




**Verification and certification report form for
CDM programme of activities
(version 03.0)**

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

BASIC INFORMATION

Title and UNFCCC reference number of the programme of activities (PoA)	Landfills' gas capture, flaring and use program in Morocco UNFCCC ID: PoA6568 TN P-No. : 8003003163 – 19/022	
Version number(s) of the PoA-DD(s) to which this report applies	2.0	
Version number of the verification and certification report	1.0	
Completion date of the verification and certification report	08/01/2021	
Monitoring period number and duration of this monitoring period	MP 2 01/08/2016 - 31/12/2018 (including both days)	
Number and version number of the monitoring report to which this report applies	Number: 1 Version: 4	
Coordinating/managing entity (CME)	Fonds d'Equipement Communal (FEC)	
Host Parties	Host Parties of the PoA	Is this a host Party to a CPA covered in this report? (yes/no)
	Morocco	Yes
Applied methodologies and standardized baselines	CDM Methodology: ACM0001 ver. 12 - Flaring or use of landfill gas Standardized baseline: N/A.	
Mandatory sectoral scopes	13 : Waste handling and disposal	
Conditional sectoral scopes, if applicable	N/A	
Estimated amount of GHG emission reductions or GHG removals for this monitoring period in the included CPAs covered in this report	321,922 t CO _{2e}	
Certified amount of GHG emission reductions or GHG removals for this monitoring period for the included CPAs covered in this report	9,723 t CO _{2e}	

Name and UNFCCC reference number of the DOE	TÜV NORD CERT GmbH E-0022
Name, position and signature of the approver of the verification and certification report	 Final Approver Evgeni Sud

SECTION A. Executive summary

The International Bank for Reconstruction and Development (IBRD) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the CDM Programme of Activities (CDM-PoA):

“Landfills’ gas capture, flaring and use program in Morocco”

with regard to the relevant requirements for CDM PoAs.

This verification covers the period from 01/08/2016 to 31/12/2018 (including both days).

The PoA aims to reduce GHG emissions from landfills in Morocco by introducing landfill gas capture and destruction equipment e.g. flare and/or gensets. CPA 1 however has only installed one flare as of today.

Details of the PoA location are given in table A-1 below:

Table A-1: Project Location

No.	Project Location
CPA # 1	Oum Azza landfill
Host Country	Morocco
Region:	Oum Azza
Project location address:	Near city of Rabat
Latitude:	+33.8727
Longitude:	-6.8089

Basic technical details of the PoA are summarized in table A-2.

Table - A-2: Technical data of the project activity CPA#1

Parameter	Unit	Value
Flare		
Manufacturer	-	BFM Haase
Capacity	N/m ³	1,500
Units	-	1
Type of flare	-	Enclosed, HTN 7.5
Gas quantity		
Min	Nm ³ /h	300
Max (design point)	Nm ³ /h	1500
Gas quality		
Min	Vol.-%	20
Design point	Vol.-%	50
Max	Vol.-%	100
Combustion temperature	°C	>1000

No gas engine to destroy LFG has been introduced so far as the amount of landfill gas does not

meet the expected quantity and quality. Due to this only the considered flare has been constructed and commissioned on 30 and 31/07/2015. The gas collection (45 vertical wells) and transport system has been installed in the months of February to March 2015.

Additional 2 horizontal wells have been installed in the month of May 2016. However, those horizontal wells are up to the date of the onsite inspection not connected to the gas transport system and to the flare system as confirmed via inspection of the same during site visit. They have been covered by waste.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design document.
- the monitoring plan is in accordance with the applied approved CDM methodology, i.e., ACM0001 ver. 12
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team members

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	Winter	Stefan	TÜV NORD CERT	x	x	x	x
2.	Other Expert	IR	Beqqal	Samir	TÜV NORD CERT	x	x	x	x

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	EI	Lubanga	David	-
2.	Technical reviewer /Approver	IR	Sud	Evgeni	TÜV NORD CERT

SECTION C. Application of materiality in conducting the verification

C.1. Consideration of materiality in planning the verification

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Materiality Threshold

The verification is based on the materiality threshold identified in table C-1 below:

Table C-1: Applied Materiality Threshold

	Threshold	Related to
<input type="checkbox"/>	0.5 %	Emission reductions or removals for registered CDM project activities achieving a total emission reduction or removal equal to or more than 500,000 tonnes of carbon dioxide equivalent per year ¹ ;
<input type="checkbox"/>	1 %	Emission reductions or removals for registered CDM project activities achieving a total emission reduction or removal of between 300,000 and 500,000 tonnes of carbon dioxide equivalent per year;
<input checked="" type="checkbox"/>	2 %	Emission reductions or removals for registered large-scale CDM project activities achieving a total emission reduction or removal of 300,000 tonnes of carbon dioxide equivalent per year or less;
<input type="checkbox"/>	5 %	Emission reductions or removals for registered small-scale CDM PoA other than registered CDM PoA covered under next category below;
<input type="checkbox"/>	10 %	Emission reductions or removals for the type of registered small-scale CDM PoA referred to in decision 3/CMP.6, paragraph 38 (referred to as microscale project activities).

Strategic Analysis

At the beginning of the verification the verification team leader has assessed the nature, scale and complexity of the verification tasks by carrying out a strategic analysis of all activities relevant to the project activity. The team leader has collected and reviewed the information relevant to assess that the designated verification team is sufficiently competent to carry out the verification and to ensure that it is able to conduct the necessary risk analysis.

Risk analysis and detailed audit testing planning

For the identification and assessment of potential reporting risks and to determine the necessary detailed audit testing procedures for residual risk areas the following table is used.

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.	Overlook relevant differences when cross checking original data (raw data) from manual logbooks (LP Gas and maintenance) and raw data and ER spreadsheets.	low	Even though there are procedures in place for all metering and cross checking processes the personnel could overlook important differences when performing the manual logbooks	Interview with personnel as well as demonstration of how the cross check is done. Cross check original data from manual logbooks and the raw data spread sheets of parameters
2.	Omissions and misstatements in data transferred from daily paper worksheet readings into digital Excel ER spreadsheet/worksheets.	Medium	Ineffective quality control of data transfer due to unclear QA/QC procedure	Check QM procedure/manual. PP may demonstrate how to transfer data and how this is crosschecked. Conduct interview with related personnel whether procedure is actually conducted but not adequately described.

¹ A year refers to a period of 12 consecutive months.

3.	Missing data due to failure of measurement equipment	Low	The monitoring plan defines operation emergency procedures in case a meter fails. Besides information is recorded electronically in the servers. Backup meters for relevant meter equipment are available onsite for fast exchange.	Check if related meters are installed as per monitoring plan. Check if emergency procedure is known across related personnel via interviews. Check back-up meters on correct calibration.
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On the basis of the risk analysis the verification has been planned. A detailed audit / verification plan has been prepared and submitted to the project participant(s) in due time before the site visit.

C.2. Consideration of materiality in conducting the verification

Based on the verification planning, verification process is carried out. The concept of materiality considered during the verification process. A breakdown of the chosen approaches is included in the following table.

Parameter	Approach ⁺	Errors* detected	Corrected	Remaining verification risk
$V_{t,wb}$ (same as $FV_{RG,h}$) = $V_{t,wb,n}$	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
$V_{CH4,t,wb}$ (same as $f_{V_{CH4,h}}$)	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
T_{flare}	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
$f_{V_{CH4,FG,h}}$	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
$FV_{RG,h}$	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
$to_{2,h}$	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material
$EC_{PJ,y}$	CDC	<input type="checkbox"/>	<input type="checkbox"/>	Not material
Other flare parameters	CDC	<input type="checkbox"/>	<input type="checkbox"/>	Not material
$M_{t,wb}$, T_t , P_t , $p_{H_2O,t,Sat}$, $EC_{BL,k,y}$, Operation hours of the energy plant	CDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not material as not relevant for this monitoring period
Aggregate				Materiality threshold not exceeded

^{*)} incl. omissions and misstatements

^{+) Verification Approaches:}

CDC: Complete data check of data including all data aggregation steps

NDC: Non-complete data check – omissions not material

SPL: Sampling approach (all data available)

ASP: Acceptance Sampling

COM: Data check at higher data aggregation levels and sampling at original data levels

The verification was basically carried out as per the verification plan. However, based on the actual situation on-site and the errors, omissions and misstatements identified during the verification minor deviations from the original plan occurred. However, due to the insignificance no major revision of the overall plan was required. Esp. there was no need for significant modification of the sampling approaches or for additional / less locations to be visited during the on-site.

SECTION D. Means of verification

D.1. Desk/document review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- the last revision of the PoA-DD including the monitoring plan^{/PoA-DD/},
- the last revisions of the CPA-DDs
- the last revision of the validation report^{/VAL/},

- CPA inclusion reports
- documentation of project equipment and operations^{/VER/}
- the monitoring report, including the claimed emission reductions for the PoA^{/MR/},
- the emission reduction calculation spreadsheet^{/XLS/}.

Other supporting documents, such as publicly available information on the UNFCCC website and background information were also reviewed.

D.2. On-site inspection

Duration of on-site inspection: 04/03/2019 to 05/03/2019				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening meeting at Oum Azza Landfill including status of the project and future development	Oum Azza Landfill	04/03/2019	Stefan Winter Samir Beqqal
2.	Walk through the site and Inspection of flaring system, control room, and location of the meters			
3.	Interview with personnel and monitoring manager			
4.	Evidence assessment			
5.	Data check against supportings			
6.	Data collection, aggregation and processing			
7.	Quality assurance	CME office	05/03/2019	
8.	ER and PE calculation review			
9.	Presentation of findings			
10.	Closing meeting			

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Freire	Javier	The Worldbank	04/03/2019 - 05/03/2019	All issues	Stefan Winter Samir Beqqal
2.	Smith	Jason	The Worldbank	04/03/2019 - 05/03/2019	MR, project implementation ER calculation Calibration procedure	
3.	Edahani	Khalid	Prefecture skhirat Temara	04/03/2019	Opening meeting	
4.	Miskane	Naima	Wilaya RSK (Rabat-Sale-Kenitra)			
5.	Bouchiba	Amina	Prefecture skhirat Temara			
6.	Balafres	Sanaa	Fond d'Equipement Communal	04/03/2019 - 05/03/2019	Opening and closing meeting	
7.	El Idrissi	Said			CME organization of PoA	
8.	Rhoualem	Faiza	Teodem / Groupe Pizzorno Environment	04/03/2019	Environment/Training planning and certificates	
9.	Eden	Christopher	Ecomethanogene	04/03/2019 - 05/03/2019	Project development, planning implementation and operation Monitoring equipment Maintenance, repair Data collection,	
10.	Assi	Mohamed	Teodem			

					aggregation and processing	
11.	Cherkaen	Hassan	Teodem	04/03/2019	Opening meeting	

D.4. Sampling approach**D.4.1 Sampling during monitoring by the PP:**

<input checked="" type="checkbox"/>	No sampling approach has been used by the PP to determine the monitored parameters				
<input type="checkbox"/>	A sampling approach has been taken for the following monitored parameter(s):				
	Parameter	Sampling approach ¹⁾	Sampling Type ²⁾	Population	Sample Size

¹⁾Sampling Approaches:

SiRS: Simple Random Sampling
 StRS: Stratified Random Sampling
 SS: Systematic Sampling
 CS: Cluster Sampling
 MSS: Multi-stage Sampling

²⁾Sampling Types:

PS: Parameter Sampling

D.4.2 Sampling approaches during verification

<input checked="" type="checkbox"/>	No sampling approach has been used by the VT to verify the monitored parameters				
<input type="checkbox"/>	A sampling approach has been applied by the VT for the following monitored parameter(s):				
	Parameter	Sampling approach ¹⁾	Sampling Type ²⁾	Population (PP sample)	Sample Size

¹⁾Sampling Approaches:

SiRS: Simple Random Sampling
 StRS: Stratified Random Sampling
 SS: Systematic Sampling
 CS: Cluster Sampling
 MSS: Multi-stage Sampling

²⁾Sampling Types:

AS: Acceptance Sampling
 PS: Parameter Sampling
 COM: Full data check at higher data aggregation levels and sampling at original data levels

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
General	-	-	-
Compliance of the monitoring report with the monitoring report form	-	3 CAR 11 CAR 13 CAR 17	-
Remaining forward action requests from validation and/or previous verifications	-	-	1
CPAs considered for verification and covered in this report	-	-	-
Programme of activities			
Compliance of the programme implementation with the registered PoA-DD	-	-	-
Implementation and operation of the management system	-	-	-
Post-registration changes	-	-	-
• Corrections	-	-	-
• Inclusion of a monitoring plan	-	-	-
• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents ²	-	-	-
• Changes to the programme design	-	-	-
• Addition of CPA inclusion template	-	-	-
• Change of coordinating/managing entity	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Component project activities			-
Compliance of the CPA implementation with the included CPA design document	1	-	-
Post-registration changes	-	-	-
• Temporary deviations from registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
• Corrections	-	-	-
• Changes to the start date-of the crediting period	-	-	-
• Inclusion of a monitoring plan	-	-	-
• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents	-	-	-
• Changes to the project design	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Compliance of the registered monitoring plan with applied methodologies and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
• Data and parameters fixed ex ante or at renewal of crediting period	-	1 CAR 20	-

² 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).

• Data and parameters monitored	-	8 CAR 1 CAR 2 CAR 3 CAR 4 CAR 5 CAR 14 CAR 15 CAR 16	1
• Implementation of sampling plan	-	-	-
Compliance with the calibration frequency requirements for measuring instruments	-	2 CAR 7 CAR 8	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	-	1 CAR 18	-
• Calculation of project GHG emissions or actual net GHG removals by sinks	-	3 CAR 6 CAR 9 CAR 10	-
• Calculation of leakage GHG emissions	-	-	-
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	-	1 CAR 12	-
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA	-	-	-
• Remarks on difference from estimated value in included CPA	-	1 CAR 19	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	1	20	2

SECTION E. Verification findings

E.1. General

E.1.1. Compliance of the monitoring report with the monitoring report form

Means of verification	<p>A draft monitoring report was submitted to the verification team by the project participants. The DOE has made this report publicly available prior to the start of the verification activities. No comments were received.</p> <p>By means of the UNFCCC website it has been checked whether the latest applicable MR template CDM-PoA-MR-FORM has been used.</p> <p>Further it has been checked whether the latest instructions for filling out the MR template have been followed. Every section has been checked against the respective guidance.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /MRT/ • /unfccc/ 		
Findings	<input checked="" type="checkbox"/>	The latest reporting template CDM-PoA-MR-FORM as listed on the UNFCCC website has been used for the Monitoring Report to be uploaded.	
	<input type="checkbox"/>	The latest instructions for filling out the MR have been followed. No adverse finding has been identified in the course of this verification.	
	<input checked="" type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>CAR 11 and CAR 13, CAR 17</p>	

Conclusion	<input type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
	Final revised MR is assessed to be completed in accordance with latest instructions for filling out the MR in the template.	

E.1.2. Remaining forward action requests from validation and/or previous verifications

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

In the course of this verification the latest version of the last issued MR^{/MR/} and the PoA Verification report^{/VER/}, 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:

<input checked="" type="checkbox"/>	There were no open issues which have been addressed in the latest version of the validation report.
<input type="checkbox"/>	All open issues from the validation have been appropriately addressed in the context of previous verifications.
<input type="checkbox"/>	All issues related to the validation have been appropriately addressed in the course of the current monitoring period (for details please refer to appendix 4)
<input type="checkbox"/>	The following issues related to the validation have not yet been appropriately addressed (for details please refer to appendix 4):
	- N/A

(ii) Open issues from previous verifications:

<input type="checkbox"/>	N/A – as this is the first monitoring period for this CDM project activity.
<input type="checkbox"/>	There were no open issues which have been addressed in the previous verification report
<input checked="" type="checkbox"/>	All issues related to the previous verification have been appropriately addressed in the course of the current monitoring period (for details please refer to appendix 4)
<input type="checkbox"/>	The following issues related to the previous verification have not yet been appropriately addressed (for details please refer to appendix 4):
	-

E.1.3. CPAs considered for verification and covered in this report

Title and UNFCCC reference number of the CPA included in the PoA as of the end of this monitoring period	Is the CPA considered for this verification? (yes/no)	The date when the CPA was included	Version of the PoA-DD	Confirmation that a request for issuance including the CPA has been published for the previous monitoring period (Y/N)
6568-0001: Landfill's gas (LFG) capture, flaring and use at the Oum Azza landfill.	Yes	18/12/2012	2.0	Yes

E.2. Programme of activities

E.2.1. Compliance of the programme implementation with the registered programme design document

Means of verification	<p>By means of an in-depth review of the PoA-DD in its latest form – as downloaded from the UNFCCC project site - and the checks carried out during the on-site visit an assessment has been carried out whether the project has been implemented and operated in line with the latest approved version of the PoA-DD and whether all physical features of the project are in place. The following has been checked: implemented technology, project equipment as well as monitoring and metering equipment.</p> <p>Further, it has been checked if relevant technical equipment of the project activity has been exchanged or modified during the monitoring period and consistent notations of key equipment (meters etc.) in PoA-DD, MR and calculation spreadsheet are applied.</p> <p>Interviews with operational personnel have been carried out, QMS records, maintenance records, instrument specifications were checked in this context. Special focus has further been laid to determine whether a potential phase wise implementation has occurred within the crediting period or any delays with respect to the starting dates have occurred.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PoA-DD/ • /CPA-DD/ • /MR/ • /VVS/ • /XLS/ • /MRT/ • /TS/, /RAW/, /RP/ • /unfccc/ 																
Findings	<table border="1"> <tr> <td data-bbox="459 1081 523 1160"><input checked="" type="checkbox"/></td><td data-bbox="531 1081 1442 1160">The programme has been implemented as described in the latest version of the PoA-DD as well as in section B.1 of the monitoring report. No deviations thereof have been identified in the course of this verification.</td></tr> <tr> <td data-bbox="459 1160 523 1283"><input type="checkbox"/></td><td data-bbox="531 1160 1442 1283">The following deviations from the registered / approved project design and or the project description in the MR have been identified in the course of this verification (for further details please refer to section E.4): - N/A</td></tr> <tr> <td data-bbox="459 1283 523 1350"><input type="checkbox"/></td><td data-bbox="531 1283 1442 1350">In this context the following CARs, CLs have been raised: -</td></tr> <tr> <td colspan="2" data-bbox="459 1350 1442 1395"><i>In case of phased implementation:</i></td></tr> <tr> <td data-bbox="459 1395 523 1451"><input type="checkbox"/></td><td data-bbox="531 1395 1442 1451">N/A</td></tr> <tr> <td data-bbox="459 1451 523 1518"><input type="checkbox"/></td><td data-bbox="531 1451 1442 1518">The phased implementation has correctly and in sufficient detail been described in the latest version of the PoA-DD.</td></tr> <tr> <td data-bbox="459 1518 523 1619"><input type="checkbox"/></td><td data-bbox="531 1518 1442 1619">The description in section B of the MR differs in content or the level of detail from the latest version of the PoA-DD. However, the description in the MR is correct and reflects the situation during the site inspection.</td></tr> <tr> <td data-bbox="459 1619 523 1709"><input type="checkbox"/></td><td data-bbox="531 1619 1442 1709">The project description in the PoA-DD/MR is not deemed sufficient. The detailed implementation timeline is as follows: N/A or add as appropriate</td></tr> </table>	<input checked="" type="checkbox"/>	The programme has been implemented as described in the latest version of the PoA-DD as well as in section B.1 of the monitoring report. No deviations thereof have been identified in the course of this verification.	<input type="checkbox"/>	The following deviations from the registered / approved project design and or the project description in the MR have been identified in the course of this verification (for further details please refer to section E.4): - N/A	<input type="checkbox"/>	In this context the following CARs, CLs have been raised: -	<i>In case of phased implementation:</i>		<input type="checkbox"/>	N/A	<input type="checkbox"/>	The phased implementation has correctly and in sufficient detail been described in the latest version of the PoA-DD.	<input type="checkbox"/>	The description in section B of the MR differs in content or the level of detail from the latest version of the PoA-DD. However, the description in the MR is correct and reflects the situation during the site inspection.	<input type="checkbox"/>	The project description in the PoA-DD/MR is not deemed sufficient. The detailed implementation timeline is as follows: N/A or add as appropriate
<input checked="" type="checkbox"/>	The programme has been implemented as described in the latest version of the PoA-DD as well as in section B.1 of the monitoring report. No deviations thereof have been identified in the course of this verification.																
<input type="checkbox"/>	The following deviations from the registered / approved project design and or the project description in the MR have been identified in the course of this verification (for further details please refer to section E.4): - N/A																
<input type="checkbox"/>	In this context the following CARs, CLs have been raised: -																
<i>In case of phased implementation:</i>																	
<input type="checkbox"/>	N/A																
<input type="checkbox"/>	The phased implementation has correctly and in sufficient detail been described in the latest version of the PoA-DD.																
<input type="checkbox"/>	The description in section B of the MR differs in content or the level of detail from the latest version of the PoA-DD. However, the description in the MR is correct and reflects the situation during the site inspection.																
<input type="checkbox"/>	The project description in the PoA-DD/MR is not deemed sufficient. The detailed implementation timeline is as follows: N/A or add as appropriate																
Conclusion	<table border="1"> <tr> <td data-bbox="459 1720 523 1776"><input checked="" type="checkbox"/></td><td data-bbox="531 1720 1442 1776">No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.</td></tr> <tr> <td data-bbox="459 1776 523 1865"><input type="checkbox"/></td><td data-bbox="531 1776 1442 1865">The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</td></tr> <tr> <td colspan="2" data-bbox="459 1865 1442 1895">The PoA is implemented as described.</td></tr> </table>	<input checked="" type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.	<input type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.	The PoA is implemented as described.											
<input checked="" type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.																
<input type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.																
The PoA is implemented as described.																	

