitly mentioned in the MR and have been correctly and consistently applied. All values are in compliance with relevant documentation such as the PDD & monitoring plan as well as the applied methodology, applied tools and other CDM related documentation, where applicable.			

**E.6.2. Data and parameters monitored**Information flow & data collection system

<b>Means of verification</b>	<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 &amp; 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>
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	<ul style="list-style-type: none"> <li>• Calibration records and certificates</li> <li>• Certificate of analysis of the standard test gas for analyzer calibration</li> <li>• Intervals (measuring frequency, reading frequency, recording frequency) of instruments for each instrument are also verified through display panel on-site and DCS generated</li> </ul> <p><i>Aggregation to recording:</i></p> <ul style="list-style-type: none"> <li>• Daily and monthly exported electricity generation (From KPX website)</li> <li>• Monthly bills of electricity imported (From KEPCO)</li> <li>• Data cross check between values from monitoring meters and values in control room &amp; data cross check between data server and daily work log.</li> </ul> <p><i>Calculation and reporting:</i></p> <ul style="list-style-type: none"> <li>• Crosscheck of implemented calculations in Excel sheets against the PDD formulae</li> <li>• Data cross check between monthly report generated by PP and Excel Sheets</li> </ul>
<b>Findings</b>	<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"> <li>• Amount of landfill gas combusted in power plant (<math>LFG_{\text{electricity}, y}</math>)</li> <li>• Methane fraction in LFG (<math>W_{CH_4, y}</math>)</li> <li>• Total amount of exported electricity out of the project (<math>EL_{EXP, PJT, Y}</math>)</li> <li>• Total amount of imported electricity to meet project requirement (<math>EL_{IMP, PJT, Y}</math>)</li> </ul> <p>For the amount of landfill gas combusted in the power plants, there are 3 flow meters.</p> <ul style="list-style-type: none"> <li>• Main flow meter to measure total flow rate: Fa</li> <li>• Flow meter for generator 1: Fb</li> <li>• Flow meter for generator 2: Fc</li> </ul> <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 <math>CH_4</math> concentration with a lower value comparing with measured data and previous one of it in every recording time. Furthermore in case of <math>CH_4</math> concentration data was not transferred to the data server due to data server malfunction or maintenance of monitoring system, PP manually records the <math>CH_4</math> concentration data every hour according to the emergency procedure in operating manual. Lastly, for the electricity, amount of exported electricity is measuring by watt-hour meters connected to KPX and imported electricity is measuring by watt-hour meter controlled by KEPCO.</p> <p>It was found by the KFQ verification team, that the information flow &amp; data collection system are fully functional and were so during the whole verification period covered under this verification. Respective documents and results were made available to KFQ for verification.</p>
<b>Conclusion</b>	<p>The KFQ verification team confirms that the information flow &amp; data collection system meets the requirements of the registered PDD and its monitoring plan as per the applied and approved methodology, AMS-I. D (Version 13) and AMS-III.G (Version 06), 'Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04)' and 'Tool to calculate the emission factor for an electricity system (Version 01.1)'. Intervals (measuring</p>

	frequency, reading frequency and recording frequency) are applied in accordance with the applied methodology, the above mentioned tools and the monitoring plan.
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**Assessment on data/parameters**

<b>Data/Parameter</b>	<b>F</b>
<b>Data Unit</b>	Not applied
<b>Description</b>	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
<b>Source of data used</b>	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
<b>Value(s)</b>	0
<b>Means of verification</b>	The verification team checked whether there were changes in the landfill management plan of the site and facilities for LFG treatment against registered PDD through waste management status data published by Ministry of Environment and physical site inspection.
<b>Findings</b>	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
<b>Conclusion</b>	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'.

<b>Data/Parameter</b>	<b>GWP<sub>CH4</sub></b>
<b>Data Unit</b>	tCO <sub>2</sub> e /tCH <sub>4</sub>
<b>Description</b>	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
<b>Source of data used</b>	Decisions under UNFCCC and the Kyoto Protocol
<b>Value(s)</b>	25 (to be applied for the second commitment period of the Kyoto Protocol)
<b>Means of verification</b>	Verification team crosschecked GWP of CH <sub>4</sub> 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.
<b>Findings</b>	No findings
<b>Conclusion</b>	KFQ confirms that PP applied 25 for GWP of CH <sub>4</sub> in emission reduction calculation for this monitoring period correctly.

<b>Data/Parameter</b>	<b>LFG<sub>electricity, y</sub></b>					
<b>Data Unit</b>	Nm <sup>3</sup> /y					
<b>Description</b>	Amount of landfill gas combusted in power plant					
<b>Source of data used</b>	Gas flow meters					
<b>Value(s)</b>	Data	Measured LFG <sub>electricity, y</sub> (Nm <sup>3</sup> )				Applied LFG <sub>electricity, y</sub> (Nm <sup>3</sup> ) in ER calculation spreadsheet
		F <sub>b</sub>	F <sub>c</sub>	F <sub>a</sub>	F <sub>b+c</sub>	
	01/01/2018~18/01/2018	213,857.400	0.000	215,404.300	213,857.400	213,857.400
	19/01/2018~18/02/2018	210,328.800	97,793.700	313,233.200	308,122.500	308,122.500
	19/02/2018~18/03/2018	142,236.000	149,630.400	304,582.200	291,866.400	291,866.400
	19/03/2018~18/04/2018	241,174.700	72,536.200	301,427.100	313,710.900	313,710.900
	19/04/2018~18/05/2018	292,047.800	9,979.100	298,042.700	302,026.900	302,026.900
	19/05/2018~18/06/2018	279,795.100	7,266.500	290,899.800	287,061.600	287,061.600
	19/06/2018~18/07/2018	273,420.300	6.100	281,892.400	273,426.400	273,426.400