E.2.2. Implementation and operation of the management system

Means of verification	The verification team conducted a review of the PoA-DD and checked related information against observations found during onsite inspection and interviews conducted during the onsite visit to respective personnel.
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	<p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PoA-DD/ • /TRAIN/ • /Interviews/
Findings	<input type="checkbox"/> In this context the following CARs, CLs have been raised:
Conclusion	<p>The CDM PoA is managed by FEC as the Coordinating Entity. More specifically, the management and coordinating PoA's tasks will be carried out by the Sustainable Development and Partnerships Directorate (SDPD) at FEC. Besides the carbon finance activity, the SDPD has a global mission of sustainable development projects mainstreaming within FEC's programme of activities. It comprises five permanent and dedicated staff members: a Managing Director, an Assistant Director, a Financial Analyst, a Technical Analyst and an administrative and follow up support person.</p> <p>The CME has</p> <ul style="list-style-type: none"> - Formal request from the interested municipality or the operator of its landfill to participate in the CDM PoA. - Arrangements for training and capacity development for personnel - System/procedure to avoid double counting - Provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA - Measures for continuous improvement of the PoA management - Record keeping system for each CPA under the PoA (currently one) <p>Based on onsite check and interviews DOE has found that the system is in place, appropriate and effective.</p>

E.2.3. Post-registration changes

E.2.3.1. Corrections

>>

It has been checked whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input checked="" type="checkbox"/>	During the verification of the current MP no need for corrections has been identified.						
<input type="checkbox"/>	<p>The following corrections have been applied:</p> <table border="1"> <tr> <td>1</td><td>Issue:</td><td></td></tr> <tr> <td>2</td><td>Issue:</td><td></td></tr> </table> <p>The PoA-DD has been revised accordingly: (New) version No.: Revision date:</p> <p>It is confirmed that the updated / corrected information is an accurate reflection of the actual project information and that the corrected parameters are in accordance with the applied methodology and the monitoring plan.</p> <p><input type="checkbox"/> A related post registration change has been submitted prior to the issuance request. The approval has been received on DD/MM/YYYY via approval number PRC-XXX-00X.</p> <p><input type="checkbox"/> A related post registration change is submitted along with this issuance request. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.</p>	1	Issue:		2	Issue:	
1	Issue:						
2	Issue:						

E.2.3.2. Inclusion of a monitoring plan

>>

<input checked="" type="checkbox"/>	N/A - as this monitoring plan was part of the registered PoA-DD /CPA-DD
<input type="checkbox"/>	In line with PS § 281 or § 282 the PP has forwarded a monitoring plan to the DOE for validation. No prior approval of the monitoring plan was required as the PP in line with PS § 282 wished to submit the monitoring plan together with the request for issuance for the first monitoring period. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.
<input type="checkbox"/>	In line with § 282 the PP submitted a monitoring plan prior to the submission of the request for issuance for validation to the DOE. A DOE has assessed the monitoring plan in line with related VVS requirements and submitted a related PRC report for prior approval. The approval has been received on DD/MM/YYYY via approval number

E.2.3.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>>

It has been checked whether any permanent changes to the registered monitoring plan (PCfrMP) or permanent deviation of monitoring from the applied methodologies (PCfMM) including standardized baselines (PCfSB) or other methodological regulatory documents have been occurred or approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input checked="" type="checkbox"/>	No PCfrMP, PCfMM or PCfSB have been submitted to the UNFCCC prior to the current monitoring period									
<input type="checkbox"/>	The following PCfrMP, PCfMM or PCfSB have been approved or are under approval by the UNFCCC									
	1	<table border="1"> <tr> <td>Title</td> <td></td> </tr> <tr> <td>Status</td> <td><input type="checkbox"/> under approval; <input type="checkbox"/> approved</td> </tr> <tr> <td>Appr.date</td> <td></td> </tr> <tr> <td>Ref. No.</td> <td></td> </tr> </table>	Title		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved	Appr.date		Ref. No.	
Title										
Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved									
Appr.date										
Ref. No.										
	2	<table border="1"> <tr> <td>Title</td> <td></td> </tr> <tr> <td>Status</td> <td><input type="checkbox"/> under approval; <input type="checkbox"/> approved</td> </tr> <tr> <td>Appr.date</td> <td></td> </tr> <tr> <td>Ref.No.</td> <td></td> </tr> </table>	Title		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved	Appr.date		Ref.No.	
Title										
Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved									
Appr.date										
Ref.No.										
<input checked="" type="checkbox"/>	During the verification of the current MP no need for a PCfrMP, PCfMM or PCfSB has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA									
<input type="checkbox"/>	An approval of the following PCfrMP, PCfMM or PCfSB is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.									
	1	Issue: <table border="1"><tr><td></td></tr></table>								
	2	Issue: <table border="1"><tr><td></td></tr></table>								
<input type="checkbox"/>	The following PCfrMP, PCfMM or PCfSB for which appendix 1 of the PS is applicable have been applied:									
	1	Issue: <table border="1"><tr><td></td></tr></table>								
	2	Issue: <table border="1"><tr><td></td></tr></table>								

E.2.3.4. Changes to the programme design

>>

It has been checked whether any changes to the project design (CoPD) have been approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input checked="" type="checkbox"/>	No CoPD has been submitted to the UNFCCC prior to the current monitoring period		
<input type="checkbox"/>	The following CoPD have been approved or are under approval by the UNFCCC		
	1	Title	
		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved
		Appr.date	
		Ref. No.	
	2	Title	
		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved
		Appr.date	
		Ref.No.	
<input checked="" type="checkbox"/>	During the verification of the current MP no need for a CoPD has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA		
<input type="checkbox"/>	An approval of the following CoPD.is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.		
	1	Issue:	
	2	Issue:	
<input type="checkbox"/>	The following CoPD for which appendix 1 of the PS is applicable have been applied:		
	1	Issue:	
	2	Issue:	

E.2.3.5. Addition of CPA inclusion template

>>
N/A

E.2.3.6. Change of coordination/managing entity

>>
N/A

E.2.3.7. Changes specific to afforestation and reforestation activities

>>

<input checked="" type="checkbox"/>	N/A - as this PoA is no A/R PoA
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E.3. Component project activities

E.3.1. Compliance of the CPA implementation with the included CPA design document

Means of verification	By means of an in-depth review of the CPA-DD in its latest form – as downloaded from the UNFCCC project site - and the checks carried out during the on-site visit an assessment has been carried out whether the project has been implemented and operated in line with the latest approved version of the CPA-DD and whether all physical features of the project are in place. The following has been checked: implemented technology, project equipment as well as monitoring and metering equipment.
------------------------------	---

	<p>Further is has been checked if relevant technical equipment of the project activity has been exchanged or modified during the monitoring period and consistent notations of key equipment (meters etc.) in CPA-DD, MR and calculation spreadsheet are applied.</p> <p>Interviews with operational personnel have been carried out, QMS records, maintenance records, instrument specifications were checked in this context. Special focus has further been laid to determine whether a potential phase wise implementation has occurred within the crediting period or any delays with respect to the starting dates have occurred.</p> <p>Further it has been checked whether any observed deviations from the registered project design have been correctly addressed as PRCs.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /CPA-DD/ • /MR/, /MRT/ • /VVS/ • /XLS/ • /QMS/ • /TS/ • /PID/ • /LY/ • /COM/ • /MAN/ • /unfccc/ 	
Findings	<input type="checkbox"/>	The project has been implemented as described in the latest version of the PoA-DD as well as in section D.1 of the monitoring report. No deviations thereof have been identified in the course of this verification.
	<input type="checkbox"/>	<p>The following deviations from the registered / approved project design and or the project description in the MR have been identified in the course of this verification (for further details please refer to section E.4):</p> <p>N/A</p>
	<i>In case of phased implementation:</i>	
	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	The phased implementation has correctly and in sufficient detail been described in the latest version of the PoA-DD.
	<input checked="" type="checkbox"/>	The description in section D.1 of the MR differs in content or the level of detail from the latest version of the PoA-DD. However, the description in the MR is correct and reflects the situation during the site inspection.
	<input type="checkbox"/>	<p>The project description in the PoA-DD/MR is not deemed sufficient. The detailed implementation timeline is as follows:</p> <p>N/A or add as appropriate</p>
	In this context the following CARs, CLs have been raised:	
	<input checked="" type="checkbox"/>	- CL 01
Conclusion	<p>During onsite visit it has been identified that a gas collection and transport system has been installed to retrieve the LFG from the Oum Azza landfill. The LFG is transported to a cleaning system and further on to a high temperature gas flare. Further all required and related monitoring equipment have also been installed. However, no gas engine for methane destruction and electricity generation has been installed yet. This is mainly due to the reason that the LFG quality and quantity is not as expected. Methane content in average at approx. 30% and quantity at 320 m³/h only. This has been confirmed based on check of raw data^{/RAW/} and Weekly and monthly reports prepared by CPA Implementer and provided to CME^{/RP/}.</p> <p>Besides that, even if a gas engine could be operated from the LFG point of view current host country regulations do prevent the project from being allowed to feed mid voltage level electricity to the grid. The law in question is currently under revision but has not yet been approved.</p>	

	<p>Based on that the project could not obtain a permit for power generation so far but submitted a dossier to the ministry of energy by 01/08/2016 as start to apply for the permit.</p> <p>From the interviews conducted and background search it is sufficiently demonstrated to the DOE that the delay in installation of gas engines is mainly out of the scope of the CPA implementer.</p> <p>The project operator however also has taken countermeasures to increase the gas quality and quantity e.g. by construction of horizontal wells instead or additional to vertical wells. Even though the horizontal wells are not connected to the gas collection system yet due to financial burdens.</p> <p>However, a CL 01 has been raised as there is a delay of the energy generation component of the project to the last year of the first crediting period. Subsequently, the number of installed units has been reduced from 6 to 5. Therefore, the total installed capacity is reduced from 6.384 MW (= 6 x 1.064 MW) to 5.320 MW. A related PRC has been submitted during this monitoring period which has been already approved on 24/11/2019 vide PRC number PRC-6568-0001.</p>
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E.3.2. Post-registration changes

E.3.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>>

It has been checked whether Temporary deviations from the registered monitoring plan (TDfrMP) or Temporary deviations from monitoring methodology or standardized baseline (TDfMM) have been applied during this monitoring period. The result is summarized in the table below.

<input checked="" type="checkbox"/>	No Temporary deviations from the registered monitoring plan (TDfrMP) or Temporary deviations from monitoring methodology or standardized baseline (TDfMM) have been submitted to the UNFCCC prior to the current monitoring period.									
<input type="checkbox"/>	The following TDfrMP or TDfMM have been approved or are under approval by the UNFCCC									
	1	<table border="1"> <tr> <td>Title</td> <td></td> </tr> <tr> <td>Status</td> <td><input type="checkbox"/>under approval;<input type="checkbox"/>approved (approval No.:)</td> </tr> <tr> <td>Appr.date</td> <td></td> </tr> <tr> <td>Ref. No.</td> <td></td> </tr> </table>	Title		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved (approval No.:)	Appr.date		Ref. No.	
Title										
Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved (approval No.:)									
Appr.date										
Ref. No.										
	2	<table border="1"> <tr> <td>Title</td> <td></td> </tr> <tr> <td>Status</td> <td><input type="checkbox"/>under approval;<input type="checkbox"/>approved (approval No.:)</td> </tr> <tr> <td>Appr.date</td> <td></td> </tr> <tr> <td>Ref.No.</td> <td></td> </tr> </table>	Title		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved (approval No.:)	Appr.date		Ref.No.	
Title										
Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved (approval No.:)									
Appr.date										
Ref.No.										
<input checked="" type="checkbox"/>	During the verification of the current MP no need for a TDfrMP or TDfMM has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA									
<input type="checkbox"/>	An approval of the following TDfrMP or TDfMM is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.									
	1	Issue:								
	2	Issue:								
<input type="checkbox"/>	The following TDfrMP or TDfMM for which appendix 1 of the PS is applicable have been applied:									
	1	Issue:								
	2	Issue:								

E.3.2.2. Corrections

>>

It has been checked whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input type="checkbox"/>	During the verification of the current MP no need for corrections has been identified.	
<input checked="" type="checkbox"/>	The following corrections have been applied:	
1	Issue:	The GWP _{CH4} has been specified for the first (21 tCO ₂ e/tCH ₄) and second commitment period (25 tCO ₂ e/tCH ₄)
2	Issue:	Start date of the crediting period has been corrected w.r.t. previous PRC of delay in start date of CP.
<input checked="" type="checkbox"/> A related post registration change has been submitted prior to the issuance request. The approval has been received on 24/11/2019 via approval number PRC-6568-001. <input type="checkbox"/> A related post registration change is submitted along with this issuance request. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.		

E.3.2.3. Changes to the start date of the crediting period of component project activities

>>

The start date of the crediting period has been changed from 01/03/2013 to 28/02/2014.

Due to the commissioning of the project on 30-31/07/2015 the start date of the crediting period has been postponed from 01/03/2013 to 28/02/2014 by one year. A related notification has been forwarded by the PP to the UNFCCC during the first monitoring period (28 Feb 2014 - 31 Jul 2016) as indicated during interviews conducted during site inspection. A related CL 02 has been raised and resolved in the first monitoring period PoA Verification Report page 19, section I.2.3. Changes to the start date of the crediting period

(https://cdm.unfccc.int/filestorage/1/5/K/15KP7R93AQN60MID24ZTCEXHSWLGBF/PoA6568_Verification%20Report_Oum%20Azza%20LFG1_v1.2.pdf?t=WkV8cWpvaWlsfDBxmIMR0p-DdvSs6qyew-Kv).

The start date has been changed and related project webpage has been revised accordingly and is now in line with the documents provided. Pls see related project page:

http://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/S173W8HI9MNUPREYKQOT6VJ5LFB4DX/vi ew

E.3.2.4. Inclusion of a monitoring plan

>>

<input checked="" type="checkbox"/>	N/A - as this monitoring plan was part of the included CPA-DD
<input type="checkbox"/>	In line with PS § 281 or § 282 the PP has forwarded a monitoring plan to the DOE for validation. No prior approval of the monitoring plan was required as the PP in line with PS § 282 wished to submit the monitoring plan together with the request for issuance for the first monitoring period. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.
<input type="checkbox"/>	In line with § 282 the PP submitted a monitoring plan prior to the submission of the request for issuance for validation to the DOE. A DOE has assessed the monitoring plan in line with related VVS requirements and submitted a related PRC report for prior approval. The approval has been received on DD/MM/YYYY via approval number

E.3.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

It has been checked whether any permanent changes to the registered monitoring plan (PCfrMP) or permanent deviation of monitoring from the applied methodologies (PCfMM) including standardized baselines (PCfSB) or other methodological regulatory documents have been occurred or approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input checked="" type="checkbox"/>	No PCfrMP, PCfMM or PCfSB have been submitted to the UNFCCC prior to the current monitoring period		
<input checked="" type="checkbox"/>	The following PCfrMP, PCfMM or PCfSB have been approved or are under approval by the UNFCCC		
	1	Title	<i>Permanent Change from Monitoring Plan</i> 1. Removal of calculated parameters in the monitoring plan section, as they are irrelevant as identified during the first verification. 2. Removal of monitoring parameters for monitoring of LFG on a dry basis, as for this CPA LFG is monitored on a wet basis, as identified during the first verification.
		Status	<input type="checkbox"/> under approval; <input checked="" type="checkbox"/> approved
		Appr.date	24/11/2019
		Ref. No.	PRC-6568-0001
	2	Title	
		Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved
		Appr.date	
		Ref. No.	
<input type="checkbox"/>	During the verification of the current MP no need for a PCfrMP, PCfMM or PCfSB has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA		
<input type="checkbox"/>	An approval of the following PCfrMP, PCfMM or PCfSB is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.		
	1	Issue:	
	2	Issue:	
<input type="checkbox"/>	The following PCfrMP, PCfMM or PCfSB for which appendix 1 of the PS is applicable have been applied:		
	1	Issue:	
	2	Issue:	

E.3.2.6. Changes to the project design

>>

It has been checked whether any changes to the project design (CoPD) have been approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

<input checked="" type="checkbox"/>	No CoPD has been submitted to the UNFCCC prior to the current monitoring period		
<input checked="" type="checkbox"/>	The following CoPD have been approved or are under approval by the UNFCCC		
	1	Title	There is a delay of the energy generation component of the project to the last year of the first crediting period. Subsequently the number of installed units has been

		reduced from 6 to 5. Therefore, the total installed capacity is reduced from 6.384 MW (= 6 x 1.064 MW) to 5.320 MW.
	Status	<input type="checkbox"/> under approval; <input checked="" type="checkbox"/> approved
	Appr.date	24/11/2019
	Ref. No.	PRC-6568-0001
2	Title	
	Status	<input type="checkbox"/> under approval; <input type="checkbox"/> approved
	Appr.date	
	Ref.No.	
<input type="checkbox"/>	During the verification of the current MP no need for a CoPD has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA	
<input type="checkbox"/>	An approval of the following CoPD is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.	
1	Issue:	
2	Issue:	
<input type="checkbox"/>	The following CoPD for which appendix 1 of the PS is applicable have been applied:	
1	Issue:	
2	Issue:	

E.3.2.7. Changes specific to afforestation and reforestation activities

>>

<input checked="" type="checkbox"/>	N/A - as this registered CPA is not an afforestation and reforestation activity
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E.3.3. Compliance of the registered monitoring plan with applied methodologies and standardized baselines

Means of verification	By means of comparison of the MR with (i) the applied CDM methodology (ii) all applicable CDM Meth tools and (iii) if applicable, a standardized baseline the verification team has checked whether the MP is in compliance with the MP related requirements of the applied methodology/tools/SB. The following sources of information have been used in this context: <ul style="list-style-type: none"> • /MR/ • /ACM0001/ • /TA/ • /unfccc/ 								
Findings	<input checked="" type="checkbox"/>	The MP is completely in accordance with the approved methodology applied by the CDM project (last registered/approved version of the PoA-DD)							
		The breakdown of MP accordance of the referenced tools is as follows:							
	<input checked="" type="checkbox"/>	1	<table border="1"> <tr> <td>Title (of the tool)</td><td>Combined tool to identify the baseline scenario and demonstrate additionality</td></tr> <tr> <td>Version</td><td>4.0</td></tr> <tr> <td>MP compliance</td><td> <input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input checked="" type="checkbox"/> N/A (for MP) </td></tr> </table>	Title (of the tool)	Combined tool to identify the baseline scenario and demonstrate additionality	Version	4.0	MP compliance	<input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input checked="" type="checkbox"/> N/A (for MP)
Title (of the tool)	Combined tool to identify the baseline scenario and demonstrate additionality								
Version	4.0								
MP compliance	<input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input checked="" type="checkbox"/> N/A (for MP)								
		2	<table border="1"> <tr> <td>Title (of the tool)</td><td>Tool Emissions from solid waste disposal sites</td></tr> <tr> <td>Version</td><td>6.0.1</td></tr> <tr> <td>MP compliance</td><td><input type="checkbox"/> full compliance</td></tr> </table>	Title (of the tool)	Tool Emissions from solid waste disposal sites	Version	6.0.1	MP compliance	<input type="checkbox"/> full compliance
Title (of the tool)	Tool Emissions from solid waste disposal sites								
Version	6.0.1								
MP compliance	<input type="checkbox"/> full compliance								

			<input type="checkbox"/> findings have been raised <input checked="" type="checkbox"/> N/A (for MP)
	3	Title (of the tool)	Tool to calculate baseline, project and/or leakage emissions from electricity consumption
		Version	1.0
		MP compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)
	4	Title (of the tool)	Tool to determine project emissions from flaring gases containing methane
		Version	1.0
		MP compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)
	5	Title (of the tool)	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
		Version	2.0.0
		MP compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)
	6	Title (of the tool)	Tool to calculate the emission factor for an electricity system
		Version	02.2.1
		MP compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)
	7	Title (of the tool)	Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion
		Version	2
		MP compliance	<input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input checked="" type="checkbox"/> N/A (for MP)
	<input checked="" type="checkbox"/>	The breakdown of MP accordance of the applicable SB is as follows:	
	1	Title (of the SB)	Name of SB
		Version	-
		MP compliance	-
<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised:		
Conclusion	<input checked="" type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.	
	<input type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.	
	The applied methodology is consistent with the versions on the UNFCCC website. Related applied tools relevant for the monitoring of the project activity have been applied correctly. No standardised baseline is applied.		

E.3.4. Compliance of monitoring activities with the registered monitoring plan

E.3.4.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	By means of comparison of the MR and the ER calculation with the latest version of the registered CPA-DD and PoA-DD the verification team has checked
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whether all parameters fixed ex-ante or at renewal of the crediting period have been applied correctly.

The following parameters have been fixed at validation:

- GWP_{CH_4} : 25 tCO₂e/tCH₄
- OX_{top_layer} : 0.1 [-]
- P_J : 50%
- $P_{Default}$: 0.75 [-]
- F : 0.5 [-]
- $DOC_{f,Default}$: 0.5 kg/kg
- $MCF_{Default}$: 0.1 [-]
- DOC_j : [-]

Waste type j:	DOCj [% wet waste]
Wood and wood products	43
Pulp, paper and cardboard (other than sludge)	40
Food, food waste, beverages and tobacco (other than sludge)	15
Textiles	24
Garden, yard and park waste	20
Glass, plastic, metal, other inert waste	0

- k_j : 1/yr

Waste type j	(MAT ≤ 20°C) and Wet (MAP/PET >1)
Pulp, paper, cardboard (other than sludge), textiles	0.06
Wood, wood products and straw	0.03
Other (non-food) organic putrescible, garden and park waste	0.10
Food, food waste, sewage sludge, beverages and tobacco	0.185

- $f_y = f$: 0 [-]
- $TDL_{j,y}$: 20% for grid elec. or 0% for back-up diesel genset
- $TDL_{k,y}$: 3%
- $EF_{grid,CM,y}$: 0.6639 tCO₂e/MWh
- W_x : 13,730,762 t
- $P_{n,j,x}$:

Waste type j	Waste composition (% wet waste)
Wood and wood products	1
Pulp, paper, cardboard (other than sludge)	6
Food, food waste, beverages and tobacco (other than sludge)	45
Textiles	5
Garden, yard and park waste	22
Glass, plastic, metal, other inert waste	21 (calculated: 100 – sum of above)

Further it has been checked whether the GWP for the respective period has been correctly applied.

The following sources of information have been used in this context:

- /MR/
- /XLS/
- /PoA-DD/
- /CPA-DD/
- /PS/
- /VVS/
- /unfccc/
- /RAW/
- /TS/

Findings



The MR and the ER calculation have considered the parameters fixed ex-ante or at the renewal of the crediting period correctly, no deviations have been observed.



The following deviations from the parameters fixed ex-ante or at renewal of crediting period have been identified in the course of this verification:

- N/A



In this context the following CARs, CLs, FARs have been raised:
CAR 03, CAR 20

Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
		The ex-ante determined values have been correctly and consistently applied after successful closure of CAR 03. Further, it is noted that the following ex-ante determined and fixed parameters η_{PJ} , ϕ_{default} , F , $\text{DOC}_{f,\text{default}}$, $\text{MCF}_{\text{default}}$, DOC_j , k_j , f , W_x , $p_{n,i,x}$ listed under section B.4.2 of the latest CPA-DD (version 6.0) are not relevant for this monitoring period as they are used to determine ex-ante parameter $F_{\text{CH4,PJ},y}$ for baseline emissions from solid waste disposal site.

E.3.4.2. Data and parameters monitored

Means of verification	<p>During the verification all relevant monitoring parameters (as listed in chapter E.7.1 of the PoA-DD and esp. B.5.1 of CPA-DD) have been verified with regard to the</p> <ul style="list-style-type: none"> (i) appropriateness of the applied measurement / determination method, (ii) the correctness of the values applied for ER calculation, (iii) the accuracy, and applied QA/QC measures. <p>The results as well as the verification procedure are described parameter-wise in the project specific verification checklist (Appendix 5).</p>	
Findings	<input checked="" type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: CAR 01, CAR 02, CAR 03, CAR 04, CAR 05, CAR 14, CAR 15, CAR 16
Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
		It can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements. Where findings have been raised the same have been resolved.

E.3.4.3. Implementation of sampling plan

Means of verification	<p>The verification team has been checked whether the PPs have applied a sampling approach to determine the monitored values. Further it has been checked whether the PPs have correctly applied the implemented sampling plan including</p> <ul style="list-style-type: none"> (i) description of the implemented sampling design (ii) collected data (iii) analysis of collected data (iv) demonstration on whether the required confidence/precision has been met. <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /XLS/ • /PoA-DD/ • /CPA-DD/. 		
Findings	<input checked="" type="checkbox"/>	The PPs have not applied sampling approaches for the parameters monitored.	
	<input type="checkbox"/>	The PPs have applied sampling approaches for the following parameters monitored.	
		1	Parameter: -
			Name: -
			Description on how the sampling efforts and survey comply with the validated sampling plan: -
		2	Parameter: -
			Name: -

		Description on how the sampling efforts and survey comply with the validated sampling plan:	-
	<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised:	
	<input type="checkbox"/>		
Conclusion	<input checked="" type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.	
	<input type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.	
	-		

E.3.5. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	<p>During the verification the relevant monitoring equipment have been checked whether the calibration requirements have been met; especially if the calibration frequency is in line with the requirements of the validated PDD and/or the applicable calibration standards.</p> <p>The results as well as the verification procedure are described equipment-wise in the project specific verification checklist (Appendix 6).</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /XLS/ • /CAL/. 		
Findings	<input checked="" type="checkbox"/>	Based on the details listed in appendix 6 the verification team can confirm that all installed monitoring equipment has been duly calibrated for this entire monitoring period.	
	<input type="checkbox"/>	<p>Based on the assessment and information as per appendix 6 delay(s) in calibration have been identified. The PP has applied the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration.</p> <p>From the related calibration certificates and emission reduction calculation the verification team confirms that the maximum permissible error has been applied in a conservative manner so that the adjusted measured values due to the delayed calibration result in fewer claimed emission reductions.</p> <p>For details, please refer to appendix 6</p>	
	<input checked="" type="checkbox"/>	<p>In this context the following CARs, CLs, FARs have been raised:</p> <p>CAR 07, CAR 08, FAR 01 from previous verification and FAR 01 from this verification</p>	
Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.	
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.	
	FAR from previous verification has been adequately addressed. Further, a FAR from this verification is raised due to a delay in calibration for monitoring equipment to measure parameter Tt and humidity beyond this monitoring period. However, as other methodological choices have been made during this monitoring period this delay has no effect on ER result during this monitoring period. However, the issue should be observed during next verification.		

E.3.6. Assessment of data and calculation of emission reductions or net removals

E.3.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>During the verification the calculation of baseline GHG emissions has been checked. In detail the following has been verified:</p> <ul style="list-style-type: none"> • <i>Transparency:</i> It has been checked whether the calculation of baseline emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae.
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	<ul style="list-style-type: none"> • <i>Parameter consistency</i>: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet. • <i>Correctness</i>: It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan and the approved methodology. • <i>Completeness</i>: It has been checked whether all calculations are complete and without omissions. <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /XLS/.
Findings	<input type="checkbox"/> <p>The calculation of the baseline emissions was found to be fully compliant with the above stated principles. The calculations of baseline GHG emissions or baseline net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information has been identified.</p>
	<input checked="" type="checkbox"/> <p>The verification team has identified mistakes in the baseline emissions calculation or the underlying calculation approaches.</p>
	<input checked="" type="checkbox"/> <p>In this context the following CARs, CLs, FARs have been raised: CAR 05 and CAR 18</p>
Conclusion	<input type="checkbox"/> <p>No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.</p>
	<input checked="" type="checkbox"/> <p>The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.</p> <p>Where corrections were required a revised baseline emissions calculation was prepared by the PPs and presented to the verification team. All raised issues were addressed appropriately so that it can be confirmed that the baseline calculation is overall correct. Two ER calculation templates are prepared: - One template w.r.t. the calculation from the raw data which also contains one sheet with the data fixed ex-ante, one sheet for hourly average data, one for the ER calculation on monthly basis and one for inputting the raw data downloaded from the remote server. The raw data/parameters are continuously monitored, recorded every 5 minutes and aggregated to average hourly values in line with related tool and methodology. Another template contains the ER summary result for the monitoring period on monthly basis. The verification team has checked the template and the related equations against the methods and equations provided in the CPA-DD, methodology and tools. The raw data in the template has been checked against the single monthly raw data sheets as well as monthly reports. The baseline emissions are calculated as following: $BE_y = (1-OX) \times (F_{CH4PJ,y} - F_{CH4BL,y}) \times GWP_{CH4} = (1-0.1) \times (122.84 + 186.40 + 135.58 - 0) \times t_{CH4} \times 25 \times t_{CO2e}/t_{CH4} = 0.9 \times 444.82 \times 25 \times t_{CO2e} = 10,008 \times t_{CO2e} \text{ (rounded down value)}$ <p>With Amount of methane in the LFG that would be flared in the baseline in year y (t_{CH4}/yr) determined via: $F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} = F_{CH4,flared,2016} + F_{CH4,flared,2017} + F_{CH4,flared,2018} + 0 = 122.84 + 186.40 + 135.58 + 0 = 444.82 \times t_{CH4}$ $F_{CH4,EL,y} = 0$ as no gas engine for electricity generation has been installed yet due to reasons described above. LFG is only destroyed by a flare. Further, as per CPA-DD $F_{CH4,BL,y}$, Amount of methane in the LFG that would be flared in the baseline in year y (t_{CH4}/yr), is equal to zero. The amount of methane in the LFG which is destroyed by flaring in year y (t_{CH4}/yr) is determined via: $F_{CH4,flared} = F_{CH4,sent-flare} - PE_{flare}/GWP_{CH4}$</p> </p>

$$F_{CH_4, \text{sent_flare}} = V_{t,wb} * V_{CH_4,t,wb} * \rho_{CH_4}$$

Methane density:

The density is determined as per equation (7b) in line with the “Tool to determine project emissions from flaring gases containing methane” and considering that the CPA-DD states that the volume flow and volumetric fraction of methane is determined via Option C (as per TOOL08), both on wet basis, and assuming that the gaseous stream is dry or saturated in a simplified conservative approach (Option 2 as per TOOL08). Option 2 may be preferred for the proposed CPA (humidity is not required). The density is calculated as following:

$$\rho_{CH_4} = P_n * MM_{CH_4} / R_u * T_n$$

All related input parameter are default values:

$$P_n = 101,325 \text{ Pa}$$

$$T_n = 273.15 \text{ K}$$

$$R_u = 8,314 \text{ Pa.m}^3/\text{kmol.K}$$

$$MM_{CH_4} = 16.04 \text{ kg/kmol}$$

$$\rho_{CH_4} = 101,325 * 16.04 / (8,314 * 273.15) = 0.71566 \text{ kg/m}^3$$

Determination of project emissions from flaring:

$$PE_{\text{flare}} = \sum TM_{RG,h} * (1 - \eta_{\text{flare},h}) * GWP_{CH_4}/1000$$

With $TM_{RG,h}$ equal to $F_{CH_4, \text{sent-flare}}$

Determination of the flare efficiency $\eta_{\text{flare},h}$:

The CPA-DD provides two options to determine the flare efficiency. As an enclosed flare is installed the flare efficiency can be determined either by applying Option (B) or Option (C) as per Tool to determine project emissions from flaring gases containing methane. As for certain periods during this monitoring period, the parameter $t_{O_2,h}$ measurement equipment did not provide reliable values the flare efficiency has been determined as per following Options for the following periods:

From 01/08/2016 till 28/02/2017 applying Option (B)

From 01/03/2017 till 31/12/2018 applying Option (C)

Flare efficiency determination as per Option (C):

$\eta_{\text{flare},h} = 0\%$ if the temperature of the exhaust gas of the flare (T_{flare}) is below 500°C during more than 20 minutes during the hour h .

Determined as per below in cases where the temperature of the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h :

$$\eta_{\text{flare},h} = 1 - (TM_{FG,h} / TM_{RG,h})$$

$TM_{FG,h}$ is calculated as following:

$$TM_{FG,h} = (TV_{n,FG,h} * fv_{CH_4,FG,h}) / 1,000,000$$

$$TV_{n,FG,h} = V_{n,FG,h} * FM_{RG,h}$$

Where:

Variable	SI Unit	Description
$TM_{FG,h}$	kg/h	Mass flow rate of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h
$TV_{n,FG,h}$	m ³ /h exhaust gas	Volumetric flow rate of the exhaust gas in dry basis at normal conditions in hour h
$fv_{CH_4,FG,h}$	mg/m ³	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in hour h

And:

$$TV_{n,FG,h} = V_{n,FG,h} * FM_{RG,h} \quad (10)$$

Where:

Variable	SI Unit	Description
$TV_{n,FG,h}$	m ³ /h	Volumetric flow rate of the exhaust gas in dry basis at normal conditions in hour h
$V_{n,FG,h}$	m ³ /kg residual gas	Volume of the exhaust gas of the flare in dry basis at normal conditions per kg of residual gas in hour h
$FM_{RG,h}$	kg residual gas/h	Mass flow rate of the residual gas in the hour h

And:

$$V_{n,FG,h} = V_{n,CO_2,h} + V_{n,O_2,h} + V_{n,N_2,h} \quad (11)$$

Where:

Variable	SI Unit	Description
$V_{n,FG,h}$	m ³ /kg residual gas	Volume of the exhaust gas of the flare in dry basis at normal conditions per kg of residual gas in the hour h
$V_{n,CO_2,h}$	m ³ /kg residual gas	Quantity of CO ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$V_{n,N_2,h}$	m ³ /kg residual gas	Quantity of N ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$V_{n,O_2,h}$	m ³ /kg residual gas	Quantity of O ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h

And:

$$V_{n,O_2,h} = n_{O_2,h} * MV_n \quad (12)$$

Where:

Variable	SI Unit	Description
$V_{n,O_2,h}$	m ³ /kg residual gas	Quantity of O ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$n_{O_2,h}$	kmol/kg residual gas	Quantity of moles O ₂ in the exhaust gas of the flare per kg residual gas flared in hour h
MV_n	m ³ /kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 L/mol)

And:

$$V_{n,N_2,h} = MV_n * \left\{ \frac{fm_{N,h}}{200. AM_N} + \left(\frac{1 - MF_{O_2}}{MF_{O_2}} \right) * [F_h + n_{O_2,h}] \right\} \quad (13)$$

Where:

Variable	SI Unit	Description
$V_{n,N_2,h}$	m ³ /kg residual gas	Quantity of N ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
MV_n	m ³ /kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 m ³ /Kmol)
$fm_{N,h}$	-	Mass fraction of nitrogen in the residual gas in the hour h
AM_N	kg/kmol	Atomic mass of nitrogen
MF_{O_2}	-	O ₂ volumetric fraction of air
F_h	kmol/kg residual gas	Stoichiometric quantity of moles of O ₂ required for a complete oxidation of one kg residual gas in hour h
$n_{O_2,h}$	kmol/kg residual gas	Quantity of moles O ₂ in the exhaust gas of the flare per kg residual gas flared in hour h

And:

$$V_{n,CO_2,h} = fm_{C,h} * MV_n / AM_C \quad (14)$$

Where:

Variable	SI Unit	Description
$V_{n,CO_2,h}$	m ³ /kg residual gas	Quantity of CO ₂ volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$fm_{C,h}$	-	Mass fraction of carbon in the residual gas in the hour h
AM_C	kg/kmol	Atomic mass of carbon
MV_n	m ³ /kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 m ³ /Kmol)

And:

$$n_{O_2,h} = \left(\frac{t_{O_2,h}}{1 - (t_{O_2,h} / MF_{O_2})} \right) \times \left[\frac{fm_{C,h}}{AM_C} + \frac{fm_{N,h}}{2 AM_N} + \left(\frac{1 - MF_{O_2}}{MF_{O_2}} \right) \times F_h \right] \quad (15)$$

Where:

Variable	SI Unit	Description
$n_{O_2,h}$	kmol/kg residual gas	Quantity of moles O ₂ in the exhaust gas of the flare per kg residual gas flared in hour h
$t_{O_2,h}$	-	Volumetric fraction of O ₂ in the exhaust gas in the hour h
MF_{O_2}	-	Volumetric fraction of O ₂ in the air (0.21)
F_h	kmol/kg residual gas	Stoichiometric quantity of moles of O ₂ required for a complete oxidation of one kg residual gas in hour h
$fm_{j,h}$	-	Mass fraction of element j in the residual gas in hour h (from equation 4)
AM_j	kg/kmol	Atomic mass of element j
j		The elements carbon (index C) and nitrogen (index N)

And:

$$F_h = \frac{fm_{C,h}}{AM_C} + \frac{fm_{H,h}}{4AM_H} - \frac{fm_{O,h}}{2AM_O} \quad (16)$$

Where:

Variable	SI Unit	Description
F_h	kmol O ₂ /kg residual gas	Stoichiometric quantity of moles of O ₂ required for a complete oxidation of one kg residual gas in hour h
$fm_{j,h}$	-	Mass fraction of element j in the residual gas in hour h (from equation 4)
AM_j	kg/kmol	Atomic mass of element j
j		The elements carbon (index C), hydrogen (index H) and oxygen (index O)

$$fm_{j,h} = \frac{\sum_i fv_{i,h} \cdot AM_j \cdot NA_{j,i}}{MM_{RG,h}} \quad (17)$$

Where:

Variable	SI Unit	Description
$fm_{j,h}$	-	Mass fraction of element j in the residual gas in hour h
$fv_{i,h}$	-	Volumetric fraction of component i in the residual gas in the hour h
AM_j	kg/kmol	Atomic mass of element j
$NA_{j,i}$	-	Number of atoms of element j in component i
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour h
j		The elements carbon, hydrogen, oxygen and nitrogen
i		The components CH ₄ , CO, CO ₂ , O ₂ , H ₂ , N ₂

Table 1. Constants used in equations

Parameter	SI Unit	Description	Value
MM_{CH_4}	kg/kmol	Molecular mass of methane	16.04
MM_{CO}	kg/kmol	Molecular mass of carbon monoxide	28.01
MM_{CO_2}	kg/kmol	Molecular mass of carbon dioxide	44.01
MM_{O_2}	kg/kmol	Molecular mass of oxygen	32.00
MM_{H_2}	kg/kmol	Molecular mass of hydrogen	2.02
MM_{N_2}	kg/kmol	Molecular mass of nitrogen	28.02
AM_c	kg/kmol (g/mol)	Atomic mass of carbon	12.00
AM_h	kg/kmol (g/mol)	Atomic mass of hydrogen	1.01
AM_o	kg/kmol (g/mol)	Atomic mass of oxygen	16.00
AM_n	kg/kmol (g/mol)	Atomic mass of nitrogen	14.01
P_n	Pa	Atmospheric pressure at normal conditions	101 325
R_u	Pa.m ³ /kmol.K	Universal ideal gas constant	8 314.472
T_n	K	Temperature at normal conditions	273.15
MF_{O_2}	Dimensionless	O ₂ volumetric fraction of air	0.21
GWP_{CH_4}	tCO ₂ /tCH ₄	Global warming potential of methane	21
MV_n	m ³ /Kmol	Volume of one mole of any ideal gas at normal	22.414

$$FM_{RG,h} = \rho_{RG,n,h} * FV_{RG,h} \quad (18)$$

Where:

Variable	SI Unit	Description
$FM_{RG,h}$	kg/h	Mass flow rate of the residual gas in hour h
$\rho_{RG,n,h}$	kg/m ³	Density of the residual gas at normal conditions in hour h
$FV_{RG,h}$	m ³ /h	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h

And:

$$\rho_{RG,n,h} = \frac{P_n}{\frac{R_u}{MM_{RG,h}} \times T_n} \quad (19)$$

Where:

Variable	SI Unit	Description
$\rho_{RG,n,h}$	kg/m ³	Density of the residual gas at normal conditions in hour h
P_n	Pa	Atmospheric pressure at normal conditions (101 325)
R_u	Pa.m ³ /kmol.K	Universal ideal gas constant (8 314)
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour h
T_n	K	Temperature at normal conditions (273.15)

$$MM_{RG,h} = \sum_i (fv_{i,h} * MM_i) \quad (20)$$

Where:

Variable	SI Unit	Description
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour h
$fv_{i,h}$	-	Volumetric fraction of component i in the residual gas in the hour h
MM_i	kg/kmol	Molecular mass of residual gas component i
I		The components CH_4 , CO , CO_2 , O_2 , H_2 , N_2

As a simplified approach, project participants may only measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N_2).

$$TM_{RG,h} = F_{CH_4, sent_flare}$$

$$F_{CH_4, sent_flare} = V_{t,wb} * V_{CH_4,t,wb} * \rho_{CH_4}$$

$$fv_{i,h} = V_{CH_4,t,wb} \text{ which is monitored}$$

$$FV_{RG,h} = V_{t,wb} \text{ which is monitored}$$

$t_{O_2,h}$ is monitored

Flare efficiency determination as per Option (B):

Use the default value for the flare efficiency. Hence the flare efficiency in the hour h ($\eta_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h .
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h .
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h .

As the O_2 value was not reliable it is considered that the manufacturer specifications on proper operation of the flare could not be met. Therefore, the flare efficiency during application of Option (B) was either 0% or 50%.

Monthly ER spreadsheets have been checked and the related options, decisions and calculation methods have been correctly applied as described.

Based on the above the DOE confirms that the method is correct and in line with CPA-DD, methodology and tools however findings have been raised which have been successfully resolved.

E.3.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	<p>During the verification the calculation of project GHG emissions has been checked. In detail the following has been verified:</p> <ul style="list-style-type: none"> • <i>Transparency</i>: It has been checked whether the calculation of project emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae. • <i>Parameter consistency</i>: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet. • <i>Correctness</i>: It has been checked whether the applied formulae and methods for calculating project emissions are in accordance with the monitoring plan and the approved methodology. • <i>Completeness</i>: It has been checked whether all calculations are complete and without omissions. <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /CPA-DD/ • /XLS/.
Findings	<div style="display: flex; align-items: center;"> <input style="margin-right: 10px;" type="checkbox"/> <div> <p>The calculation of the project emissions was found to be fully compliant with the above stated principles.</p> <p>The calculations of project GHG emissions or actual net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission</p> </div> </div>

		factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.
	<input checked="" type="checkbox"/>	The verification team has identified mistakes in the project emissions calculation or the underlying calculation approaches.
	<input checked="" type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: CAR 06, CAR 09, & CAR 10
Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
<p>Where corrections were required a revised PE calculation was prepared by the PPs and presented to the verification team. All raised issues were addressed appropriately so that it can be confirmed that the baseline calculation is overall correct.</p> <p>Two sources for project emissions have to be observed for this project activity:</p> <ol style="list-style-type: none"> 1. Project emissions due to electricity consumption 2. Project emissions from flaring of gas containing methane <p>The latter PE_{flare} is already described above for calculation of baseline emissions. Project emissions from electricity consumption are calculated as follows:</p> $PE_{EC,y} = EC_{PJ,j,y} \times EF_{EL,y} \times (1 + TDL_{j,y})$ <p>With</p> <p>$EC_{PJ,j,y}$ Net quantity of electricity consumed from the grid (MWh)</p> <p>$EF_{EL,y}$ Emission Factor of the grid used for CPA's electric consumption (tCO₂/MWh)</p> <p>$TDL_{j,y}$ Average technical transmission and distribution losses in the grid in the year y</p> <p>Project emissions from fossil fuel consumption have been assessed in the CPA-DD and set to zero which is verified to be reasonable and plausible based on document check and onsite inspection.</p> <p>Besides during this site visit it has been identified that there is additional electricity consumption on the landfill outside the project area which is clearly attributed to the project activity. This is the operation of two compressors to pump water out of the landfill and ten (10) pumps dewatering the landfill esp the area where the wells are located. However, as they are operated onsite the landfill the electricity is not monitored via the elec. meter of the project activity but by the general meter of the landfill. Based on that, the exact electricity consumption cannot be determined. Due to this the PP opted to calculate the related project emissions as follows:</p> <p>Each compressor has a nominal capacity of 4 kW. To be conservative, it is assumed that the compressors have been operating at full capacity every hour of the monitoring period + 10%:</p> $EC_{PJ,com} = 2 \times 4 \text{ kW} \times 24 \text{ d/h} \times (365d * 2 + 153d) \times 110\% = 186,490 \text{ kWh} = 186.490 \text{ MWh}$ <p>Each of the 10 electric dewatering pump has a nominal capacity of 1.1 kW. The pumps have been considered operating at full capacity, starting from 30/11/2017 until the end of monitoring period 31/12/2018. To be conservative, full operation of 24 hours per day is considered:</p> $EC_{PJ,pump} = 10 \times 1.1 \text{ kW} \times 24 \text{ h/d} \times (365d + 32d) = 104,808 \text{ kWh} = 104.808 \text{ MWh}$ $EC_{PJ,y} = EC_{PJ,e} + EC_{PJ,com} + EC_{PJ,pump} = 66.617 \text{ MWh} + 186.490 \text{ MWh} + 104.808 \text{ MWh} = 357.915 \text{ MWh}$ $PE_{EC,y} = EC_{PJ,j,y} \times EF_{EL,y} \times (1 + TDL_{j,y}) = 357.915 \text{ MWh} \times 0.6639 \text{ tCO}_2/\text{MWh} \times 1.2 = 285 \text{ tCO}_2e$ <p>The verification team has checked the name plates of the compressors and pumps, as well as the number of equipment, and can therefore confirm that the capacity applied is correct and that the calculation is correct and conservative as the compressor/pumps are only operating part time and not all year round and in addition for transmission losses. Further, the date of start of use of dewatering pumps has been checked via interview with operating personnel and as per weekly report 50 of 2017 the pumps started operation from 17/12/2017. Hence,</p>		

	the consideration from 30/11/2017 is conservative. This is in line with PS Appendix 1 §3. And therefore, it is considered in line with the requirements. Based on the above the DOE confirms that the method is correct and in line with CPA-DD, methodology and tools however CAR 06 has been raised and been resolved.
--	--

E.3.6.3. Calculation of leakage GHG emissions

Means of verification	<p>During the verification the calculation of leakage GHG emissions has been checked. In detail the following has been verified:</p> <ul style="list-style-type: none"> • Transparency: It has been checked whether the calculation of project emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae. • Parameter consistency: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet. • Correctness: It has been checked whether the applied formulae and methods for calculating project emissions are in accordance with the monitoring plan and the approved methodology. • Completeness: It has been checked whether all calculations are complete and without omissions. <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /XLS/. 						
Findings	<table border="1"> <tr> <td><input type="checkbox"/></td><td>The calculation of the leakage emissions was found to be fully compliant with the above stated principles. The calculations of project GHG emissions or actual net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.</td></tr> <tr> <td><input type="checkbox"/></td><td>The verification team has identified mistakes in the project emissions calculation or the underlying calculation approaches.</td></tr> <tr> <td><input type="checkbox"/></td><td>In this context the following CARs, CLs, FARs have been raised: -</td></tr> </table>	<input type="checkbox"/>	The calculation of the leakage emissions was found to be fully compliant with the above stated principles. The calculations of project GHG emissions or actual net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.	<input type="checkbox"/>	The verification team has identified mistakes in the project emissions calculation or the underlying calculation approaches.	<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: -
<input type="checkbox"/>	The calculation of the leakage emissions was found to be fully compliant with the above stated principles. The calculations of project GHG emissions or actual net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.						
<input type="checkbox"/>	The verification team has identified mistakes in the project emissions calculation or the underlying calculation approaches.						
<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: -						
Conclusion	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td>No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.</td></tr> <tr> <td><input type="checkbox"/></td><td>The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.</td></tr> </table> <p>As per CPA-DD no leakage has to be considered.</p>	<input checked="" type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.	<input type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.		
<input checked="" type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.						
<input type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.						

E.3.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Means of verification	<p>The verification team has checked if the MR includes a summary table of the emission reductions calculation specifying separately</p> <ul style="list-style-type: none"> - Total baseline emissions, - Total project emissions, - Total leakage, - Total emission reductions. <p>It has been assessed whether the values are correct or need to be revised as a consequence of issues identified above.</p>				
Findings	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td>Section H.4 of the MR includes in a summary table of the emission reductions calculation.</td></tr> <tr> <td><input checked="" type="checkbox"/></td><td>The summary table specified the total baseline, project and leakage emissions as well as the total emission reductions separately.</td></tr> </table>	<input checked="" type="checkbox"/>	Section H.4 of the MR includes in a summary table of the emission reductions calculation.	<input checked="" type="checkbox"/>	The summary table specified the total baseline, project and leakage emissions as well as the total emission reductions separately.
<input checked="" type="checkbox"/>	Section H.4 of the MR includes in a summary table of the emission reductions calculation.				
<input checked="" type="checkbox"/>	The summary table specified the total baseline, project and leakage emissions as well as the total emission reductions separately.				

	<input type="checkbox"/>	The values as specified in the ER summary table are correct; no issues have been identified during the verification which requires changes in the ER calculation.
	<input checked="" type="checkbox"/>	During the verification issues with impact on the ER calculation have been identified.
	<input checked="" type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: CAR 12
Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
		After corrections have been applied the values as specified in the ER summary table are correct.

Title and UNFCCC reference number of the CPA	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e)		
				Amount achieved before 1 January 2013	Amount achieved from 1 January 2013	Amount achieved in the entire monitoring period
6568-0001: Landfill's gas (LFG) capture, flaring and use at the Oum Azza landfill.	10,008	285	0	0	9,723	9,723
Total	10,008	285	0	0	9,723	9,723

E.3.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA

Means of verification	The verification team has checked if the MR includes a comparison of actual values of the monitoring period with the estimations in the registered PoA-DD. It has further checked which of the below listed cases is applicable for the calculated ER of the current monitoring period.	
Findings	<input checked="" type="checkbox"/>	Case 1: The ex-ante estimated value was found to be proportionally higher than the ex-post determined value. No further action is deemed required.
	<input type="checkbox"/>	Case 2: The ex-ante estimated value fits very good to the actually monitored value. No further justification is deemed required.
	<input type="checkbox"/>	Case 3: The ex-ante estimated value was found to be proportionally lower than the ex-post determined value.
	<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: -
Conclusion	<input checked="" type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.

	<input type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
	-	

Title and UNFCCC reference number of the CPA	Actual values achieved by the CPAs during this monitoring period	Value estimated in ex ante calculation in the included CPA-DD(s)
6568-0001: Landfill's gas (LFG) capture, flaring and use at the Oum Azza landfill.	9,723	321,922
Total	9,723	321,922

E.3.6.6. Remarks on difference from estimated value in included CPA

Means of verification	On the basis of the above comparison of actual values of the monitoring period with the estimations in the registered CPA-DD (B.4.4) and section F.6 of the MR, the verification team has checked whether (in case 2) an appropriate explanation is included in the MR.	
Findings	<input checked="" type="checkbox"/>	No further justification or explanation is deemed required as actual emissions of this MP do not exceed significantly the ex-ante calculated emission reductions (applicable for case 1 and 2).
	<input type="checkbox"/>	For case 3: The PP has provided a related justification in the MR. The reasons for the increase are as follows: - N/A
	<input checked="" type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: CAR 19
Conclusion	<input type="checkbox"/>	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
	The justifications provided were found to be reasonable and the underlying facts have been verified by the team.	

E.3.7. Assessment of reported sustainable development co-benefits

Means of verification	<input checked="" type="checkbox"/>	N/A – as the PP has not monitored the sustainable development co-benefits of the registered CDM project activity or not requested the DOE to verify them.
	<input type="checkbox"/>	The project participants have monitored the sustainable development co-benefits of the registered CDM project activity, and requested the DOE to verify them. The following sources of information have been used in this context: <ul style="list-style-type: none"> • /MR/ • /CPA-DD/ • /unfccc/ • /IM01/
Findings	<input checked="" type="checkbox"/>	N/A – as the CME has not monitored the sustainable development co-benefits of the registered CDM project activity or not requested the DOE to verify them.
	<input type="checkbox"/>	Therefore, the DOE has assessed and confirms that: (a) The monitoring has been carried out in accordance with the document for monitoring sustainable development co-benefits, if such document was developed and published on the UNFCCC CDM website in accordance with the “CDM project standard for project activities”; (b) The reported monitoring results correspond to the sustainable development co-benefits of the project activity as observed by the DOE.
	<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised: -

Conclusion	<input checked="" type="checkbox"/>	No CARs / CLs / FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input type="checkbox"/>	The raised CARs / CLs / FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details, please refer to Appendix 4.
	<input checked="" type="checkbox"/>	N/A – as the PP has not monitored the sustainable development co-benefits of the registered CDM project activity or not requested the DOE to verify them.

E.3.8. Global stakeholder consultation

Means of verification	<p>In accordance with the PCP the DOE has submitted the initial version of the monitoring report provided by the CME for this monitoring period to be published on the UNFCCC webpage.</p> <p>The monitoring report has been published for the period from 06/02/2019.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /MR/ • /unfccc/ 	
Findings	<input checked="" type="checkbox"/>	No comments have been received on the published monitoring report for this monitoring period.
	<input type="checkbox"/>	Comments have been received and the DOE has concluded that comments are related to issues outside the CDM rules and requirements. Please refer to the list provided under Conclusion of this Section below for related information.
	<input type="checkbox"/>	<p>Comments have been received.</p> <p>The DOE has</p> <ul style="list-style-type: none"> - requested further information from the submitters of the comments - informed the project participants of the comments received, and requested their feedback within a specified timeframe, - considered the input received and has assessed whether such comments are relevant to the CDM project activity, - acknowledged receipt of all submitted comments on the MR of the proposed CDM project activity, - assessed whether the comments are related to the CDM rules and requirements (if so related findings have been raised as per below), - used all possible means to determine the authenticity of the name and contact details of the individual or organization on whose behalf the comments have been submitted, - contacted the secretariat to make them publicly available (if only addressed to the DOE), - determined whether authentic and relevant comments in the global stakeholder consultation were taken into due account in the PDD of the proposed CDM project activity.
	<input type="checkbox"/>	<p>In this context the following CARs, CLs, FARs have been raised, i.e. as the DOE concludes that the comments are related to the CDM rules and requirements:</p> <p>-</p>
Conclusion	<input checked="" type="checkbox"/>	No CARs / CLs / FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	<input type="checkbox"/>	The raised CARs / CLs / FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
		As the DOE has concluded that comments are related to issues outside the CDM rules and requirements the comments and information gathered are listed as follows:

	Nbr.	Original comment received	Feedback by the PP	Statement by DOE
	1			
	2			

SECTION F. Internal quality control

Before the submission of the final verification report a technical review of the whole verification procedure was carried out. The technical reviewers are competent GHG auditors where at least one is being appointed for the scope this project falls under. The technical reviewers are not considered to be part of the verification team and thus not involved in the decision-making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may have been confirmed or revised. Furthermore, reporting improvements might have been achieved.

After the successful technical review an overall (esp. procedural) assessment of the complete verification has been carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the submission for requesting for issuance is conducted.