	19/07/2018~18/08/2018	241,915.200	21,428.200	277,427.200	263,343.400	263,343.400
	19/08/2018~18/09/2018	246,251.100	8,410.100	265,404.100	254,661.200	254,661.200
	19/09/2018~18/10/2018	256,159.500	0.000	254,428.000	256,159.500	256,159.500
	19/10/2018~18/11/2018	238,124.100	7,113.600	237,238.600	245,237.700	245,237.700
	19/11/2018~18/12/2018	211,515.100	26,548.800	226,440.800	238,063.900	238,063.900
	19/12/2018~31/12/2018	86,542.700	17,395.700	102,387.700	103,938.400	103,938.400
	<b>01/01/2018~31/12/2018</b>	2,933,367.800	418,108.400	3,368,808.100	3,351,476.200	3,351,476.200
<b>Means of verification</b>	<p>The verification 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>					
<b>Findings</b>	<p>Each flow meter (Fa: main meter, Fb: for 1<sup>st</sup> generator, Fc: 2<sup>nd</sup> 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 (e.g. 09/05/2018, 10/05/2018 and 22/06/2018 etc.). Verification team checked data lag period and reviewed whether manually recorded data is correctly applied in the baseline emission calculation.</p> <p>Daily data of 'Fb + Fc' and 'Fa' are also compared. The differences between these two reading data could not be exceeding maximum error range (1,728 Nm<sup>3</sup>/day: theoretical calculation with each flow meter's accuracy) according to internal QA/QC procedures. Verification team checked two reading data ('Fb + Fc' and 'Fa') described as above during this monitoring period and identified that difference between daily data of 'Fb + Fc' and 'Fa' were not exceeding 1,728 Nm<sup>3</sup>/day. Thus measured 'Fb + Fc' was applied in baseline emission calculation.</p> <p>The verification team checked the daily work log, the operating manual, ER calculation spreadsheet, raw data sheet and confirmed that all data applied to BE calculation are consistent and correct as per the registered PDD.</p> <p>However, verification team found several issued in calculation of LFG flow rate as below:</p> <p>i) PP explained that amount of landfill gas combusted in power plant on 29/01/2018(06:56~08:43, 08:46~14:40,14:57~15:01,15:10~18:22,18:42~23:59), 30/01/2018(00:00~14:56,15:24~15:34),27/02/2018(13:44~17:41),15/05/2018(09:07~10:33) is '0' due to measurement error in MR version 1.0 but '0' was not applied in baseline emission calculation of ER calculation spreadsheet.</p> <p>ii) In the course of calculation of LFG flow rate on 31/01/2018, 09/05/2018,</p>					

	<p>10/05/2018, 22/06/2018 and 12/07/2018, PP applied the LFG flow rate from daily work log due to monitoring system error but it was not consistent flow rate in raw data and ER calculation spreadsheet.</p> <p>iii) While checking <math>F_b</math> in ER calculation spreadsheet, verification team found that on 26/06/2018 <math>F_b</math> (<math>1.6 \text{ Nm}^3</math>) is inconsistent with raw data sheet, therefore applied value of <math>\text{LFG}_{\text{electricity},y}</math> for the period of 19/06/2018~18/07/2018 and 01/01/2018~31/12/2018 are incorrect as <math>267,675.400 \text{ Nm}^3</math> in MR (Version 1.0). <b>(Refer to Appendix 4/Table 2/CAR ID 01)</b>. After the PP have submitted the MR (Version 3.0) and ER calculation spreadsheet (Version 3.0), there are no inconsistencies between the MR and raw data.</p> <p>For the CAR ID 01 mentioned above, it is corrected as below:</p> <p>i) After the PP have submitted the MR (Version 3.0), verification team checked flow rate in raw data for above mentioned 4 days and confirmed that '0' is correctly applied in baseline emission calculation for the flow rate due to measurement error. Such events are well explained in Section B (See Table B-1), implementation of project activity, of the MR (Version 3.0).</p> <p>ii) PP applied LFG flow rate for certain time period of on 31/01/2018, 09/05/2018, 10/05/2018, 22/06/2018 and 12/07/2018 from raw data in baseline emission calculation and verification team confirmed that it is consistent with raw data.</p> <p>iii) Verification team checked <math>F_b</math> for the period of 19/06/2018~18/07/2018 and it is confirmed as <math>273,420.300 \text{ Nm}^3</math> based on raw data of its flow. Verification team checked ER calculation spreadsheet and confirmed that correct value is applied in baseline emission calculation.</p>
<b>Conclusion</b>	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>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> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p> <p>The raised CAR (ID 01) has been completely resolved</p>

<b>Data/Parameter</b>	$W_{\text{CH}_4,y}$
<b>Data Unit</b>	%
<b>Description</b>	Methane fraction in LFG
<b>Source of data used</b>	Methane analyzer
<b>Value(s)</b>	52.328
<b>Means of verification</b>	<p>The measured methane fraction is monitoring automatically and continuously by gas analyzer.</p> <p>The verification 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>
<b>Findings</b>	<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</p>

	<p>recording lag is occasionally occurred. In that case, PP takes conservative approach to adopt CH<sub>4</sub> concentration with a lower value comparing with measured data and previous one of it in every recording time. Verification team reviewed daily raw data (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 CH<sub>4</sub> concentration data was not transferred to the data server due to data server malfunction or maintenance of monitoring system, PP manually records the CH<sub>4</sub> concentration data every hour according to the emergency procedure in operating manual. Thus verification team reviewed CH<sub>4</sub> concentration recorded hourly for such events to confirm methane analyzer functioned properly at that time through daily work log.</p> <p>Measured LFG real time data have calculated from automatically recorded data by continuous integrating flow meters. But if there is system error or any difficulties due to natural disasters, a daily work log or the lowest CH<sub>4</sub> concentration data of the day has been temporarily applied during the error period. On 05/04/2018, the CH<sub>4</sub> concentration from daily work log was used for the period of 11:07:42~13:25:16 due to monitoring system error. However, the evidence of error was not provided by PP to confirm whether correct value is applied in ER calculation or not. <b>(Refer to Appendix 4/Table 2/CL ID 02).</b></p> <p>Entire events related to the description above are well in Section B (See Table B-1 Operation events history) of the MR (Version 3.0) and verification team checked it through daily raw data (Mokpo LFG plant ERP data) and daily work log. Also verification team checked that methane fraction in LFG is calculated as weighted average CH<sub>4</sub> concentration based on confirmed raw data to calculate baseline.</p>
<b>Conclusion</b>	<p>Methane fraction in LFG is measuring by methane analyzer 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><math>W_{CH_4,y}</math> in MR version 1.0(published version) was 52.349% but it was revised as 52.328% and applied in ER calculation due to above CAR 01.</p> <p>KFQ verification team confirmed that 52.328% is correctly calculated based on reliable raw data and applied in the baseline emission calculation for this monitoring period.</p> <p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>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> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p> <p>The raised CL (ID 02) has been completely resolved</p>

<b>Data/Parameter</b>	<b>EL<sub>EXP,PJT,Y</sub></b>
<b>Data Unit</b>	MWh
<b>Description</b>	Total amount of exported electricity out of the project
<b>Source of data used</b>	Watt-hour meter

Value(s)	Data	W <sub>a</sub>	W <sub>c</sub>	Total EL <sub>EXP</sub> (MWh)
	01/01/2018~18/01/2018	249.799	0.000	249.799
	19/01/2018~18/02/2018	285.539	133.179	418.718
	19/02/2018~18/03/2018	180.070	193.409	373.479
	19/03/2018~18/04/2018	279.242	75.433	354.675
	19/04/2018~18/05/2018	337.552	9.862	347.414
	19/05/2018~18/06/2018	345.959	7.855	353.814
	19/06/2018~18/07/2018	331.163	0.000	331.163
	19/07/2018~18/08/2018	293.887	20.984	314.871
	19/08/2018~18/09/2018	331.293	9.452	340.745
	19/09/2018~18/10/2018	333.397	0.000	333.397
	19/10/2018~18/11/2018	293.908	8.628	302.536
	19/11/2018~18/12/2018	290.699	32.533	293.233
	19/12/2018~31/12/2018	100.110	22.303	122.413
	<b>01/01/2018~31/12/2018</b>	<b>3,622.619</b>	<b>513.637</b>	<b>4,136.256</b>
<b>Means of verification</b>	<p>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> <p>The verification 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>			
<b>Findings</b>	<p>There are two Watt-hour meters, W<sub>a</sub> and W<sub>c</sub>, as described in the registered PDD. W<sub>a</sub> measures generated electricity from 1<sup>st</sup> and 2<sup>nd</sup> generators, and W<sub>c</sub> measures electricity generated by 2<sup>nd</sup> generator.</p> <p>Amount of electricity exported is automatically monitored by these two meters connected to 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. The amount of power transmitted by each generator is measured in each watt-hour meter. Therefore, the sum of each electricity in EL<sub>EXP,PJT,Y</sub> is not calculated in duplicate.</p>			
<b>Conclusion</b>	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>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> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p>			

<b>Data/Parameter</b>	EL <sub>IMP,PJT,Y</sub>
<b>Data Unit</b>	MWh
<b>Description</b>	Total amount of imported electricity to meet project requirement
<b>Source of data used</b>	Watt-hour meter

Value(s)	Data	Measured EL <sub>IMP</sub> (MWh)
	01/01/2018~18/01/2018	1.104
	19/01/2018~18/02/2018	1.464
	19/02/2018~18/03/2018	0.888
	19/03/2018~18/04/2018	1.392
	19/04/2018~18/05/2018	0.096
	19/05/2018~18/06/2018	0.048
	19/06/2018~18/07/2018	0.648
	19/07/2018~18/08/2018	1.584
	19/08/2018~18/09/2018	0.072
	19/09/2018~18/10/2018	0.072
	19/10/2018~18/11/2018	0.816
	19/11/2018~18/12/2018	0.144
	19/12/2018~31/12/2018	0.672
	<b>01/01/2018~31/12/2018</b>	<b>9.000</b>
<b>Means of verification</b>	<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 verification 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>	
<b>Findings</b>	<p>The amount of imported electricity is measured automatically by certified watt-hour meter (<math>W_b</math>) 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.</p>	
<b>Conclusion</b>	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>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> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p>	

### E.6.3. Implementation of sampling plan

<b>Means of verification</b>	N/A
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

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

#### General statement

<b>Means of verification</b>	The means of verification in relation to the specific instruments are stated in detail in the tables further below.
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<b>Findings</b>	The findings in relation to the specific instruments are stated in detail in the tables further below.
<b>Conclusion</b>	KFQ confirms that the calibration of the measuring equipment has been conducted as per the applied methodology and the monitoring plan. KFQ confirms that there has not been any calibration delay for any instrument affecting the verification period and thus, there is no error to be applied on any monitored parameters.

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, 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.

<b>Data/Parameter</b>	<b>LFG<sub>electricity, v</sub></b>			
<b>Data Unit</b>	Nm <sup>3</sup> /y			
<b>Description</b>	Amount of landfill gas combusted in power plant			
<b>TAG Number/Serial Number</b>	<ul style="list-style-type: none"> <li>· F<sub>a</sub> (Main flow meter): GR-160994</li> <li>· F<sub>b</sub> (Flow meter for 1<sup>st</sup> generator): GR-160995</li> <li>· F<sub>c</sub> (Flow meter for 2<sup>nd</sup> generator): GR-170320 (used from 21/03/2017)</li> </ul>			
<b>Type</b>	Thermal mass flow meter			
<b>Accuracy level</b>	+/- 0.5 % of F.S for F <sub>a</sub> , F <sub>b</sub> , and F <sub>c</sub>			
<b>Calibration entity</b>	Golden Rules Co., Ltd. for F <sub>a</sub> , F <sub>b</sub> and F <sub>c</sub>			
<b>Calibration frequency</b>	3 years			
<b>Previous calibration (if applicable)</b>		F <sub>a</sub> (Main flow meter)	F <sub>b</sub> (Flow meter for 1 <sup>st</sup> generator)	F <sub>c</sub> (Flow meter for 2 <sup>nd</sup> generator)
	Date	31/03/2015~ 01/04/2015	31/03/2015~ 01/04/2015	-
	Validity	30/03/2018	30/03/2018	-
<b>Latest calibration</b>		F <sub>a</sub> (Main flow meter)	F <sub>b</sub> (Flow meter for 1 <sup>st</sup> generator)	F <sub>c</sub> (Flow meter for 2 <sup>nd</sup> generator)
	Date	02/09/2016	02/09/2016	20/03/2017
	Validity	01/09/2019	01/09/2019	19/03/2020
<b>Applied period of max. permissible error (when applicable)</b>	N/A (No calibration delay)			
<b>Means of verification</b>	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.			
<b>Findings</b>	<p>It was found that the instrument, as stated in the MR (F<sub>a</sub>: Main flow meter, F<sub>b</sub>: Flow meter for 1<sup>st</sup> generator and F<sub>c</sub>: Flow meter for 2<sup>nd</sup> generator), physically exists and could be identified by the TAG Number and the serial number.</p> <p>It was also found that it has been calibrated regularly according to the calibration frequency described in the registered PDD. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.</p>			
<b>Conclusion</b>	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.			

<b>Data/Parameter</b>	<b>W<sub>CH<sub>4</sub>,y</sub></b>	
<b>Data Unit</b>	%	
<b>Description</b>	Methane fraction in LFG	
<b>TAG Number/Serial Number</b>	A8M7282T	
<b>Type</b>	Infrared gas analyzer	
<b>Accuracy level</b>	· Linearity: 1% of F.S · Repeatability: 0.5% of F.S	
<b>Calibration entity</b>	Korea Research Institute of Standards and Science	
<b>Calibration frequency</b>	3 years	
<b>Previous calibration (if applicable)</b>	Date	26/03/2015
	Validity	25/03/2018
<b>Latest calibration</b>	Date	26/03/2018
	Validity	25/03/2021
<b>Applied period of max. permissible error (when applicable)</b>	1days (26/03/2018)  The KFQ verification team is identified that there was a delayed calibration occurred on gas analyzer (S/N: A8M7282T). Latest calibration (26/03/2018) of gas analyzer was passed valid date of previous calibration (25/03/2018) of it.	
<b>Means of verification</b>	The KFQ verification team has visually checked the physical existence of the gas analyzer at the project site. The KFQ verification 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.	
<b>Findings</b>	<p>It was found that the instrument, as stated in the MR physically exists and could be identified by the TAG Number and the serial number.</p> <p>While checking calibration of gas analyzer, verification team identified that latest calibration of methane analyzer was performed on 26/03/2018 which is after valid period of previous calibration of this analyzer. Also adjusting measured value of the delayed calibration was not occurred in MR version 1.0 and ER calculation. <b>(Refer to Appendix 4/Table 2/CAR ID 02)</b>. After PP have submitted the MR (version 3.0) and ER calculation spreadsheet, PP adjusted measured value during the delayed calibration period (26/03/2018) by applying the maximum permission error of instruments as per the requirement of VVS appendix (Version 02.0). As per the latest calibration report issued by Korea Research Institute of Standards and Science, calibration result meets all instruments requirement thus PP applied linearity (+/-1% of full scale) to measure methane fraction on 26/03/2018. The verification team checked specification of this methane analyzer provided by manufacturer and it specification is as below:</p> <ul style="list-style-type: none"> <li>- Linearity: +/-1% of full scale</li> <li>- Repeatability: +/-0.5% of full scale</li> <li>- Zero drift: +/- 2% full scale/monthly</li> <li>- Span drift: +/- 2% full scale/monthly</li> </ul> <p>In case of zero and span test, PP performed these test monthly and verification team identified that its result are all within +/- 2% full scale during this monitoring period including 26/03/2018. Thus PP applied linearity (+/-1% of full scale) instead of Repeatability (+/-0.5% of full scale) to measured methane fraction on 26/03/2018 for adjusting due to delayed calibration.</p> <p>Verification team checked conservative recalculation for this monitoring period is corrected and confirmed that revised W<sub>CH<sub>4</sub>,y</sub> is used in baseline emission calculation.</p>	
<b>Conclusion</b>	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements in VVS and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.  KFQ confirms that the error has been applied in a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed GHG emission reductions or net anthropogenic GHG removals; and for all	