SECTION G. Verification opinion

The International Bank for Reconstruction and Development (IBRD) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the CDM Programme of Activities (CDM-PoA): "Landfills' gas capture, flaring and use program in Morocco", with regard to the relevant requirements for CDM Programme of Activities. The PoA reduces GHG emissions due to collection and destruction of landfill gas in the host country of Morocco.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design documents,
- the monitoring plan is in accordance with the applied approved CDM methodology, i.e., ACM0001 ver. 12.0,
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately,
- the monitoring system is in place and functional. The project has generated GHG emission reductions,
- the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

TÜV NORD JI/CDM CP further confirms that the project has achieved emission reductions in the above-mentioned reporting period as follows:

Emission reductions: **9,723 tCO₂e**

SECTION H. Certification statement

As a duly accredited DOE, TÜV NORD CERT confirms that the CDM PoA

“Landfills’ gas capture, flaring and use program in Morocco”

registered under

UNFCCC-No. : 6568

has achieved emission reductions in accordance with all applicable requirements for registered CDM project activities during the current monitoring period

MP-No.: 2

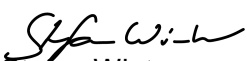
from: 01/08/2016

to: 31/12/2018

(including both days) as follows:

Emission reductions: **9,723 tCO₂e**

Essen, 08/01/2021



Stefan Winter

Team Leader

TÜV NORD JI/CDM Certification Program

Appendix 1. Abbreviations

Abbreviations	Full texts
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO ₂	Carbon dioxide
CO _{2eq}	Carbon dioxide equivalent
CL	Clarification Request
DVerR	Draft Verification Report
ER	Emission Reduction
FAR	Forward Action Request
FEC	Fonds d'Equipement Communal
GHG	Greenhouse gas(es)
IM	Interview Memo
LFG	Landfill gas
MP	Monitoring Plan
MR	Monitoring Report
PA	Project Activity
PoA-DD	Programme of Activity Design Document
CPA-DD	Component Project Activity Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

Appendix 2. Competence of team members and technical reviewers



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JICDM Certification Program

Mr. Stefan Winter

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2023-07-27
VCS / ISO 14064-2	Senior Assessor (Validation, Verification) Technical Reviewer	2023-07-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
2.1	Energy distribution
3.1	Energy demand
4.1	Cement and lime production
4.2	Paper
5.2	Caprolactam, nitric and adipic acid
9.1	Aluminium and magnesium production
9.2	Iron, steel and Ferro-alloy production
10.1	Fugitive emissions from oil and gas
13.1	Solid waste and wastewater
13.2	Manure

163 - Rev. 7, Date: 2020-07-22

163_S01-VA060-F20_2020-07-22_rev7

S01-VA060-F20 rev3 / 2012-10-25



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JICDM Certification Program

Mr. David Lubanga

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2021-10-20
VCS / ISO 14064-2	Senior Assessor (Validation, Verification) Technical Reviewer	2021-10-20

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
3.1	Energy demand
13.2	Manure

251 - Rev. 7, Date: 2018-10-19

251_S01-VA060-F20_2018-10-19_rev7.doc

S01-VA060-F20 rev3 / 2012-10-25



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JICDM Certification Program

Mr. Samir Beqqal

SCHEME	STATUS	VALID UNTIL
CDM	Host Country Expert Morocco	
VCS / ISO 14064-2	Host Country Expert Morocco	

110 - Rev. 3, Date: 2016-04-16

110_S01-VA060-F20_2016-04-16_rev3.doc

S01-VA060-F20 rev3 / 2012-10-25



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JICDM Certification Program

Mr. Evgeni Sud

SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification) Technical Reviewer	2022-12-10
J1	Lead Assessor (Validation, Verification) Technical Reviewer	2022-12-10
VCS / ISO 14064-2	Lead Assessor (Validation, Verification) Technical Reviewer	2022-12-10

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
13.1	Solid waste and wastewater

052- Rev. 4, Date: 2019-12-11

S01-VA060-F20_2019-05-12_rev4

S01-VA060-F20 rev3 / 2012-10-25

Appendix 3. Documents reviewed or referenced

No	Author	Reference	Title	References to the document	Provider
1	UNFCCC	/ACM001/	Applied large scale methodology ACM0001 ver. 12, "Flaring or use of landfill gas"		Other
2	DOE	/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)		Other
3	IPCC	/IPCC/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book	www.ipcc-nggip.iges.or.jp	Other
4	UNFCCC	/KPI/	Kyoto Protocol (1997)	http://unfccc.int/kyoto_protocol/items/2830.php	Other
5	UNFCCC	/MA/	Decision 3/CMP. 1 (Marrakesh – Accords)	http://cdm.unfccc.int/Reference/CO2PMOP/index.html	Other
6	UNFCCC	/MRT/	Monitoring Report Form for PoAs (CDM-PoA-MR-FORM), Version 3.0	https://cdm.unfccc.int/Reference/PDDs_Forms/index.html	Other
7	UNFCCC	/PoA-DD/	Project Design Document for CDM PoA project: "Landfills' gas capture, flaring and use program in Morocco" version 2, dated 05/12/2012	https://cdm.unfccc.int/ProgrammeOfActivities/poadb/4ES30VGAX6PR8LNBDYH5TZQ9IJF1M2/view	Other
8	UNFCCC	/CPA-DD/	Component Project Activity Design Document for CPA1: "Landfill's gas (LFG) capture, flaring and use at the Oum Azza landfill." version 6, dated 21/08/2019	https://cdm.unfccc.int/PRCCContainer/DB/prcp583954721/view	Other
9	UNFCCC	/PS/	CDM project standard for programmes of activities (Version 2.0)	http://cdm.unfccc.int/Reference/Standards/index.html	Other
10	PP	/VAL/	Validation Report for CDM PoA project "Landfills' gas capture, flaring and use program in Morocco" version 5, dated 05/12/2012 Validation Report for inclusion of CDM CPA1 "Landfills' gas capture, flaring and use program at the Oum Azza landfill" version 4, dated 05/12/2012 Assessment report on Post Registration Changes for CDM CPA1 "Landfills' gas capture, flaring and use program at the Oum Azza landfill" version 1, dated 22/08/2019	https://cdm.unfccc.int/ProgrammeOfActivities/poadb/4ES30VGAX6PR8LNBDYH5TZQ9IJF1M2/view and https://cdm.unfccc.int/PRCCContainer/DB/prcp583954721/view	Other
11	UNFCCC	/VVS/	CDM validation and verification standard for programmes of activities (Version 2.0)	http://cdm.unfccc.int/Reference/Standards/index.html	Other

No	Author	Reference	Title	References to the document	Provider
12	UNFCCC	/SAMPLE/	“Guidelines for Sampling and Surveys for CDM Project Activities and Programme Activities” (Version 4.0) “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities” (version 8.0)	https://cdm.unfccc.int/Reference/Guidclarif/index.html http://cdm.unfccc.int/Reference/Standards/index.html	Other
13	UNFCCC	/TA/	<ul style="list-style-type: none"> • Tool to calculate project or leakage CO2 emissions from fossil fuel combustion Version 2 • Emissions from solid waste disposal sites Version 7 • Tool to calculate baseline, project and/or leakage emissions from electricity consumption Version 1 • Project emissions from flaring Version 2.0.0 • Tool to calculate the emission factor for an electricity system Version 4.0 • Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 2.0.0 	http://cdm.unfccc.int/Reference/tools/index.html	Other
14	UNFCCC	/GOT/	Glossary “CDM terms” (version 10.0)	https://cdm.unfccc.int/Reference/index.html	Other
15	Manufacturers	/TS/	Technical data sheets of the monitoring equipment installed and/or technical manual: <ul style="list-style-type: none"> - Flare stack including drawing of the flare stack) - Elec. Meter - Thermocouples - Pressure sensor - Temp. and humidity sensor - Exhaust gas analyzer (data sheet and manual) - LFG analyzer (data sheet and manual) - Flow meters 		PP
16	PP	/XLS/	Initial, intermediate and final Emission reductions spreadsheet <ul style="list-style-type: none"> - Template - Monthly calculations - Spreadsheet based on annual calculation - Summary 		PP
17	PP	/RAW/	Raw data spreadsheets covering the monitoring period as retrieved from the remote server		PP
18	Manufacturer/certifying entity	/CAL/	Calibration certificates of the measurement equipment installed <ul style="list-style-type: none"> - LFG analyzer - Exhaust gas analyzer - Flow meters - Pressure transmitter - Thermocouples - Temp. and humidity sensor - Elec. meter 		PP

No	Author	Reference	Title	References to the document	Provider
			Calibration certificates of the inert gas bottle and standard gas bottles Please refer to Annex 6 for further details. Calibration plan		
19	CPA Implementer	/RP/	Weekly and monthly reports prepared by CPA Implementer and provided to CME		CPA Implementer
20	ENC energy	/COM/	Checklist for Commissioning and system validation by ENC Energy dated 31/07/2015		PP
21	Riegonor	/LY/	Layout diagram of the Oum Azza landfill including positioning of wells and gas collection system		CPA Implementer
22	ENC energy/Teodem	/TRAIN/	Training records: <ul style="list-style-type: none"> - Operation of project - Maintenance - Monitoring equipment - Automatic monitoring system - Health and safety 		CPA Implementer
23	ENC energy	/PID/	Project PID diagram including all measurement equipment installed and wiring		CPA Implementer
24	ENC energy Abyl Carbon	/MAN/	Operation and maintenance manual for the flare stack and gas treatment system dated 24/07/2015 CDM Operation manual ver 2 dated 27/10/2015		CPA Implementer Abyl Carbon
25	Abyl Carbon	/IA/	Internal audit reports dated 02/11/2015		Abyl Carbon
26	PP/UNFCCC	/NOT/	Email notification to UNFCCC by PP World Bank w.r.t. postponing the start date of the crediting period dated 28/10/2016 Email on confirmation on receipt of related notification by UNFCCC dated 30/10/2016		PP
27	QED	/QED/	Email by Technician of QED Env. Systems Ltd. manufacturer and installing entity of the gas analyser system dated 14/12/2020 confirming that CH ₄ is analysed on wet basis as no humidity is removed before cartridge http://www.qedenv.com/		QED
28	PP	/MR/	Monitoring report for this 2 nd monitoring period titled "Landfills' gas capture, flaring and use program in Morocco": Version 1, dated 29/01/2020 Version 2, dated 20/09/2020 Version 3, dated 30/10/2020 Version 4, dated 15/12/2020 sent 17/12/2020 Version 4, dated 15/12/2020 sent 30/12/2020 Version 4, dated 15/12/2020 sent 07/01/2021		PP

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

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

FAR ID	01	Section no.	G.2	Date: 28/09/2016
Description of FAR				
FAR is raised as the delay in calibration for the parameter T_{flare} is affecting the next subsequent verification from 01/08/2016 to 01/09/2016.				
Project participant response (1st round)				Date: 28/09/2016
Information on calibration delay of the thermocouple to be reported in the monitoring report of the next verification.				
Documentation provided by project participant (1st round)				
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s):	New version No.: 2 and 3	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:	
<input type="checkbox"/>	Other:			
DOE assessment (1st round)				Date: 23/10/2020
Related response is pending.				
Project participant response				Date: 15/12/2020
Due to the delay in calibration for the parameter T_{flare} , the project owner has taken the most conservative approach to remove the total baseline emission for August 2016, but still account the project emissions from the electricity consumptions.				
Documentation provided by project participant				
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:	
<input type="checkbox"/>	Changes in MR	Section(s):	New version No.:	
<input checked="" type="checkbox"/>	Changes in XLS	Worksheet(s): ER Summary	New version No.:	
<input type="checkbox"/>	Other:			
DOE assessment (2nd round)				Date: 17/12/2020
DOE can confirm that most conservative approach has been taken for time until 01/09/2016, the date when the equipment was calibrated, instead of 842 tCO ₂ for BE as per latest ER summary even -3 tCO ₂ have been considered and PE have been considered and therefore even negative emissions. BE ER summary refers to "-3" tCO ₂ as PE from flaring are considered under Baseline emission section as per CPA-DD as it is used to determine $F_{CH_4, flared, y}$ as per equation (6) of CPA-DD. Additionally, the PE from electricity consumption have been considered resulting in total of -6 tCO _{2e} ER for the month of August 2016. Finding closed.				
Conclusion <i>Tick the appropriate checkbox</i>		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed		

Table 3. CL from this verification

CL ID	01	Section no.	C.1	Date: 05/03/2019
Description of CL				
As per onsite interview with operation personnel and onsite inspection no gas engine is installed as of today and the possibility that a gas engine will be installed is considered low. Further, the plant is now operating since almost four years and in the sixth year, clarify why the none installation of is not considered a post registration change to the project activity as the related CPA-DD specifically refers to the installation of Jenbacher gas engines and providing a table with the installation schedule.				
Project participant response (1st round)				Date: 23/09/2020
Engines have not yet been installed as the law permitting connection to the electricity grid has not yet been finalized. Neither has administrative permissions for connection been received from local authorities. Therefore, the CPA-DD has been revised accordingly and the updated CPA-DD version 6 was approved on 24 November 2019. On page 5 of the revised CPA-DD, Table 3 "Engine deployment schedule" has been modified to reflect the non-installation of the gas engines during the time of 2013 and 2020.				

Documentation provided by project participant (1 st round)		
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): C.1	New version No.: 2.0
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		
DOE assessment (1 st round)		Date: 09/10/2020
<p>As per interview with personnel during onsite assessment and check of related host country legislation, it is confirmed that it was not possible to install related considered grid connection for installation and operation of related gas engines. Further, the LFG level and quality is also not at a level as expected due to high water level in the landfill as confirmed during onsite inspection and check of LFG raw data.</p> <p>However, please clarify why the PRC-6568-001 approved on 24/11/2019 is not reported in the corresponding MR as per instructions to fill MR. Further revision requested.</p>		
Project participant response (2 nd round)		Date: 12/11/2020
<p>PRC-6568-001 approved on 24/11/2019 has been reported in the updated MR using latest template (version 03).</p> <p>Further details regarding the changes have been also updated in section C of the MR.</p>		
Documentation provided by project participant (1 st round)		
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): C.3.2, C.3.5, C.3.6	New version No.: 3.0
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		
DOE assessment (2 nd round)		Date: 17/11/2020
<p>OK. The related changes as per PRC-6568-001 to the CPA have been now correctly described in the MR as per instructions providing a brief summary as well as related PRC number and date of approval. The changes are reported in line with the related assessment report.</p> <p>Finding is closed.</p>		
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

Table 4. CAR from this verification

CAR ID	01	Section no.	E.2	Date:	05/03/2019
Description of CAR					
<p>Parameter $V_{t,wb}$:</p> <p>The additional comment states that flow meter "FT2" is used for ER calculation whereas serial number K3262219000 is stated under monitoring equipment, which is "FT1" as per onsite inspection. Revision requested.</p>					
Project participant response (1 st round)					
<p>MR has been updated on page 7 for parameter $V_{t,wb}$ (same as $FV_{RG,H}$), FT1 was mentioned as the meter used for calculation.</p> <p>The updated ER calculation has used values from FT1 and PT4, it has been confirmed by comparing the original raw data imported from the measurement devices and the ER calculation derived from the monitoring parameters.</p>					
Documentation provided by project participant (1 st round)					Date: 23/09/2020
<input type="checkbox"/> Changes in the PDD	Section(s):		New version No.:		
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2		New version No.: 2.0		
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:		
<input type="checkbox"/> Other:					
DOE assessment (1 st round)					Date: 09/10/2020
<p>OK. MR has been corrected accordingly as per onsite inspection and actual values used. FT1 is used to determine emission reductions.</p>					
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed				

CAR ID	02	Section no.	E.2	Date:	05/03/2019
Description of CAR					

The following issues w.r.t. parameter $v_{CH_4,t,wb}$ have been identified:

1. Pls specify the date stated under calibration "08/04/2016"
2. Under calibration frequency it is stated "auto calibration" and validity of calibration "Valid during the entire monitoring period" whereas the calibration frequency is every year. Further specification requested.
3. As per monthly and or weekly report checked it has been identified that the analyzer GA14465 has been replaced by GA14466 on 27/12/2016 and not 05/12/2016. Correction requested.
4. As per onsite inspection, it has been identified that the standard calibration gas used has a content of 49.99% CH_4 and 50.01% CO_2 and is valid until 12/04/2019 composed on 13/04/2016 cylinder #438508, which is inconsistent with data stated in MR. Correction, requested.

Project participant response (1st round)

1. The mentioned files named "GA14465_08-04-2016 (1)" and "GA14465_08-04-2016 (2)" have been submitted by project owner, and both documents mentioned 08-Apr-2016 as the date of certification. Also, the date has been clarified to be 08 April 2016, and is updated to use the consistent format as other dates on page 8 of the MR for parameter $v_{CH_4,t,wb}$ (same as $f_{vCH_4,h}$).
2. The calibration frequency is confirmed to be every year. In addition, a calibration is automatically triggered in case of deviation. Dates of validity of GA14465 and GA14466 are specified in the revised MR on page 8 under parameter $v_{CH_4,t,wb}$ (same as $f_{vCH_4,h}$). The calibration frequency has been updated to "every year and auto calibration when triggered in case of deviation" on page 8 and 11 of revised MR.
3. The statement "GA14465 was replaced by GA14466 on 27/12/2016" was updated on page 8 of revised MR.
4. The revision is done on page 8 of the updated MR to reflect the identified onsite inspection.

Documentation provided by project participant (1 st round)		Date: 23/09/2020
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2	New version No.: 2.0
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (1st round) Date: 21/10/2020

1. Ok. Related specification of the date has been provided. DOE checked provided calibration certificate, which confirms the date of 08/04/2016.
2. Ok. Related correction has been conducted in MR in line with actual calibration validity of one year as crosschecked with previous verification report.
3. Ok. MR has been updated accordingly.
4. Ok. MR has been updated in accordance with situation found during onsite inspection and documents checked.

Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed
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CAR ID	03	Section no.	E.2	Date: 05/03/2019
Description of CAR				
Besides following issues in section E.2 have been identified:				
<ol style="list-style-type: none"> 1. The parameter descriptions for $V_{t,db}$, T_t and P_t are inconsistent with related CPA-DD. 2. Following parameters are missing: $F_{CH_4,sent_flare,y}$, $PE_{flare,y}$, $PE_{EC,y}$ 				
Project participant response (1st round)				
<ol style="list-style-type: none"> 1. $V_{t,db}$ is not presented here as they are not relevant for this monitoring period. Descriptions for T_t and P_t are updated on page 9 of the revised MR consistently as per the latest CPA-DD. 2. Parameters $F_{CH_4,sent_flare,y}$, $PE_{flare,y}$, and $PE_{EC,y}$ are not presented here as they are not monitored but calculated. Values of these parameters for the monitoring period can be verified in the ER calculations spreadsheets and related formulas are presented in section F. Page 13 of the MR has been updated. 				
Documentation provided by project participant (1st round)				Date: 23/09/2020
<input type="checkbox"/> Changes in the PDD	Section(s):		New version No.:	
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2		New version No.: 2.0	
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/> Other:				
DOE assessment (1st round)				Date: 09/10/2020

1. Not OK. A related PRC has been conducted to change the monitoring plan in accordance with actual circumstances identified during onsite inspection. The data is monitored on wet basis and therefore related parameters required to determine ER on dry basis are not relevant. Please refer PRC-6568-001 approved 29/11/2019. However, please clarify the following sentence provided at the end of section E.2 in MR

"Parameters $V_{t,db}$, $V_{CH4,t,db}$, $M_{t,wb}$, $M_{t,db}$, $p_{H2O,t,sat}$, $F_{CH4,EL}$, $EC_{BL,k,y}$, and Operation hours of the energy plant are not presented here as they are not relevant for this monitoring period."

The parameters $V_{t,db}$, $V_{CH4,t,db}$, $M_{t,db}$, $F_{CH4,EL}$, are not included in the latest approved monitoring plan.

2. Not Ok. A related PRC has been conducted during which the monitoring plan has been updated. The related parameters are now not included in the monitoring parameter any longer. Please refer PRC-6568-0001 approved on 29/11/2019. However, please clarify the following sentence provided at the end of section E.2 in MR

"Parameters $F_{CH4-sent-flare,y}$, $PE_{flare,y}$ and $PE_{EC,y}$, are not presented here as they are not monitored but calculated. Values of these parameters for the monitoring period can be verified in the ER calculations spreadsheets and related formulas are presented in section H."

The parameters $F_{CH4-sent-flare,y}$, $PE_{flare,y}$ and $PE_{EC,y}$ are not included in the latest approved monitoring plan.

Project participant response (2 nd round)		Date: 15/12/2020
1.	As Parameters $V_{t,db}$, $V_{CH4,t,db}$, $M_{t,db}$, $F_{CH4,EL}$ are not included in the latest approved monitoring plan, they are deleted from section E.2 of the updated MR.	
2.	The parameters $F_{CH4-sent-flare,y}$, $PE_{flare,y}$ and $PE_{EC,y}$ are not included in the latest approved monitoring plan as either fixed ex-ante parameters or monitored parameters, they are removed from section E of the updated MR.	