	measured values taken during the period between the scheduled date of calibration and the actual date of calibration.
	The raised CAR (ID 02) has been completely resolved.

<b>Data/Parameter</b>	<b>EL<sub>EXP, PJT, Y</sub></b>		
<b>Data Unit</b>	MWh		
<b>Description</b>	Total amount of exported electricity out of the project		
<b>TAG Number/Serial Number</b>	· W <sub>a</sub> (Measuring exported electricity by 1 <sup>st</sup> and 2 <sup>nd</sup> generator): 95246742 · W <sub>c</sub> (Measuring exported electricity by 2 <sup>nd</sup> generator): 50339836		
<b>Type</b>	Watt-hour meter		
<b>Accuracy level</b>	0.5s		
<b>Calibration entity</b>	Korea Testing Certification (KTC)		
<b>Calibration frequency</b>	At least once in 2 years		
<b>Previous calibration (if applicable)</b>		Wa	Wc
	Date	17/08/2016~19/08/2016	17/08/2016~19/08/2016
	Validity	16/08/2018	16/08/2018
<b>Latest calibration</b>		Wa	Wc
	Date	07/08/2018~09/08/2018	07/08/2018~09/08/2018
	Validity	06/08/2020	06/08/2020
<b>Applied period of max. permissible error (when applicable)</b>	N/A (No calibration delay)		
<b>Means of verification</b>	The KFQ verification team has visually checked the physical existence of 2 Watt-hour meters at the project site. The KFQ verification 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.		
<b>Findings</b>	It was found that the instrument, 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 registered PDD. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.		
<b>Conclusion</b>	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.		

Data/Parameter	EL <sub>IMP,PJT,Y</sub>	
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)	S/N	24142000332
	Date	17/08/2016~19/08/2016
	Validity	16/08/2018
Latest calibration	S/N	24142000332
	Date	07/08/2018~09/08/2018
	Validity	06/08/2020
Applied period of max. permissible error (when applicable)	N/A (No calibration delay)	



applicable)	
<b>Means of verification</b>	The KFQ verification team has visually checked the physical existence of the Watt-hour meter at the project site. The KFQ verification 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.
<b>Findings</b>	It was found that the instrument, 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 registered PDD. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
<b>Conclusion</b>	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.

## 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

<b>Means of verification</b>	<p>KFQ has reviewed all data, parameters and calculations with respect to calculation of the baseline GHG emissions and checked them against the requirements out of the applied methodology (AMS-I.D Version 13 and AMS-III.G Version 06), the registered PDD (Version 6.0 dated on 12/06/2017) 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 PP 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>
<b>Findings</b>	<p>The baseline GHG emissions have been found to be 33,650.841 tCO<sub>2</sub>e for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PP. 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 and AMS-III.G Version 06) and the registered PDD (Version 6.0 dated on 12/06/2017).</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 MR 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 MR, 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 registered 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 DCS, production log sheets and meters available in the operators control room or on-site. Further</p>

	<p>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<sub>y</sub></td><td>= (MD<sub>y</sub> - MD<sub>req,y</sub>) + EL<sub>EXP,PJT,y</sub> x CEF</td><td>33,650.841 tCO<sub>2</sub>e</td></tr><tr><td>MD<sub>y</sub></td><td>= LFG<sub>electricity,y</sub> x W<sub>CH4,y</sub> X D<sub>CH4,y</sub> x GWP<sub>CH4</sub></td><td>31,427.603 tCO<sub>2</sub>e</td></tr><tr><td>MD<sub>req,y</sub></td><td></td><td>0</td></tr><tr><td>EL<sub>EXP,PJT,y</sub></td><td></td><td>4,136.256 MWh</td></tr><tr><td>CEF</td><td></td><td>0.5375 tCO<sub>2</sub>/MWh</td></tr><tr><td>LFG<sub>electricity,y</sub></td><td></td><td>3,351,476.200 Nm<sup>3</sup></td></tr><tr><td>W<sub>CH4,y</sub></td><td></td><td>52.328 %</td></tr><tr><td>D<sub>CH4,y</sub></td><td></td><td>0.0007168 t/Nm<sup>3</sup></td></tr><tr><td>GWP<sub>CH4</sub></td><td></td><td>25</td></tr></table>	Parameter	Formula	Value	BE <sub>y</sub>	= (MD <sub>y</sub> - MD <sub>req,y</sub> ) + EL <sub>EXP,PJT,y</sub> x CEF	33,650.841 tCO <sub>2</sub> e	MD <sub>y</sub>	= LFG <sub>electricity,y</sub> x W <sub>CH4,y</sub> X D <sub>CH4,y</sub> x GWP <sub>CH4</sub>	31,427.603 tCO <sub>2</sub> e	MD <sub>req,y</sub>		0	EL <sub>EXP,PJT,y</sub>		4,136.256 MWh	CEF		0.5375 tCO <sub>2</sub> /MWh	LFG <sub>electricity,y</sub>		3,351,476.200 Nm <sup>3</sup>	W <sub>CH4,y</sub>		52.328 %	D <sub>CH4,y</sub>		0.0007168 t/Nm <sup>3</sup>	GWP <sub>CH4</sub>		25
Parameter	Formula	Value																													
BE <sub>y</sub>	= (MD <sub>y</sub> - MD <sub>req,y</sub> ) + EL <sub>EXP,PJT,y</sub> x CEF	33,650.841 tCO <sub>2</sub> e																													
MD <sub>y</sub>	= LFG <sub>electricity,y</sub> x W <sub>CH4,y</sub> X D <sub>CH4,y</sub> x GWP <sub>CH4</sub>	31,427.603 tCO <sub>2</sub> e																													
MD <sub>req,y</sub>		0																													
EL <sub>EXP,PJT,y</sub>		4,136.256 MWh																													
CEF		0.5375 tCO <sub>2</sub> /MWh																													
LFG <sub>electricity,y</sub>		3,351,476.200 Nm <sup>3</sup>																													
W <sub>CH4,y</sub>		52.328 %																													
D <sub>CH4,y</sub>		0.0007168 t/Nm <sup>3</sup>																													
GWP <sub>CH4</sub>		25																													
Conclusion	<p>KFQ confirms that all required data for calculation of the baseline GHG emissions were available for the whole verification period.</p> <p>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 GHG emissions 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 confirms that the error has been applied in a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed GHG emission reductions or net anthropogenic GHG removals; and for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.</p>																														

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

<b>Means of verification</b>	<p>KFQ has reviewed all data, parameters and calculations with respect to calculation of the project GHG emissions and checked them against the requirements out of the applied methodology (AMS-I.D Version 13 and AMS-III.G Version 06), the registered PDD (Version 6.0 dated on 12/06/2017) 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 PP 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>
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Findings

The project GHG emissions have been found to be 4.838 tCO<sub>2</sub>e for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PP. 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 PDD (Version 6.0 dated 12/06/2017), as well as relevant tools applied.

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 MR 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 the spreadsheets, including corresponding re-calculations of data during events as described in the MR, 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 registered 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), such as raw data generated in the DCS, 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.

A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above.

Parameter	Formula	Value
PE <sub>y</sub>	= EL <sub>IMP,PJT,y</sub> x CEF	4.838 tCO <sub>2</sub> e
EL <sub>IMP,PJT,y</sub>		9.000 MWh
CEF		0.5375 tCO <sub>2</sub> /MWh

Conclusion

KFQ confirms that all required data for calculation of the project GHG emissions were available for the whole verification period.

KFQ confirms that suitable cross-checking of data was possible and has been performed as described.

KFQ confirms that the PP has followed appropriate methods and formulae for calculating project GHG 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 GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.

### E.8.3. Calculation of leakage GHG emissions

<b>Means of verification</b>	KFQ has checked, whether leakage emissions (if any) were determined by the PP in accordance with the applied methodology and the PDD.
<b>Findings</b>	KFQ has found that the approach applied by the PP 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.
<b>Conclusion</b>	KFQ confirms that the PP approach with regard to leakage GHG emissions is correct and that no leakage GHG emissions need to be considered in the project activity based on the applied methodology.

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

<b>Means of verification</b>	<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 and AMS-III.G Version 06), and the PDD (Version 6.0 dated 12/06/2017), 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 PP 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 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>
<b>Findings</b>	<p>The GHG emission reductions have been found to be 33,646 tCO<sub>2</sub>e for the verification period. It was found that the first day on which CERs are being claimed in this verification period has been correctly specified by the PP, being 01/01/2018. It was found that a complete set of data covering the monitoring period has been provided by the PP. 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 and AMS-III.G Version 06) and the PDD (Version 6.0 dated 12/06/2017), 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 MR 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 MR, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations including delayed calibration are in line with the procedure in the registered 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 DCS, 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>
<b>Conclusion</b>	<p>KFQ confirms that all required data for 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.</p> <p>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 GHG emission reductions have been followed.</p> <p>KFQ confirms that any emission factors, GWPs and default values and reference</p>

	<p>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 GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p> <p>KFQ confirms that the first day in which CERs are being claimed in the verification period is 01/01/2018, i.e. later than 31/12/2012. No pro-rata approach is applicable.</p> <p>KFQ finally confirms that the amount of emission reductions claimed by the PP for the verification period from 01/01/2018 to 31/12/2018, amounting to 33,646 tCO<sub>2</sub>e, is correctly determined and calculated.</p>
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#### E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

<b>Means of verification</b>	KFQ compared the ex-ante estimation of emission reductions in the registered PDD with the emission reductions reported by the PP in the MR.
<b>Findings</b>	<p>KFQ found that the emission reductions for this monitoring period, from 01/01/2018 to 31/12/2018 in the PDD were estimated as 26,874 tCO<sub>2</sub>e (value rounded down). The actual emission reductions reported by the PP during the same period were 33,646 tCO<sub>2</sub>e and is thus higher than the value estimated in the PDD.</p> <p>It was found that the PP has correctly described the situation in the MR as well.</p>
<b>Conclusion</b>	<p>KFQ confirms that the reported emission reductions in the MR (Version 3.0) are higher than estimated in the PDD.</p> <p>KFQ confirms that the emission reductions claimed by the PP are reasonable.</p>

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

<b>Means of verification</b>	As per the specific instructions of the CDM-VCR-FORM, in this section it is to be explained how the cause of any increase in the actual GHG emission reductions in this monitoring period were assessed in accordance with the applicable verification requirements in the VVS. As there is actual increase of actual GHG emission reductions (refer to E.8.5), the cause of the increase were investigated by PP and KFQ has checked the respective explanation offered by the PP in the monitoring period.
<b>Findings</b>	<p>The reported emission reductions in the monitoring report during 9<sup>th</sup> monitoring period is approximately 25.2 % higher than the ex-ante estimation in the PDD, but reasons of this increasing were not sufficient to explain by PP. <b><u>(Refer to Appendix 4/Table 2/CL ID 03)</u></b></p> <p>After the PP have submitted the MR (Version 3.0), PP explained reasons of emission reductions increasing based on as below.</p> <ul style="list-style-type: none"> <li>• <u>Updated value of GWP<sub>CH4</sub></u> <ul style="list-style-type: none"> <li>: According to the decision made at COP 17, new GWP for methane, 25 from 21 is applied for this monitoring period.</li> </ul> </li> <li>• <u>Applied conservative data to estimate annual emission reduction in the PDD</u> <ul style="list-style-type: none"> <li>: While estimate annual emission reduction in the registered PDD, methane emission potential of a solid waste disposal site (BE<sub>CH4,SWDS,y</sub>) 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 6.92 m<sup>3</sup>/min in MR (Version 3.0) whereas it was 6.46 m<sup>3</sup>/min in registered PDD.</li> </ul> </li> <li>• <u>Concentration of methane</u> <ul style="list-style-type: none"> <li>: W<sub>CH4</sub> for this monitoring period is 52.328 % whereas 50 % was applied to estimate annual emission reduction in the PDD</li> </ul> </li> </ul>
<b>Conclusion</b>	<p>KFQ confirms that the cause of increase in the actual GHG emissions reductions were well justified during the verification period.</p> <p>KFQ confirms that the emission reductions claimed by the PP are reasonable.</p> <p>The raised CL (ID 03) has been completely resolved.</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

<b>Means of verification</b>	The GHG emission reductions reported in the MR are 33,646 tCO <sub>2</sub> e. As described in detail in Section E of this report, all relevant aspects of the project activity have
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	been assessed in order to determine, whether the claimed emission reductions by the PP are correctly determined, reasonable and fairly stated and based on verifiable evidence and in accordance with the applied methodology and the registered PDD as well as applicable tools.
<b>Findings</b>	It was found that the project activity is implemented and operated according to the registered PDD and the monitoring of any and all data and parameters as well as calculation of baseline GHG emissions, project GHG emissions and GHG emission reductions is complete conducted in accordance with the registered PDD, the applied methodology.
<b>Conclusion</b>	KFQ arrived at the conclusion that the GHG emission reductions reported in the MR and claimed by the PP are correctly determined with 33,646 tCO <sub>2</sub> e for the covered verification period between 01/01/2018 to 31/12/2018. This implies, that 100% of the reported GHG 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.