Documentation provided by project participant (1 st round)		
<input type="checkbox"/>	Changes in the PDD	Section(s): New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.1, E.2, F New version No.: 4
<input type="checkbox"/>	Changes in XLS	Worksheet(s): New version No.:
<input type="checkbox"/>	Other:	

DOE assessment (2 nd round)		Date: 17/12/2020
Ok. MR has been updated accordingly and all relevant monitoring parameters have been provided now. Besides,		
1. Details for parameters η_{PJ} , $\phi_{default}$, F , $DOC_{f,default}$, $MCF_{default}$, DOC_j , k_j , f , W_x , $p_{n,i,x}$ are not provided as they are not relevant and used during this monitoring period.		
2. Details for parameters $M_{t,wb}$, T_t , P_t , $p_{H2O,t,sat}$, $EC_{BL,k,y}$, and Operation hours of the energy plant are not provided as they are not relevant for this monitoring period.		
However, following issues have been identified w.r.t. section E.2:		
3. E.2: $V_{t,wb}$: Title of parameter incorrect.		
4. E.2: $EC_{PJ,y}$: Under value the units are given whereas they are provided at different cell.		

Project participant response (2 nd round)	
3.	E.2: $V_{t,wb}$: corrected.
4.	E.2: Deleted

Documentation provided by project participant (2 nd round)		Date: 28/12/2020
<input type="checkbox"/>	Changes in the PDD	Section(s): New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2 New version No.: 4 dated 15/12/2020 sent 30/12/2020
<input type="checkbox"/>	Changes in XLS	Worksheet(s): New version No.:
<input type="checkbox"/>	Other:	

DOE assessment (2 nd round)		Date: 30/12/2020
3. OK. E.2: $V_{t,wb}$: corrected in line with related CPA-DD.		
4. OK. E.2: $EC_{PJ,y}$: Units deleted now.		
Finding closed.		

Conclusion Tick the appropriate checkbox		<input type="checkbox"/> Additional action should be taken (finding remains open)
		<input checked="" type="checkbox"/> The finding is closed

CAR ID	04	Section no.	E.2	Date: 05/03/2019
Description of CAR				

Parameter T_{flare}: During this monitoring period, the thermocouple has been exchanged on 02/09/2016, 18/05/2017 and 29/03/2018. The MR only provides the date and information for exchange on 18/05/2017. Therefore, correction of the inconsistency is requested.					
Project participant response (1st round)					
The information regarding "thermocouple has been exchanged on 02/09/2016, 18/05/2017 and 29/03/2018" has been updated on page 11 of the revised MR.					
Documentation provided by project participant (1st round)					Date: 23/09/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):		New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2		New version No.: 2	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/>	Other:				
DOE assessment (1st round)					Date: 09/10/2020
Not ok. The MR has been updated in E.2 in parameter table for T _{flare} under Additional comment with the following: "TC 05-2038721 0-0500 has been exchanged on 02/09/2016, 18/05/2017 and 29/03/2018. A spare part is available on site". However, in line with instructions to fill MR and VVS please provide related details of each thermocouple used with serial number, manufacturer, date of calibration and its validity.					
Project participant response (2nd round)					Date: 15/12/2020
Under the Parameter T _{flare} , information for "monitoring equipment" has included the following table to provide related details of each thermocouple used with serial number, manufacturer, date of calibration and its validity.					
Monitoring equipment	Manufacturer Type Accuracy	Batch number	Calibration / replacement frequency	Date of last calibration / replacement	Validity
Thermocouple	Günther Type S ±1.0°C	05-20387210-0500	Every year	Factory calibration 02/09/2016	02/09/2016 to 01/09/2017
Thermocouple	Günther Type S ±1.0°C	05-20387210-0500	Every year	Factory calibration 18/05/2017	18/05/2017 to 17/05/2018
Thermocouple	Günther Type S ±1.0°C	05-20387210-0500	Every year	Factory calibration 29/03/2018	29/03/2018 to 28/03/2019
Documentation provided by project participant (1st round)					
<input type="checkbox"/>	Changes in the PDD	Section(s):		New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2		New version No.: 4.0	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/>	Other:				
DOE assessment (2nd round)					Date: 17/12/2020
Related specification of measurement equipment details have been provided in updated MR. Related information on make, type, serial/batch number, accuracy, calibration dates, exchange dates and validity. The stated dates are correct as per related calibration sheets. The thermocouples calibrations have a validity of one year as per monitoring plan. However, the thermocouples will not be calibrated but exchanged prior to expire of the one-year calibration validity. The exchange dates have been checked by interview with operational personnel as well as weekly reports of operation team prepared. As per Email of supplier thermocouples have been bought as bulk/batch and related number is correct for the entire bulk/batch. As a new thermocouple has been installed the delay identified is ending 02/09/2016 and the new equipment is duly calibrated by manufacturer and within PME. Finding is closed.					
Conclusion Tick the appropriate checkbox		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed			

CAR ID	05	Section no.	E.2	Date: 05/03/2019
Description of CAR				

Following issues w.r.t. gas analyzer for CH₄ and O₂ in exhaust gas have been identified, parameter $f_{VCH_4, RG, h}$ and $t_{O_2, h}$:

1. The date stated in MR for third party re-calibration (13/06/2016) is inconsistent with the certificate (16/03/2016).
2. Further, during onsite inspection it has been identified that the results provided from the O₂ measurement are not plausible since 28/02/2017.

Project participant response (1st round)

1. For third party re-calibration the dates have been updated to be "16/03/2016" on page 11 and 12 of revised MR.
2. As the O₂ measurement device was missing calibration since 28th February 2017 till now, we are taking the most conservative method from 1st March 2017 till the end of this monitoring period on 31st December 2018 using default value of 0 and 50% as per Step 6 on page 9 of the "Tool to determine project emissions from flaring gases containing methane":

"In case of enclosed flares and use of the default value for the flare efficiency, the flare efficiency in the hour h ($\eta_{flare, h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h .
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h .
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h ."

As the project in enclosed flares thus is qualified to use such approach, also using the default value is decreasing the ER results on average more than 12% thus is considered more conservative. All ER calculations have been updated accordingly. ER Calculations for the period during August 2016 till February 2017 remain qualified and thus still use equation 14 on page 9 of the tool.

Documentation provided by project participant (1 st round)		Date: 23/09/2020
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s):	New version No.: 2.0
<input checked="" type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		
DOE assessment (1 st round)		Date: 21/10/2020

1. Not ok. The related date has been updated accordingly as per calibration certificate to 16/03/2016. However, the MR states that calibration frequency is "Every year and auto calibration when triggered in case of deviation" which is in contrast to the description of the related manufacturer manual and previous verification. The equipment has the possibility of an automatic calibration option, which is described in the related manual section 1.9. As per onsite inspection and also checked during previous verification the exhaust gas analyser for CH₄ and O₂ in exhaust gas is set on automatic calibration mode: The equipment conducts therefore regular, automatic calibrations against standard gas after zero check by use of inert gas (N₂). Pls clarify the related statement in MR on calibration to be conducted on annual/yearly basis.
2. Not ok. Please clarify and specify reference to missing calibration since 28th February 2017 and statement in MR that calibration frequency is "Every year and auto calibration when triggered in case of deviation" which is in contrast to the description of the related manufacturer manual and previous verification. The equipment has the possibility of an automatic calibration option, which is described in the related manual section 1.9. As per onsite inspection and also checked during previous verification the exhaust gas analyser for CH₄ and O₂ in exhaust gas is set on automatic calibration mode: The equipment conducts therefore regular, automatic calibrations against standard gas after zero check by use of inert gas (N₂). Pls further clarify the reason for implausible values e.g. malfunction of measurement equipment or O₂ sensor or analyser.

Besides, CPA-DD in section B.4.1 provides two options to determine the flare efficiency. This is either Option (B) or (C) as per related PoA-DD. Option (B) is for enclosed flares and use of default value for flare efficiency and Option (C) is used for enclosed flares and continuous monitoring of the flare efficiency. If Option (C) is applied the related results from measurement equipment for parameter $t_{O_2,h}$ are required. If Option (B) is applied these results are not required.

Further CPA-DD under Option (B) states if there is "no continuous monitoring of the flare efficiency, the project implementer may monitor the temperature in the exhaust gas of the flare to determine whether the flare is operating or not, and use the default value for the flare efficiency.

Hence the flare efficiency in the hour h ($\eta_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h .
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h .
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h .

Based on that the CME may choose from the two Options (B) and (C) for verification how the flare efficiency is determined and therefore the application of Option (B) in case any of the equipment required to determine flare efficiency on continuous monitoring is not possible, is therefore applicable and in line with CPA-DD and therefore in line with the monitoring plan. Accordingly, the flare efficiency for this monitoring period has been determined via Option (B) as detailed before.

Project participant response (2nd round)		Date: 15/12/2020
<ol style="list-style-type: none"> 1. parameters $f_{CH_4,RG,h}$ and $t_{O_2,h}$ have added the statement "The exhaust gas analyser for CH₄ in exhaust gas is set on automatic calibration mode: The equipment conducts therefore regular, automatic calibrations against standard gas after zero check by use of inert gas (N₂). to be consistent with the onsite confirmation, the manufacturer manual and previous verification. 2. In order to avoid implausible O₂ values, the $t_{O_2,h}$ values are not used to calculate flare efficiency from March 2017 onward to ensure conservativeness by using default value of 0 and 50% as per Step 6 on page 9 of the "Tool to determine project emissions from flaring gases containing methane". 		
Documentation provided by project participant (1st round)		
<input type="checkbox"/>	Changes in the PDD	Section(s): New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2 New version No.: 4
<input type="checkbox"/>	Changes in XLS	Worksheet(s): New version No.:
<input type="checkbox"/>	Other:	
DOE assessment (2nd round)		Date: 17/12/2020

1. Ok. MR parameter $t_{O_2,h}$ and $f_{V_{CH_4,FG,h}}$: Description for calibration frequency has been revised to "Auto calibration" also under QA/QC. This is in line with related manual and as identified during onsite inspection. The analyser conducts automatic calibrations against standard gas after zero check by use of inert gas (N₂).
2. Ok. The CPA-DD provides two options to determine the flare efficiency. As an enclosed flare is installed the flare efficiency can be determined either by applying Option (B) or Option (C) as per *Tool to determine project emissions from flaring gases containing methane*. As for certain periods during this monitoring period, the parameter $t_{O_2,h}$ measurement equipment did not provide reliable values the flare efficiency has been determined as per following Options for the following periods:
 From 01/08/2016 till 28/02/2017 applying Option (B)
 From 01/03/2017 till 31/12/2018 applying Option (C)
 As the CPA-DD allows to choose from applying either Option (B) or (C) this approach is accepted and in line with related underlying documents. DOE has checked related monthly ER spreadsheets and can confirm that the related Option and approach is applied for the stated periods as required by the CPA-DD, methodology and tools.

Conclusion Tick the appropriate checkbox	<input type="checkbox"/> Additional action should be taken (finding remains open)
	<input checked="" type="checkbox"/> The finding is closed

CAR ID	06	Section no.	E.2 and ER calc	Date: 05/03/2019
Description of CAR				
Parameter $EC_{PJ,y}$: <ol style="list-style-type: none"> 1. Wrong use of "," for 1,1 kW. Clarify if 1.1 kW is meant. 2. The value provided for the electricity amount consumed by the leachate pumps is inconsistent with the recalculation by the VT. Total days reduced by Sundays have to be considered as pumps are only used during working hours and Sunday is no working day. Further, clarify whether bank holidays have been considered or not as also on bank holidays no one is at the site and therefore pumps are also not in operation on bank holidays. 3. Finally supporting evidence is requested to justify the date when leachate pumps have been started to be used (30/11/2017 as per MR). 				
Project participant response (1st round)				
<ol style="list-style-type: none"> 1. 1.1kW has been updated on page 13 of revised MR. 2. The total days used in the MR for electricity consumptions are the most conservative to account everyday so that project emissions are not undercalculated, thus the current calculation is maintained. 3. Evidence of the date of installation of the electric pumps (Video dated 12/07/2017 (email with download link) and page 4 of Weekly report (week 50) have been provided to confirm pump installation. The video has been checked and the date when leachate pumps have been started to be used is confirmed to be on 17/12/2017. 				
Documentation provided by project participant (1st round)				Date: 23/09/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2	New version No.: 2	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:	
<input type="checkbox"/>	Other:			
DOE assessment (1st round)				Date: 21/10/2020

1. Not Ok. The related description under any comment of parameter table EC_{PJ,y} has been deleted. Pls clarify.
2. Not ok. Unclear response as the project emissions from electricity consumption are not determined using installed capacity of equipment times operation hours during this monitoring period but the values from the related electricity meter. However, as the water level in the landfill is quite high, additional electricity consumption attributable to the project activity has been identified during last verification by related dewatering pumps, which have been installed. Please specify and justify that the electricity consumption of those dewatering pumps is monitored via Elec. Meter LQN1315.
3. Not ok. Related consideration of elec. Consumption by dewatering pumps has been deleted from any comment from parameter table EC_{PJ,y}. DOE checked related weekly report which confirms that on 17/12/2017 "Newly installed pumps must still be connected to the flow meter. Only ten pumps are currently connected to the flowmeter." On this date, new dewatering pumps have been installed compared to the mobile pump used before as indicated in verification report of previous verification. Therefore, CME to clarify and specify how the additional attributable electricity consumption has been considered at all and before and after 17/12/2017.

Project participant response (2nd round)	Date: 15/12/2020
<ol style="list-style-type: none"> 1. The description about the 1.1kW pumps are added back to the "monitoring equipment" part. 2. There are two compressors and 10 leachate pumps used in the project without being measure by the Elec. Meter LQN1315. 3. Therefore, below descriptions and calculations are added to parameter EC_{PJ,y}. It has been confirmed and updated in the MR. <ol style="list-style-type: none"> (a) Electricity consumption calculated using capacities and operation hours due to the leachate pumping (2 compressors and 10 pumps) Each compressor has a nominal capacity of 4 kW. To be conservative, we will assume that the compressors have been functioning at full capacity every hours of the monitoring period + 10%, since installation of the pumps. $ECPJ,com = 2 * 4kW * 24h/d * (365d * 2 + 153d) * 110\% = 186,490kWh = 186.490MWh$ (b) Each electric pump has a nominal capacity of 1.1 kW. The pumps have been functioning at full capacity, starting from 30/11/2017 until the end of monitoring period 31/12/2018. To be conservative, we assume full operation of 24 hours per day. $ECPJ,pump = 10 * 1.1kW * 24h/d * (365d + 32d) = 104,808kWh = 104.808MWh$ $EC_{PJ,y} = ECPJ,e + ECPJ,com + ECPJ,pump = 66.617 MWh + 186.490MWh + 104.808MWh = 357.915MWh$	

Documentation provided by project participant (1st round)			
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): F.2	New version No.: 4
<input checked="" type="checkbox"/>	Changes in XLS	Worksheet(s): ER summary, Monthly ER spreadsheets	New version No.:
<input type="checkbox"/>	Other:		
DOE assessment (2nd round)			Date: 17/12/2020

1. OK. Parameter Table for EC_{PJ,y} has been updated and provides now reference w.r.t. consideration of compressors and dewatering pumps und source, monitoring equipment and additional comment. The descriptions are deemed sufficient and correct as per onsite inspection.
2. and 3. Ok. Both the compressors (4kW mobile) and the new dewatering pumps (20x1.1 kW) have been now considered for project emission determination. Their electricity consumption is attributable to the project activity and there additionally to the electricity consumption of the flare station considered for calculating project emissions. In both cases, for compressors and pumps, it is considered that the equipment was operational 24h a day. For the compressors during the entire monitoring period and for the dewatering pumps from 30/11/2017 onwards as indicated in weekly report 50 the pumps started operation form 17/12/2012 and applying from beginning of Dec is considered conservative. For compressors even a 10% add-on on total consumption has been considered. As per onsite inspection and check of documents, this approach is the most conservative assumption possible and therefore accepted.

Conclusion Tick the appropriate checkbox	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed
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CAR ID	07	Section no.	E.2	Date: 05/03/2019
Description of CAR				

For parameter Tt for LFG temperature and humidity the following issues have been identified:

1. Delay in calibration for equipment 10036 from: 01/08/2016 to: 30/08/2016
2. Delay in calibration for equipment 10062 from: 30/08/2017 to: 31/12/2018 and beyond
3. MR states that meter #10066 has been used from 18/07/2017 however, as per onsite inspection this is the date when the meter has been received and still meter #10062 is installed and used. MR to be revised accordingly.

Project participant response (1st round)

1. Tt is taken from TT1 of the measurement device and equipment 10036 has indeed missed calibration for the period between 01/08/2016 and 30/08/2016 10036 due to unavailability of local calibration companies. However, this parameter was initially monitored in the aim of determining the density of methane pCH₄; nevertheless, as per "Tool to determine project emissions from flaring gases containing methane" pCH₄ is a default value of 0.716, thus this parameter is considered not relevant for monitoring any more.
2. It was agreed during the verification mission to change the TH1 SN 10062 and send it for calibration to verify that it remains within the operating limits. TH1 was calibrated on 27/05/2019 certificate of calibration is available.
3. Meter #10066 was received and installed on the same day which is 18/07/2017. Thus, MR is reflecting the actual situation.

Documentation provided by project participant (1st round)**Date:** 23/09/2020

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2	New version No.: 2
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (1st round)**Date:** 23/10/2020

1. Not ok. As option C is applied based on CPA-DD parameter for LFG sent to flare is determined as per "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (ver 2.0) and as per this tool the mass flow of greenhouse gas (methane) is calculated as per the following equations:

Option C

The mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

$$F_{i,t} = V_{t,wb,n} * v_{i,t,wb} * \rho_{i,n} \quad (9)$$

with

$$\rho_{i,n} = \frac{P_n * MM_i}{R_u * T_n} \quad (10)$$

The following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb} * [(T_n/T_t) * (P_t/P_n)] \quad (11)$$

Therefore, please clarify why this parameter would not be relevant any longer.

2. Not ok. Even though considering TH1 100066 was installed on 18/07/2018, delay in calibration is identified for TH1 10066 from 18/07/2018 until end of monitoring period as no subsequent calibration of exchange in meter is given in MR.
3. Not ok. Please provide justification on the exchange of TH1 100062 by TH1 100066 on 18/07/2017.

Project participant response (2nd round)**Date:** 15/12/2020

As option C is applied based on CPA-DD parameter for LFG sent to flare is determined as per "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 2), and ρ_{CH4} is a default value of 0.716 from the tool.

As indicated from the section No. 3 on page 18 of the equipment UCG manual:

"Biogas flow rate in the suction pipe in Nm³ / h (Biogas from landfill flowrate in Nm³ / h)", the measured values are normalized flows and thus is equal to $V_{t,wb,n}$.

Besides, it has been confirmed with the project owner that FT1 can be normalized if the reading goes through an API or if the pressure and temperature readings are entered directly into the flowmeter. In the case of Oum Azza, the readings are transmitted via an API thus is normalized values. Therefore, there is no need to use values from Pt and Tt to convert.

Therefore, parameters Pt, and Tt are not irrelevant for the monitoring and thus not listed in the MR anymore.

Documentation provided by project participant (2nd round)

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2	New version No.: 4.0
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (2nd round)

Date: 18/12/2020

Pt and Tt as per monitoring plan are used to determine LFG density. However, density is determined via default values and therefore both parameters are not to be used during this entire monitoring period. The flow meters, either FT1 or FT2, automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters and the results of the raw data in the digital control system are already given in Nm³. Hence Both parameters Tt and Pt are not relevant for this monitoring period. Density is determined via default values.