#### E.9. Assessment of reported sustainable development co-benefits

<b>Means of verification</b>	The PP has neither developed sustainable development co-benefits nor monitored sustainable development co-benefits of the project activity, the section is therefore not applicable in this verification period.
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

#### E.10. Global stakeholder consultation

<b>Means of verification</b>	There were no comments received with regard to the stakeholder consultation conducted after the publication of the first monitoring report in accordance with the "CDM project cycle procedure for project activities", the section is therefore not applicable in this verification period.
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

### 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 PP 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 02.0), KFQ could confirm that:

- The project activity has been implemented and operated as per the registered PDD (Version 6.0, dated 12/06/2017),
- The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately,
- The monitoring plan is as per the applied methodology,
- The monitoring plan in MR is as per the monitoring plan in the registered PDD,
- The monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan, and approved methodology including applicable tool(s) and generated GHG emission reductions data,
- The GHG emission reductions in the MR (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:

Title of project activity	Mokpo Landfill Gas Recovery Project for Electricity Generation
UNFCCC Reference Number	2834
Date of registration	18/02/2010
Registered PDD	12/06/2017 (Version 6.0)
Methodology applied	AMS-I.D (Version 13) AMS-III.G (Version 06)
Final version of MR	3.0 (dated 29/07/2019)
Crediting period	18/02/2010 to 17/02/2020
Monitoring period	01/01/2018 to 31/12/2018
Total GHG emission Reductions Verified	Baseline emissions: 33,650.841 tonnes CO <sub>2e</sub> Project emissions: 4.838 tonnes CO <sub>2e</sub> Leakage: 0 tonnes CO <sub>2e</sub> Emission reductions: <u>33,646.003 tonnes CO<sub>2e</sub></u>
ER Claimed	<u>33,646 tonnes CO<sub>2e</sub></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 activity: 'Mokpo Landfill Gas Recovery Project for Electricity Generation' (UNFCCC Registration Ref. No. 2834) for the period 01/01/2018 to 31/12/2018.

The PP is responsible for the collection of data in accordance with the monitoring plan 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 methodology AMS-I.D (Version 13) and AMS-III.G (Version 06), the registered PDD of 12/06/2017 (Version 6.0), the validation report (dated 17/02/2010) and the MR (Version 3.0) dated 29/07/2019. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

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 on the reported GHG emission reductions.

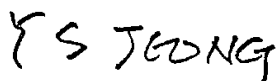
In our opinion the GHG emissions reductions of the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' (UNFCCC Registration Ref. No. 2834) for the period from 01/01/2018 to 31/12/2018 are fairly stated in the MR (Version 3.0).

The data generation, aggregation, recording, calculation and reporting of GHG emission reductions were conducted correctly on the basis of the approved baseline and monitoring methodology AMS-I.D (Version 13) and AMS-III.G (Version 06), and the monitoring plan contained in the registered PDD.

Hence, KFAQ is able to certify that the emission reductions from the 'Mokpo Landfill Gas Recovery Project for Electricity Generation' during the period from 01/01/2018 to 31/12/2018 are 33,646 tCO<sub>2</sub>e.

**Signed on behalf of the Korean Foundation for Quality**

Signature :

Handwritten signature in black ink, appearing to read 'YS JEONG'.

Name : Yu Shim JEONG, Managing Director of Sustainability Management Institute

Date : 04 August 2019



## Appendix 1. Abbreviations

Abbreviations	Full texts
AMS	Approved Small Scale Methodology
BE	Baseline Emissions
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
CO <sub>2</sub>	Carbon dioxide
CO <sub>2e</sub>	Carbon dioxide equivalent
DCS	Distributive Control System
DOE	Designated Operational Entity
EB	Executive Board
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
QA/QC	Quality Assurance and Quality Control
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)**

- 1.1 Thermal energy generation
- 1.2 Renewables
- 3.1 Energy demand
- 5.2 Caprolactam, nitric and adipic acid
- 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 14 September 2017

Sustainability Management Institute  
Yu Shim JEONG



## CERTIFICATE OF COMPETENCE

**Name :** Su Hyun PARK

**Qualification :**

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

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 11 January 2018

Sustainability Management Institute  
Mi Jung LEE



## CERTIFICATE OF COMPETENCE

**Name:** Ji Yu LEE

**Qualification:**

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

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 15 March 2019.

Sustainability Management Institute  
Mi Jung LEE



## CERTIFICATE OF COMPETENCE

**Name :** Yeonggyeong KANG

**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
- 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 02 January 2019

Sustainability Management Institute  
Mi Jung LEE

### Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Project participants	Monitoring report	Version 1.0 25/02/2019 Version 3.0 29/07/2019	Project Participant
2	Project participants	ER calculation spread sheet	Version 1.0 25/02/2019 Version 3.0 29/07/2019	Project Participant
3	Project participants	CDM Project Design Document : Mokpo Landfill Gas Recovery Project for Electricity Generation: - Version 06	12/06/2017 <a href="https://cdm.unfccc.int/Projects/DB/emc1249265030.9/view">https://cdm.unfccc.int/Projects/DB/emc1249265030.9/view</a>	UNFCCC Website Project Participant
4	Korean Foundation for Quality (KFQ)	PRC validation report PRC-2834-001 PRC-2834-002	<a href="https://cdm.unfccc.int/PRContainer/searchFinalized?ref=&amp;proj_ref=2834&amp;track=&amp;types_op=or&amp;status=">https://cdm.unfccc.int/PRContainer/searchFinalized?ref=&amp;proj_ref=2834&amp;track=&amp;types_op=or&amp;status=</a>	Others
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)	<a href="https://cdm.unfccc.int/Projects/DB/emc1249265030.9/view">https://cdm.unfccc.int/Projects/DB/emc1249265030.9/view</a>	Others
6	Korean Foundation for Quality (KFQ)	8 <sup>th</sup> verification/certification report for 'Mokpo Landfill Gas Recovery Project for Electricity Generation (Version 2.1)	<a href="https://cdm.unfccc.int/Projects/DB/emc1249265030.9/iProcess/KFQ1525337824.25/view">https://cdm.unfccc.int/Projects/DB/emc1249265030.9/iProcess/KFQ1525337824.25/view</a>	Others
7	Data server	Spread sheet of daily raw data (raw data sheet) downloaded from the data server: flow rate, methane fraction	from 01/01/2018 to 31/12/2018	Project Participant
8	Data server/Hanwha Corporation	Event log files and daily work log recorded manually	from 01/01/2018 to 31/12/2018	Project Participant
9	Hanwha Corporation	Monthly report of waste volume in Mokpo Landfill site	from 01/01/2018 to 31/12/2018	Project Participant
10	Hanwha Corporation	Operational manual –Mokpo LFG Power Plant (Version 27)	01/01/2019	Project Participant
11	Hanwha Corporation/KPX	Daily, weekly, monthly record for electricity export and sales receipt of it	from 01/01/2018 to 31/12/2018	Project Participant
12	KEPCO	Monthly bill for electricity imported	from 01/01/2018 to 31/12/2018	Project Participant
13	Golden Rules Co., Ltd./ National Metrology Institute/Korea Testing Certification/Korea Testing Certification	Calibration report: - $F_a/F_b/F_c$ - gas analyzer - Watt-hour meter ( $W_a/W_c$ ) - Watt-hour meter ( $W_b$ )	from 01/01/2018 to 31/12/2018	Project Participant
14	Hanwha Corporation	Internal audit records External audit records Management review reports	2018	Hanwha Corporation
15	CDM Executive Board	Standards, Procedure & Checklists · Clean Development Mechanism Validation and Verification Standard, version 02.0	29/11/2018	Others

		<ul style="list-style-type: none"> <li>• Clean Development Mechanism Project Standard, version 02.0</li> <li>• Sampling and surveys for CDM project activities and programme of activities, version 07</li> <li>• Clean Development Mechanism Project Cycle Procedure, version 02.0</li> <li>• 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</li> <li>• Guideline on the application of materiality in verifications, version 02.0</li> <li>• Request for issuance and post registration changes: Completeness Checklist, version 03.0</li> <li>• Monitoring report form, version 06.0</li> <li>• Verification and certification report form for CDM project activities, version 02.1</li> </ul>	29/11/2018  04/05/2017  29/11/2018  13/09/2012  20/02/2015  27/03/2015  07/06/2017  11/01/2018 All published under: <a href="http://cdm.unfccc.int/Reference/index.html">http://cdm.unfccc.int/Reference/index.html</a>	
		<ul style="list-style-type: none"> <li>• AMS-I.D: Grid connected renewable electricity generation (Version 13)</li> </ul>	14/12/2007 <a href="https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK">https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK</a>  28/03/2008 <a href="https://cdm.unfccc.int/methodologies/DB/0KHNES8D09H134V3TZDQ47C3LQL3H2">https://cdm.unfccc.int/methodologies/DB/0KHNES8D09H134V3TZDQ47C3LQL3H2</a>	
		<ul style="list-style-type: none"> <li>• AMS-III.G: Landfill methane recovery (Version 06)</li> </ul>		

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

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

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

Table 2. CL from this verification

CL ID	01	Section no.	E.3	Date: 16/04/2019
Description of CL				
Verification team identified that the description of events on 30/01/2018, 27/06/2018, 26/06/2018 and 29/12/2018 in the MR (version 1.0, table B-1) is not consistent with evidence (i.e daily work log) of its events.				
Project participant response				Date: 29/07/2019
PP revised the monitoring report to reflect correct description of events occurred during this monitoring period.				
Date	Duration	Operation events		
30/01/2018	00:00-14:56	- 1 <sup>st</sup> generator's trip occurred		
	15:24-15:34	- 2 <sup>nd</sup> generator's trip occurred		
27/06/2018	04:13-08:45	Black-out		
	23:50-23:59			
29/06/2018	0:11-01:58	Black-out		
29/12/2018	03:54-09:14	Error of equipment		
	09:52-11:25	Generator shift from 1 <sup>st</sup> generator to 2 <sup>nd</sup> generator		
	11:31-11:46			
	11:51-12:08			
	12:21-12:34			
Documentation provided by project participant				
MR (Version 3.0)				
DOE assessment				Date: 05/08/2019
Verification team checked above mentioned operational events during this monitoring period against internal record such as daily work log and event log files. Based on those evidence and interview with plant manager during on-site assessment, verification team confirmed that description provided in MR version 3.0 is correct and it is classified according to the 'Operational manual-Mokpo LFG power plant (version 27)'. Verification team also checked ER calculation process and couldn't find any error related to this event in ER calculation.				

<b>CL ID</b>	02	<b>Section no.</b>	E.6.2	<b>Date:</b> 16/04/2019
<b>Description of CL</b>				
Measured LFG real time data have calculated from automatically recorded data by continuous integrating flow meters. But if there is system error or any difficulties due to natural disasters, a daily work log or the lowest CH <sub>4</sub> concentration data of the day has been temporarily applied during the error period. On 05/04/2018, the CH <sub>4</sub> concentration from daily work log was used for the period of 11:07:42~13:25:16 due to monitoring system error. However, the evidence of error was not provided by PP to confirm whether correct value is applied in ER calculation or not.				
<b>Project participant response</b>				<b>Date:</b> 29/07/2019
PP submitted the daily work log on 05/04/2018 as the evidence.				
<b>Documentation provided by project participant</b>				
Daily work log (05/04/2018)				
<b>DOE assessment</b>				<b>Date:</b> 05/08/2019



Verification team checked that CH<sub>4</sub> concentration on 05/04/2018 in daily raw data in ER calculation spread sheet is consistent with evidence of the daily work log. Verification concluded that CH<sub>4</sub> concentration, 52.328% is correctly calculated and reflected in baseline emission calculation.