Conclusion

Tick the appropriate checkbox

- ☐ Additional action should be taken (finding remains open)
☒ The finding is closed

CAR ID	08	Section no.	E.2	Date:	05/03/2019
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Description of CAR

For parameter P_t a delay in calibration from: 29/05/2018 to: 01/06/2018 has been identified.

Project participant response (1st round)

The MR has been updated to reflect the delay on page 9: "A slight delay in calibration from: 25/05/2018 to 01/06/2018 has occurred; however, as the calibration on 01/06/2018 has been properly taken place, no issues were identified during the period identified."

However, this parameter was initially monitored in the aim of determining the density of methane ρ_{CH4} ; nevertheless, as per "Tool to determine project emissions from flaring gases containing methane" ρ_{CH4} is a default value of 0.716, thus this parameter is considered not relevant for monitoring any more.

Documentation provided by project participant (1st round)

Date: 23/09/2020

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s):	New version No.: 2.0
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (1st round)

Date: 23/10/2020

Not ok. As option C is applied based on CPA-DD parameter for LFG sent to flare is determined as per "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (ver 2.0) and as per this tool the mass flow of greenhouse gas (methane) is calculated as per the following equations

Option C

The mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

$$F_{i,t} = V_{t,wb,n} * V_{i,t,wb} * \rho_{i,n} \quad (9)$$

with

$$\rho_{i,n} = \frac{P_n * MM_i}{R_u * T_n} \quad (10)$$

The following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb} * [(T_n/T_t) * (P_t/P_n)] \quad (11)$$

Therefore, please clarify why this parameter would not be relevant any longer.

Project participant response (2nd round)	Date: 15/12/2020
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As option C is applied based on CPA-DD parameter for LFG sent to flare is determined as per "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 2), and ρ_{CH4} is a default value of 0.716 from the tool.

As indicated from the section No. 3 on page 18 of the equipment UCG manual:

"Biogas flow rate in the suction pipe in Nm³ / h (Biogas from landfill flowrate in Nm³ / h)", the measured values are normalized flows and thus is equal to $V_{t,wb,n}$.

Besides, it has been confirmed with the project owner that FT1 can be normalized if the reading goes through an API or if the pressure and temperature readings are entered directly into the flowmeter. In the case of Oum Azza, the readings are transmitted via an API thus is normalized values. Therefore, there is no need to use values from P_t and T_t to convert.

Therefore, parameters P_t and T_t are not irrelevant for the monitoring and thus not listed in the MR anymore.

Documentation provided by project participant (1st round)

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input type="checkbox"/> Changes in MR	Section(s):	New version No.:
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (2nd round)	Date: 17/12/2020
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P_t and T_t as per monitoring plan are used to determine LFG density. However, density is determined via default values and therefore both parameters are not to be used during this entire monitoring period. The flow meters, either FT1 or FT2, automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters and the results of the raw data in the digital control system are already given in Nm³. Hence Both parameters T_t and P_t are not relevant for this monitoring period. Density is determined via default values.

Conclusion

Tick the appropriate checkbox

- ☐ Additional action should be taken (finding remains open)
☒ The finding is closed

CAR ID	09	Section no.	ER calc	Date: 05/03/2019
Description of CAR				

Following issues w.r.t. Emission reduction calculation as per provided spreadsheets have been identified:

1. As per interview with personnel, it has been identified that the values used for ER calculation are based on measurement equipment FT1 and PT1 installed prior to the blower whereas the MR states that FT2 and PT4 are used which are installed after the blower. Clarification and revision requested.
2. A deviation in the aggregation procedure from raw data to monthly report has been identified. E.g. Week 51 flow rate. Inconsistencies between data from weekly report and monthly ER spreadsheet have been identified. Clarification and correction requested.
3. Inconsistency between monthly ER spreadsheet and ER summary file has been identified for August 2016 for ER result: 634.52 to 634.58.
4. Inconsistent data w.r.t. project emissions in ER summary file (312.35 tCO₂e) and MR (260 tCO₂e).
5. Month given in sheet is inconsistent with the title of the document e.g. Oum Azza_201708 ER calculations.xlsx with sheet "Oum Azza 201706". Same for Oum Azza_201707 ER calculations.xlsx
6. The ER summary file in sheet EC & PE calculates the project emissions from elec. consumption of the compressors considering a value of "30.5x5". Clarification is requested w.r.t. the application of the values 30.5 and 5 as the MR states that elec. consumption from the compressors is considered 24 h/d for 365 d/year.
7. ER summary files provides only inserted data but calculated e.g. ER not as $ER = BE - PE$ but and inserted value.

Project participant response (1st round)

1. The updated ER calculation has used values from FT1 and PT4, it has been confirmed by comparing the original raw data imported from the measurement devices and the ER calculation derived from the monitoring parameters.
2. All monthly ER calculations now have been updated directly deriving from the raw data of each month coming from the meter readings and all inconsistencies are corrected.
3. ER calculation excel files and MR are now all updated to be consistent.
4. ER calculation excel files and MR are now all updated to be consistent.
5. All ER calculation excel files are renamed consistently.
6. The total days used for electricity consumptions are the most conservative to account everyday so that project emissions are not undercalculated, thus the current calculation is using the difference of end reading and start reading of electricity meter each month to reflect the actual electricity consumption every month.
7. ER was updated using formula $ER = BE - PE$ in the updated excel calculation sheets.

Documentation provided by project participant (1st round)

Date: 23/09/2020

<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): E.2	New version No.: 2.0
<input checked="" type="checkbox"/>	Changes in XLS	Worksheet(s): ER summary	New version No.:
<input type="checkbox"/>	Other:		

DOE assessment (1st round)

Date: 23/10/2020

1. Ok. MR has been revised and refers now that FT1 values are used for calculations. As per raw data spreadsheets data from FT1 and PT4 are considered.
2. Ok. The data aggregation has been revised in such that the raw data and monthly aggregation is conducted in the same spreadsheet file but different tabs. DOE checked week 51 (December 2016, 2017 and 2018) files and can confirm that the aggregation is correct now.
3. OK. ER result for Aug 2016 is now consistent between monthly ER sheet and ER summary spreadsheet.
4. Not ok. PE value now consistent between ER spreadsheet and Table F.4 but inconsistency in BE value between ER spreadsheet and MR table in F.4. Further revision requested.
5. Ok. File title is now consistent with related content for the stated files and also for other file provided.
6. Ok. ER spreadsheet considers now the elec consumption as per related installed elec meter based on end and start reading difference.
7. Not ok. ER summary spreadsheet still only provides inserted values but not calculation as per $ER = BE - PE$ etc. Further revision requested.

Project participant response (2nd round)

Date: 15/12/2020

4. BE and PE values are now consistently presented in all MR sections and ER spreadsheets.
7. ER summary spreadsheet now provides calculations $ER = BE - PE$.

Documentation provided by project participant (1st round)

<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:
<input type="checkbox"/>	Changes in MR	Section(s):	New version No.:
<input checked="" type="checkbox"/>	Changes in XLS	Worksheet(s): ER summary	New version No.: ER_Summary 20201215
<input type="checkbox"/>	Other:		

DOE assessment (2nd round)		Date: 17/12/2020
4. Ok. BE and PE values are now mutually consistent within documents. 7. Ok. ER calculation spreadsheet "ER_Summary 20201215.xls" has been revised accordingly and ER is linked with BE and PE cells. Related monthly input values are taken from the monthly spreadsheets, which contain the raw data and further tabs on processed data for further use.		
Conclusion Tick the appropriate checkbox	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

CAR ID	10	Section no.	F.2	Date: 05/03/2019
Description of CAR				
Following issues w.r.t. section F.2 have been identified: <ol style="list-style-type: none"> Section F.2 of the MR states that the project emissions from electricity consumed by the CPA are 208 tCO₂e whereas table in F.4 states 260 tCO₂e. Pls clarify the inconsistency. Besides, the section F.2 states that the project emissions from flaring "are presented in section H.1 above" however, there is no section H.1 in this MR. Pls clarify and revise accordingly. 				
Project participant response (1st round)				
<ol style="list-style-type: none"> The ER calculation and MR have been updated consistently to reflect the latest revision. Page 15 has been updated in revised MR wrt. The section number F.1 instead of H.1. 				
Documentation provided by project participant (1st round)				Date: 23/09/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s): F.1 und H.1	New version No.: 2	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:	
<input type="checkbox"/>	Other:			
DOE assessment (1st round)				Date: 23/10/2020
<ol style="list-style-type: none"> Not ok. Sections have been revised however, F.2 states 50 tCO₂e and table in F.4 refers to 53 tCO₂e now. Besides, please also clarify why additional electricity consumption attributable to the project activity is not further considered as per MR ver 1. Not ok. Revised MR in section F.2 only refers to PE from elec. Consumption and that "Full detailed calculations of project emissions are provided in electronic spreadsheets attached to the monitoring report." Therefore, please clarify in which section project emissions from flaring are considered. 				
Project participant response (2nd round)				
<ol style="list-style-type: none"> F.2 has been updated to include all relevant project emissions. Please see response to CAR06 above. Project emissions from flaring are already considered in appropriate section. <p>According to the "Tool to determine project emissions from flaring gases containing methane", project emissions from flaring of the residual gas stream are calculated based on the flare efficiency and the mass flow rate of methane in the residual gas stream that is flared.</p> $F_{CH4, flared, y} = F_{CH4, sent_flare, y} - \frac{PE_{flare, y}}{GWP_{CH4}} \quad (6)$ <p>Where:</p> <p>$F_{CH4, flared, y}$ Amount of methane in the LFG which is destroyed by flaring in year y (tCH₄/yr) $F_{CH4, sent_flare, y}$ Amount of methane in the LFG which is sent to the flare in year y (tCH₄/yr) $PE_{flare, y}$ Project emissions from flaring of the residual gas stream in year y (tCO₂e/yr) GWP_{CH4} Global warming potential of CH₄ (tCO₂e/tCH₄)</p> <ol style="list-style-type: none"> Therefor PE_{flare} is already considered and deducted while calculating baseline emissions. 				
Documentation provided by project participant (2nd round)				Date: 15/12/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:	
<input checked="" type="checkbox"/>	Changes in MR	Section(s): F.2, F.4	New version No.: 4.0	
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:	
<input type="checkbox"/>	Other:			
DOE assessment (2nd round)				Date: 17/12/2020
<ol style="list-style-type: none"> Ok. Values are now consistent between sections of MR. Ok. PE_{flare} are considered in section F.1 similar to the determination way is given in tool and CPA-DD. Therefore, considered reasonable and accepted. 				

Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed
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CAR ID	11	Section no.	General	Date:	09/10/2020
Description of CAR					
The MR has to be updated to the apply the latest version of the MR template version 3 (CDM-POA-MR-FORM)					
Project participant response (1st round)					
The MR has been updated to apply the latest version of the MR template version 3 (CDM-POA-MR-FORM).					
Documentation provided by project participant (1st round)					Date:
<input type="checkbox"/> Changes in the PDD					Section(s): New version No.:
<input checked="" type="checkbox"/> Changes in MR					Section(s): New version No.: 4.0
<input type="checkbox"/> Changes in XLS					Worksheet(s): New version No.:
<input type="checkbox"/> Other:					
DOE assessment (1st round)					Date:
Ok. The latest MR provided uses the latest template as per UNFCCC webpage. Finding closed.					
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed				

CAR ID	12	Section no.	F.4	Date:	23/10/2020
Description of CAR					
Table in section F.4 refers under Baseline emission to 11,358 and project emissions to 53 and GHG emission reductions from 01/01/2013 again to 11,358 tCO ₂ e. Pls clarify how BE could be equal to ER if the project has to consider project emissions of, in this case, 53.07 tCO ₂ e.					
Project participant response (1st round)					
The inconsistency has been corrected in section F.					
Documentation provided by project participant (1st round)					Date:
<input type="checkbox"/> Changes in the PDD					Section(s): New version No.:
<input checked="" type="checkbox"/> Changes in MR					Section(s): F.4 New version No.: 4.0
<input type="checkbox"/> Changes in XLS					Worksheet(s): New version No.:
<input type="checkbox"/> Other:					
DOE assessment (1st round)					Date:
Not ok. The inconsistent values have been updated. However, as per stated values the result is 10,281 not 10,208 as BE = 10,566 and PE = 285. Pls clarify.					
Project participant response (2nd round)					
10,565.6	285.1	10,280.4			
It is due to the rounding of decimal numbers. As presented in the excel calculation sheet, the BE = 10,565.6 tCO ₂ , PE= 285.1 tCO ₂ , the ER = 10,280.4 tCO ₂ and rounded to 9,723 tCO ₂ as per the requirement to keep only integer for ER result.					
Documentation provided by project participant (2nd round)					Date:
<input type="checkbox"/> Changes in the PDD					Section(s): New version No.:
<input checked="" type="checkbox"/> Changes in MR					Section(s): F.4 New version No.: 4.0
<input type="checkbox"/> Changes in XLS					Worksheet(s): New version No.:
<input type="checkbox"/> Other:					
DOE assessment (2nd round)					Date:
Ok. Clarified. Finding closed.					
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed				

CAR ID	13	Section no.	F.1, F.2, F.3	Date:	23/10/2020
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Description of CAR			
A related spreadsheet is provided with underlying raw data to present full calculations of emission reductions for this monitoring period. However, as per instructions to fill MR "sample calculations for all formulae used to calculate baseline/project/leakage GHG emissions [...], applying actual values" are to be provided in section F.1, F.2 and F.3 or corresponding section in MR template version 7. Therefore, related revision of MR is requested.			
Project participant response (1 st round)			
Sample calculations for all formulae used to calculate baseline/project/leakage GHG emissions [...], applying actual values" have been provided in section F.1, F.2 and F.3 and corresponding section in updated MR.			
Documentation provided by project participant (1 st round)			Date: 15/12/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s): F.1, F.2, F.3	New version No.: 4.0
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/>	Other:		
DOE assessment (1 st round)			Date: 17/12/2020
OK. Related sections F.1, F.2 and F.3 of the MR have updated and provide now sample calculation of the related emissions.			
Finding closed.			
Conclusion Tick the appropriate checkbox		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

CAR ID	14	Section no.	E.2, F.1, F.2	Date:	23/10/2020
Description of CAR					
Please clarify why parameter $p_{H_2O,t,Sat}$ would not be relevant for this monitoring period as indicated in section E.2. Please refer to CPA-DD footnote 17 and Option 2 on determination of moisture content and its consideration in ER calculation. MR is missing reference in F.1 and F.2 how moisture content has been considered in ER calculation.					
Project participant response (1 st round)					
As Option C of Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is applied to calculate the density of methane, and the resulting mass flow of methane, $p_{H_2O,t,Sat}$ is only for option B or E thus not relevant here.					
Documentation provided by project participant (1 st round)					Date: 15/12/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:		
<input type="checkbox"/>	Changes in MR	Section(s):	New version No.:		
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:		
<input type="checkbox"/>	Other:				
DOE assessment (1 st round)					Date: 17/12/2020
As per CPA-DD this parameter is used in "For option B or E, $p_{H_2O,t,Sat}$ may be required in case Option 2 is applied". However, Option C as per related Tool to determine the mass flow of a greenhouse gas in a gaseous stream is applied to determine the mass flow of the GHG methane (Volume on wet basis and methane content on wet basis). Therefore, this parameter is not required to determine the mass flow of the GHG and no revision of the MR conducted due to this issue.					
Conclusion Tick the appropriate checkbox		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed			

CAR ID	15	Section no.	E.2,	Date:	23/10/2020
Description of CAR					
Section E.2 states after last parameter table as following:					
<ol style="list-style-type: none"> Parameters $V_{t,db}$, $V_{CH_4,t,db}$, $M_{t,wb}$, $M_{t,db}$, $p_{H_2O,t,sat}$, $F_{CH_4,EL}$, $EC_{BL,k,y}$, and Operation hours of the energy plant are not presented here as they are not relevant for this monitoring period. Parameters $F_{CH_4-sent-flare,y}$, $PE_{flare,y}$ and $PE_{EC,y}$ are not presented here as they are not monitored but calculated. Values of these parameters for the monitoring period can be verified in the ER calculations spreadsheets and related formulas are presented in section H." 					
However, following parameters are not included in the latest approved monitoring plan $V_{t,db}$, $V_{CH_4,t,db}$, $M_{t,db}$, $F_{CH_4,EL}$.					

Project participant response (1 st round)		
Irrelevant parameters have been deleted from the updated MR.		
Documentation provided by project participant (1 st round)		Date: 15/12/2020
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s): E.2	New version No.: 4
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		
DOE assessment (1 st round)		Date: 17/12/2020
<p>Ok. MR has been updated accordingly and all relevant monitoring parameters have been provided now. Besides,</p> <ol style="list-style-type: none"> Details for parameters η_{PJ}, ϕ_{default}, F, $\text{DOC}_{f,\text{default}}$, $\text{MCF}_{\text{default}}$, DOC_j, k_j, f, W_x, $p_{n,i,x}$ are not provided as they are not relevant and used during this monitoring period. Details for parameters $M_{t,\text{wb}}$, T_t, P_t, $p_{\text{H}_2\text{O},t,\text{sat}}$, $\text{EC}_{\text{BL},k,y}$, and Operation hours of the energy plant are not provided as they are not relevant for this monitoring period. <p>Finding closed.</p>		
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

CAR ID	16	Section no.	E.2	Date:	23/10/2020
Description of CAR					
<p>Section E.2 states for parameter T_t as following:</p> <p>"The temperature and humidity sensor is used to determine whether the measurements of LFG are in dry or wet conditions. Though the average temperature is below 60°C, the measurements of the moisture content analyser show that the measurements of the flow and the volumetric fraction of methane are taken in wet basis."</p> <p>Please clarify which average temperature is referred to as the tool requires the monitoring and measurement frequency "to be averaged hourly or at a shorter time interval" and based on raw data provided in many hours the LFG temperature is above 60°C.</p> <p>Besides, specify why the indication that temperature is below 60°C is proof that volumetric fraction of methane is taken in wet basis as commonly there is a water trap and heating system of the sample probe in the AEMS directly before the analyser cartridge. As per technical knowledge of the assessment team the CH₄ cartridge is damaged if not dry gas is analysed, water and humidity destroy the cartridge. Therefore, clarify how recalculation to wet basis with humidity measurement has been conducted to calculate emission reduction on the same basis wet for volume and volumetric fraction.</p>					
Project participant response (1 st round)					
<p>According to response to CAR08, parameter T_t is not relevant to be monitored anymore and is removed from the MR.</p> <p>Besides, as per the manufacturer specification, GeoTech methane analyzer installed at Landfill Site, the equipment does not remove any humidity from the gas before measuring, the humidity simply makes up part of the balance figure or essentially anything that is not measured by the analyser. Therefore, the measurement is consistently on wet basis.</p>					
Documentation provided by project participant (1 st round)					Date: 15/12/2020
<input type="checkbox"/> Changes in the PDD	Section(s):		New version No.:		
<input type="checkbox"/> Changes in MR	Section(s):		New version No.:		
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:		
<input checked="" type="checkbox"/> Other: Email by manufacturer					
DOE assessment (1 st round)					Date: 17/12/2020
<p>Ok. DOE contacted related analyser manufacturer who clarified via email^{QED/} that no humidity is removed prior to the analyser. Therefore, DOE considers the value analysed for methane content of the LFG as on "wet basis". Water, which is transported along with the LFG is removed in a water trap. No further changes to the ER is required as also the volume is determined on wet basis.</p> <p>Finding closed.</p>					
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed				