<b>CL ID</b>	03	<b>Section no.</b>	E.8.6	<b>Date:</b>	16/04/2019							
<b>Description of CL</b>												
The reported emission reductions (33,646 tCO <sub>2</sub> e) in the monitoring report during 9 <sup>th</sup> monitoring period is approximately 25.2 % higher than the ex-ante estimation in the PDD (26,874tCO <sub>2</sub> e). However PP have insufficiently described this increasing reason in MR (Version 1.0).												
<b>Project participant response</b>					<b>Date:</b>							
PP revised the MR to include reasons and changes to the project design of the following:												
<p>i) PP explained that the emission reductions increased to 25.2 % during this monitoring period compared to the expected emission reductions that are on the registered PDD. Applying the GWP and CH<sub>4</sub> concentration given in PDD to the emission reductions that since the increase in the GWP, emission reduction had about 17.5 % increase in this monitoring period (When the previous GWP CH<sub>4</sub> is applied, total reduction is 28,617 tCO<sub>2</sub>e).</p> <p>The PDD estimate was based on 50% CH<sub>4</sub> concentration but the actual concentration exceeds 52.328 % in this monitoring period. (When the 50% CH<sub>4</sub> concentration is applied, total reduction is 32,247 tCO<sub>2</sub>e).</p> <p>ii) PP explained that the LFG flow was estimated to be 6.46 m<sup>3</sup>/min (on the registered CDM-PDD in 2018) but the actual average flow was 6.92 m<sup>3</sup>/min during the monitoring period. In other words, there was 7.16 % of the difference between the theoretical and the actual values. When the 50% CH<sub>4</sub> concentration and 21 GWP were applied, the LFG<sub>y</sub> per minute is 8.7 m<sup>3</sup>/min and the difference with theoretical and the actual values are 34.6 %.</p>												
<b>Content</b>	<b>Year</b>	<b>LFG<sub>y</sub> (m<sup>3</sup>/min)</b>	<b>=</b>	<b>BE<sub>CH4,SWDS,y</sub></b>	<b>/</b>	<b>GWP</b>	<b>/</b>	<b>D<sub>CH4</sub></b>	<b>/</b>	<b>W<sub>CH4,y</sub></b>	<b>/</b>	<b>MIN<sub>year</sub></b>
PDD	2018	6.46	=	23,343	/	21	/	0.0007168	/	0.5	/	480,000
MR	2018	6.92	=	31,427	/	25	/	0.0007168	/	0.52	/	480,000
Therefore, PP explained that reported emission reduction in monitoring report is higher than the ex-ante estimation in the PDD in accordance with above.												
<b>Documentation provided by project participant</b>												
MR (Version 3.0) ER calculation spread sheet (version 3.0)												
<b>DOE assessment</b>											<b>Date:</b>	
PP have submitted the MR (Version 3.0) and verification team confirmed that the emission reductions claimed by the PP is reasonable. Thus verification team confirmed that the explanation for the increased emission reductions of the project activity during the verification period is reasonable.												

**Table 3. CAR from this verification**

<b>CAR ID</b>	01	<b>Section no.</b>	E.6.2	<b>Date:</b>	16/04/2019
<b>Description of CAR</b>					
The verification team found several issued in calculation of LFG flow rate as below.					
<p>i) PP explained that amount of landfill gas combusted in power plant on 29/01/2018(06:56~08:43, 08:46~14:40,14:57~15:01,15:10~18:22,18:42~23:59),30/01/2018(00:00~14:56,15:24~15:34),27/02/2018(13:44~17:41),15/05/2018(09:07~10:33) is '0' due to measurement error in MR version 1.0 but '0' was not applied in baseline emission calculation of ER calculation spreadsheet.</p> <p>ii) In the course of calculation of LFG flow rate on 31/01/2018, 09/05/2018, 10/05/2018, 22/06/2018 and 12/07/2018, PP applied the LFG flow rate from daily work log due to monitoring system error but it was not consistent flow rate in raw data and ER calculation spreadsheet.</p> <p>iii) While checking F<sub>b</sub> in ER calculation spreadsheet, verification team found that on 26/06/2018 F<sub>b</sub> (1.6 Nm<sup>3</sup>) is inconsistent with raw data sheet, therefore applied value of LFG<sub>electricity,y</sub> for the period of 19/06/2018~18/07/2018 and 01/01/2018~31/12/2018 are incorrect as 267,675.400 Nm<sup>3</sup> in MR (Version 1.0).</p>					
<b>Project participant response</b>					<b>Date:</b>
29/07/2019					

For the CAR ID 01 mentioned above, it is corrected as below by PP:	
i) Applied LFG flow rate from raw data on 29/01/2018, 30/01/2018, 27/02/2018, 15/05/2018 is revised to '0'	
ii) PP revised the ER calculation spreadsheet to correct flow rate from raw data on 31/01/2018, 05/04/2018, 09/05/2018, 10/05/2018, 22/06/2018 and 12/07/2018	
iii) PP revised LFG <sub>electricity,y</sub> from raw data for period of 19/06/2018~18/07/2018 and 01/01/2018~31/12/2018, and these are included in D.2 in MR (Version 2.0)	
<b>Documentation provided by project participant</b>	
MR (Version 3.0)	
ER calculation spreadsheet (Version 3.0)	
<b>DOE assessment</b>	<b>Date:</b> 05/08/2019
For the CAR ID 01 mentioned above, it is assessed as below:	
i) After the PP have submitted the MR (Version 3.0), verification team checked flow rate in raw data for above mentioned 4 days and confirmed that '0' is correctly applied in baseline emission calculation for the flow rate due to measurement error. Such events are well explained in Section B (See Table B-1), implementation of project activity, of the MR (Version 3.0).	
ii) PP applied LFG flow rate for certain time period of on 31/01/2018, 09/05/2018, 10/05/2018, 22/06/2018 and 12/07/2018 from raw data in baseline emission calculation and verification team confirmed that it is consistent with raw data.	
iii) Verification team checked Fb for the period of 19/06/2018~18/07/2018 and it is confirmed as 273,420.300 Nm <sup>3</sup> based on raw data of its flow. Verification team checked ER calculation spreadsheet and confirmed that correct value is applied in baseline emission calculation.	

<b>CAR ID</b>	02	<b>Section no.</b>	E.7	<b>Date:</b> 16/04/2019
<b>Description of CAR</b>				
While checking calibration of gas analyzer, verification team identified that latest calibration of methane analyzer was performed on 26/03/2018 which is after valid period of previous calibration of this analyzer. Also adjusting measured value of the delayed calibration was not occurred in MR version 1.0 and ER calculation.				
Date of previous calibration		Validity of previous calibration		Date of last calibration
25/03/2018		26/03/2018 ~25/03/2021		26/03/2018
<b>Project participant response</b>				<b>Date:</b> 29/07/2019
Applied +/-1% to measured value on 26/03/2018 due delayed calibration as per VVS appendix (version 02.0).				
<b>Documentation provided by project participant</b>				
MR (Version 3.0)				
ER calculation spread sheet (Version 3.0)				
<b>DOE assessment</b>				<b>Date:</b> 05/08/2019
After PP have submitted the MR (version 3.0) and ER calculation spreadsheet, PP adjusted measured value during the delayed calibration period (26/03/2018) by applying the maximum permission error of instruments as per the requirement of VVS appendix (Version 02.0). As per the latest calibration report issued by Korea Research Institute of Standards and Science, calibration result meets all instruments requirement thus PP applied linearity (+/-1% of full scale) to measure methane fraction on 26/03/2018. The verification team checked specification of this methane analyzer provided by manufacturer and its specification is as below:				
<ul style="list-style-type: none"> <li>- Linearity: +/-1% of full scale</li> <li>- Repeatability: +/-0.5% of full scale</li> <li>- Zero drift: +/- 2% full scale/monthly</li> <li>- Span drift: +/- 2% full scale/monthly</li> </ul>				
In case of zero and span test, PP performed these test monthly and verification team identified that its result are all within +/- 2% full scale during this monitoring period including 26/03/2018. Thus PP applied linearity (+/-1% of full scale) instead of Repeatability (+/-0.5% of full scale) to measured methane fraction on 26/03/2018 for adjusting due to delayed calibration.				
Verification team checked conservative recalculation for this monitoring period is corrected and confirmed that revised W <sub>CH<sub>4</sub>,y</sub> is used in baseline emission calculation.				

Table 4. FAR from this verification

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