CAR ID	17	Section no.	General	Date:	28/12/2020
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Description of CAR			
<p>Following issues w.r.t. MR filling, mistakes and inconsistencies have been identified:</p> <ol style="list-style-type: none"> 1. Title Page: Please clarify if this is MR1 or MR2. 2. Title Page: CME name is incorrect with UNFCCC project webpage. 3. Title page: Reference to standardized baseline is missing. 4. Title Page: Ex-post ER inconsistent with the ER Summary spreadsheet 5. A.1.1: The title and version of the generic CPA-DD are inconsistent with DD. 6. A.1.2: The title of CPA1 and gCPA as well as version of the generic CPA-DD are inconsistent with related DDs. 7. A.2: CME name is incorrect and reference to "1.1" is made. Pls clarify. 8. B.1: The title of CPA 1 is incorrect with CPA-DD. 9. C.1: Ex-post ER inconsistent with the ER Summary spreadsheet. 10. C.3.2, C.3.5, C.3.6: Title of CPA1 given is inconsistent with related CPA-DD. 11. C.3.3: Date of initial start of crediting period shall be clarified. 12. D: Please clarify reference to G.2. 			
Project participant response (1 st round)			
<ol style="list-style-type: none"> 1. Title Page: corrected in MR as 1. 2. Title Page: corrected. 3. Title page: No SB applied. 4. Title Page: to be corrected once all ER calculation is confirmed. 5. A.1.1: The title/s and version corrected 6. A.1.2: see above A.1.1 response. 7. A.2: corrected and 1.1 deleted. 8. B.1: corrected. 9. C.1: Ex-post ER inconsistent with the ER Summary spreadsheet - to be corrected once all ER calculation is confirmed. 10. C.3.2, C.3.5, C.3.6: corrected. 11. C.3.3: corrected. 12. D.: Corrected to E.2 			
Documentation provided by project participant (1 st round)			Date: 28/12/2020
<input type="checkbox"/>	Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/>	Changes in MR	Section(s):	New version No.: 4.0 dated 15/12/2020 sent 30/12/2020
<input type="checkbox"/>	Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/>	Other:		
DOE assessment (1 st round)			Date: 30/12/2020
<ol style="list-style-type: none"> 1. OK. Title Page: It has been clarified that this is MR1 for this monitoring period. 2. Ok. Title Page: The CME name is now correct as per UNFCCC project webpage. 3. Ok. Title page: Reference to SB now provided. No SB applied. 4. OK. Title Page: ER values corrected. 5. Ok. A.1.1: The title of CPA1 and gCPA and version of the generic CPA-DD have been corrected. 6. OK. A.1.2: titles and versions of CPA 1 and gCPA corrected as applicable in line with related DDs. 7. OK. A.2: The CME name is now correct as per UNFCCC project webpage. Reference to 1.1. was editorial mistake and has been deleted. 8. Ok. B.1: Title of CPA 1 has been corrected in line with related CPA-DD. 9. C.1: Ex-post ER consistent with the ER Summary spreadsheet now. 10. Ok. C.3.2, C.3.5, C.3.6: Title of CPA 1 has been corrected in line with related CPA-DD. 11. Ok. C.3.3: Initial start date of CP has been corrected to 01/03/2013 as checked with previous CPA-DD. 12. Ok. D.: Reference to G.2 has been revised to E.2 of MR. 			
Conclusion <i>Tick the appropriate checkbox</i>		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

CAR ID	18	Section no.	F.1	Date: 28/12/2020
Description of CAR				

Following issues w.r.t. section F.1 been identified:

- Section refers to Step 6 as per page 9 of Tool to determine project emissions from flaring gases containing methane whereas related step 6 is given on page 10 of the tool. Pls clarify.
- It is stated that flare efficiency for March 2017 to 2018 is determined using following method:
 $\eta_{\text{flare},h} = 0$, if $T_{\text{flare}} < 500\text{ }^{\circ}\text{C}$,
 $\eta_{\text{flare},h} = 0.5$ if $T_{\text{flare}} \geq 500\text{ }^{\circ}\text{C}$
 However, as per CPA-DD the related method is given as following:
 - 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below $500\text{ }^{\circ}\text{C}$ for more than 20 minutes during the hour h.
 - 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above $500\text{ }^{\circ}\text{C}$ for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h.
 Pls clarify the inconsistency.

Project participant response (1st round)

- Corrected.
- MR revised and XLS spreadsheet revised to determine ER on hourly basis.

Documentation provided by project participant (1st round)

Date: 28/12/2020

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s):	New version No.: 4 dated 15/12/2020 sent 30/12/2020
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (1st round)

Date: 30/12/2020

- Ok. The reference to page 9 of the tool has either been deleted or revised to page 10 correctly as per tool.
- Ok. MR has been revised accordingly < is exchanged with below and \geq with above" in line with CPA-DD and related tool. Further, the entire XLS Spreadsheet for ER calculation has been revised to determine ER on hourly basis in order to reflect the flare efficiency to be determined "during the hour h". The same ER spreadsheet as for 1st Verification has been used with updated data for this monitoring period. DOE checked the files and data is correctly included, fixed parameters correctly used and flare efficiency determined for each hour. Due to conservativeness for the period from March 2017 onwards the flare efficiency is either 0% or 50%, no 90% flare efficiency has been applied. From August 2016 until end Feb 2017 the flare efficiency is either 0% or determined/calculated as per Step 6 of related Tool to determine project emissions from flaring gases containing methane, whereas for August 2016 no baseline emissions are claimed due to conservativeness and delay in calibration for an equipment. Considering this the ER result can be confirmed to be highly conservative.
- Not ok. However, the value stated for T_n of 273 K is inconsistent with CPA-DD which refers to 273.15 K. PLs revise accordingly also in related equation. Further, the related value for CH₄ density as stated in MR is inconsistent with value in annual ER spreadsheets.

Project participant response (2nd round)

- Corrected in MR and in ER Spreadsheets

Documentation provided by project participant (2nd round)

Date: 07/01/2021

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s):	New version No.: 4 dated 15/12/2020 sent 07/01/2021
<input checked="" type="checkbox"/> Changes in XLS	Worksheet(s): ER summary and annual ER spreadsheets	New version No.:
<input type="checkbox"/> Other:		

DOE assessment (2nd round)

Date: 07/01/2021

- Ok. The value stated for T_n in MR has been corrected to 273.15 K in line with CPA-DD. And also updated in related equation stated in MR section F.1. Further, the related value for CH₄ density in annual ER spreadsheets has been revised to be calculated in same fashion as given in MR. Values are now consistent in both documents. This results in slight change in ER result to 9,723 tCO₂e.

Conclusion

Tick the appropriate checkbox

- ☐ Additional action should be taken (finding remains open)
☒ The finding is closed

CAR ID	19	Section no.	F.6	Date: 28/12/2020
Description of CAR				

Section F.6 of MR states that the lower ER result is due to lower amount of LFG. This is true due to the high water level in the landfill, however, please clarify why no reference is made to missing installed engines which should also contribute to ER result.		
Project participant response (1st round)		
Specified.		
Documentation provided by project participant (1st round)		Date: 28/12/2020
<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input checked="" type="checkbox"/> Changes in MR	Section(s):	New version No.: 4 dated 15/12/2020 sent 30/12/2020
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		
DOE assessment (1st round)		Date: 30/12/2020
Ok. Related specification has been provided now in Section F.6 of MR. Reference is made also to the none installation of gensets.		
Conclusion Tick the appropriate checkbox	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed	

CAR ID	20	Section no.	E.1	Date: 28/12/2020
Description of CAR				
Following issues w.r.t. MR section E.1 have been identified:				
1. E.1: Title of GWP _{CH4} is not 100% consistent with CPA-DD. Pls check and correct. 2. E.1: EF _{grid,CM,y} or EF _{EL,y} : Title of parameter is incon to CPA-DD and pls clarify statement under purpose of data "or actual net GHG removals". 3. E.1: TDL _y : Title of parameter incorrect and description incon with CPA-DD and pls clarify statement under purpose of data "or actual net GHG removals". Finally, related information on TDL _{k,y} is missing				
Project participant response (1st round)				
1. E.1: GWP _{CH4} corrected. 2. E.1: EF _{grid,CM,y} or EF _{EL,y} : Title of parameter corrected - deleted "or EF _{EL,y} " 3. E.1: TDL _y : TDL _{j,y} is correct.				
Documentation provided by project participant (1st round)				Date: 28/12/2020
<input type="checkbox"/> Changes in the PDD	Section(s):		New version No.:	
<input checked="" type="checkbox"/> Changes in MR	Section(s):		New version No.: 4 dated 15/12/2020 sent 30/12/2020	
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/> Other:				
DOE assessment (1st round)				Date: 30/12/2020
1. Ok. E.1: Description of parameter GWP _{CH4} is now in line with related CPA-DD. 2. Ok. E.1: EF _{grid,CM,y} or EF _{EL,y} : Title of parameter corrected in line with CPA-DD - deleted "or EF _{EL,y} " 3. Ok. E.1: TDL _y : Entire parameter table has been corrected in line with related CPA-DD.				
Conclusion Tick the appropriate checkbox	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed			

Table 5. FAR from this verification

FAR ID	01	Section No.	E.2	Date: 05/03/2019
Description of FAR				
For parameter, Tt and humidity delay in calibration has been identified during onsite inspection on 05/03/2019, which was still ongoing. Therefore, the subsequent verifying DOE shall take into account a delay in calibration for this parameter.				
Project participant response				Date: 15/12/2020

Initially, Pt, TH1 and Tt were measured for determine the density of methane ρ_{CH_4} ; However, according to Option C of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” is applied to calculate the density of methane, and the resulting mass flow of methane: $\rho_{CH_4} = P_n \cdot MMCH_4 / R_u \cdot T_n$, as P_n , $MMCH_4$, R_u and T_n are all default values, and ρ_{CH_4} thus is a default value of 0.716.

Also, as indicated from the section No. 3 on page 18 of the equipment UCG manual:

“Biogas flow rate in the suction pipe in Nm^3 / h (Biogas from landfill flowrate in Nm^3 / h)”, the measured values are normalized flows and thus is equal to $V_{t,wb,n}$.

Besides, it has been confirmed with the project owner that FT1 can be normalized if the reading goes through an API or if the pressure and temperature readings are entered directly into the flowmeter. In the case of Oum Azza, the readings are transmitted via an API thus is normalized values. Therefore, there is no need to use values from Pt and Tt to convert.

Therefore, there is no need to measure TH1 and TT1 and Pt anymore. MR has been updated accordingly. This FAR can be considered solved for future monitoring period as well.

Documentation provided by project participant

<input type="checkbox"/> Changes in the PDD	Section(s):	New version No.:
<input type="checkbox"/> Changes in MR	Section(s):	New version No.:
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Other:		

DOE assessment

Date: DD/MM/YYYY

n.a.

Conclusion

Tick the appropriate checkbox

☐ To be checked during the next periodic verification

Appendix 5. Monitored Parameters

Table A-5:Periodic Verification Checklist – Monitored Parameters

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
A. $V_{t,wb}$ (same as $FV_{RG,h}$)		Volumetric flow of the gaseous stream (LFG) in time interval t on a wet basis		
<p>a) Measurement / Determination method (VVS, §§ 346-350) Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)). Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</p>	<p>/IM01/ /POADD/ /ACM001 / /TS/ /TA/</p>	<p><i>Description:</i> The volumetric flow of LFG is measured continuously on wet basis by a thermal mass flow meter E+H Proline Prowirl200. Two identical flow meters have been installed FT1 and FT2. FT1 before the blower and FT2 before the flare. Both measure the LFG flow and provide the result directly and automatically in normalized cubic meters considering temperature and pressure.</p> <p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p> <p><i>Verifier's action:</i> By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p><i>Conclusion:</i> The parameter is monitored as per CPA-DD. However, CAR 01 has been raised.</p>	CAR 01	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i>	/CAL/ /MM/ /TS/	<i>Description:</i> The meters have an accuracy of $\pm 0.75\%$. Further the initial calibration has been conducted on 15/04/2015. No subsequent calibration is required as it has a lifelong calibration. This is indicated in the related technical data sheet of the supplier. <i>Verifier's action:</i> By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection <i>Conclusion:</i> The meter has been duly calibrated for this entire monitoring period.	Ok	Ok
c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /RAW/ /XLS/ /RP/	<input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment) <i>Description:</i> The data is obtained digitally. 5 minutes data are recorded and aggregated to average hourly values for calculation. The parameter is monitored to calculate the quantity of methane collected from the landfill and sent to the flare stack. <i>Verifier's action:</i> By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as crosschecked against monthly and weekly reports. <i>Conclusion:</i> The values are correctly monitored and the calculation method and way is correct too. No inconsistencies have been identified. No implausible data have been found.	Ok	Ok
B. $v_{CH_4,t,wb}$ (same as $f_{v_{CH_4,h}}$)		Volumetric fraction of CH ₄ in time interval <i>t</i> on a wet basis		
a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used.</i>	/IM01/ /POADD/ /ACM001/ /TS/ /TA/	<i>Description:</i> The volumetric fraction of methane (CH ₄) in the LFG is measured by a Geotech FAU gas analyser serial number GA 14466. The analyser measures the methane content in m ³ /m ³ as well as on wet basis as shown by the meter. <i>In case of calibration of the analyser a second analyser of the same type serial number GA 14465 is used by the PP. The analyser is exchanged each time the other one has to be calibrated. The exchange history is as following:</i>	CAR 02 CAR 46	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p><i>Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>		<p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets as well as Email by manufacturer.</p> <p>Conclusion: The parameter is monitored as per CPA-DD. Besides the volumetric fraction is monitored on the same basis as the related flow rate/quantity of the LFG. However, CAR 02 and CAR 16 have been raised and resolved.</p>		
<p>b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs. Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>	<p>/CAL/ /MM/</p>	<p>Description: The analyzer has an accuracy of 2.0%, even 0.2% at auto-calibration. Further the factory calibration has been conducted on 18/04/2015 and is in use since 01/08/2015. Pls refer to annex 6 for calibration details.</p> <p>The analyzer has been exchanged on 23/04/2016.</p> <p>The analyzer conducts a zero calibration against ambient air and a value calibration against standard gas on 5-minute basis. The standard gas had a content of 49.99% CH₄ and 50.01% CO₂ and is valid until 12/04/2019 composed on 13/04/2016 cylinder #438508, certificate S095880.</p> <p>Verifier's action: by means of checking MR, CPA-DD, and technical data sheet and onsite inspection.</p>	<p>CAR 02 CAR 16</p>	<p>Ok</p>

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Conclusion: The meter has been duly calibrated for this entire monitoring period. However, CAR 02 and CAR 16 have been raised.		
c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /XLS/ /RAW/	<input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment) Description: The parameter is monitored to calculate the amount of methane destroyed by the project activity during this monitoring period. Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports. Conclusion: No inconsistency or mistake has been identified. The value is calculated as per CPA-DD.	Ok	Ok
C. P_t		Pressure of the LFG in time interval <i>t</i>		
a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used.</i> <i>Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/IM01/ /POA-DD/ /ACM001/ /TS/ /TA/	Description: Pressure of the LFG is measured by pressure sensor E+H Cerabar M PMP51 serial number K5060D01129. The parameter is required to determine the density of the LFG. However, density is determined via default values during this monitoring period and therefore both parameters are not to be used during this entire monitoring period. The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.	CAR 07 CAR 08	Ok

CDM-PoA-VCR-FORM

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: The parameter is monitored as per CPA-DD. Besides the volumetric fraction is monitored on the same basis as the related flow rate/quantity of the LFG. However, CAR 4 has been raised.</p>		
<p>b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>	<p>/CAL/ /MM/ /MR/ /TS/</p>	<p>Description: Pt and Tt as per monitoring plan are used to determine LFG density. However, density is determined via default values and therefore both parameters are not to be sued during this entire monitoring period. Therefore, not applicable for this monitoring period.</p> <p>Verifier's action: by means of checking MR, CPA-DD, technical data sheet and onsite inspection.</p> <p>Conclusion: CAR 7 and CAR 8 have been raised.</p>	<p>CAR 07 CAR 08</p>	Ok
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	<p>/MR/ /XLS/ /RAW/ /RP/</p>	<p><input type="checkbox"/> Correct <input checked="" type="checkbox"/> Not correct (initial assessment)</p> <p>Description: Not applicable during this monitoring period.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports.</p> <p>Conclusion: CAR 7 and CAR 8 have been raised.</p>	<p>CAR 07 CAR 08</p>	Ok
D. T_t		Temperature of the LFG in time interval <i>t</i>		
<p>a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL)</i></p>	<p>/IM01/ /POADD/ /ACM001 / /TS/</p>	<p>Description: Temperature of the LFG is measured by temperature sensor Avenisense Wateract-air. The parameter is required to determine the density of the LFG.</p>	<p>CAR 07 CAR 08</p>	FAR 01

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p><i>but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i></p> <p><i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used.</i></p> <p><i>Furthermore, verify the frequency of measurements as per the requirements.</i></p> <p><i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	/TA/	<p>However, density is determined via default values during this monitoring period and therefore both parameters are not to be used during this entire monitoring period.</p> <p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: CAR 7, CAR 8 and CAR 16 have been raised. However, a FAR is raised as the parameter shows a delay in calibration even considering that the parameter is not relevant for this monitoring period as options and choices for ER calculation have been chosen which do not require results from this measurement equipment.</p>	CAR 16	
<p><i>b) Accuracy and QA/QC Procedure</i></p> <p><i>(VVS, §§ 351-357)</i></p> <p><i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i></p> <p><i>Describe whether all applicable QA/QC procedures are met.</i></p> <p><i>Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.</i></p>	<p>/CAL/</p> <p>/MM/</p> <p>/MR/</p> <p>/TS/</p>	<p>Description: Pt and Tt as per monitoring plan are used to determine LFG density. However, density is determined via default values and therefore both parameters are not to be used during this entire monitoring period. Therefore not applicable for this monitoring period.</p> <p>Verifier's action: by means of checking MR, CPA-DD, and technical data sheet and onsite inspection.</p> <p>Conclusion: CAR 7, CAR 8 and CAR 16 have been raised.</p>	<p>CAR 07</p> <p>CAR 08</p> <p>CAR 16</p>	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i>				
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner. In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	<p>/MR/ /XLS/ /RAW/ /RP/</p>	<p><input type="checkbox"/> Correct <input checked="" type="checkbox"/> Not correct (initial assessment) Description: Not applicable during this monitoring period. Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports. Conclusion: CAR 7, CAR 8 and CAR 16 have been raised.</p>	<p>CAR 07 CAR 08 CAR 16</p>	Ok
E. T_{flare}		Temperature in the exhaust gas of the flare		
<p>a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)). Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	<p>/IM01/ /PoADD/ /ACM001/ / /TS/ /TA/</p>	<p>Description: Temperature in the exhaust gas of the flare is measured by Günther Type S thermocouple serial number 05-20387210-0500. Thermocouples are not calibrated but exchanged prior to end of calibration validity. Therefore, three thermocouples have been used during this monitoring period. However, as all have been purchased in a bulk/batch all have the same numbering. However, DOE has checked during onsite inspection that different thermocouples are used and checked storage of other equipment and can confirm that different thermocouples have been used. The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p>	<p>FAR 01 CAR 04</p>	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: The parameter has been duly monitored however FAR 01 from previous verification has been raised.</p>		
<p>b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.</i> <i>Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>	/CAL/ /MM/	<p>Description: The thermocouple has an accuracy of $\pm 1.0^{\circ}\text{C}$. Further the factory calibration has been conducted on 27/07/2015 and is in use since 01/08/2015. The calibration frequency is annually or it is exchanged by another new thermocouple. Therefore, the calibration validity was due on 31/07/2016. A new thermocouple is installed on 02/09/2016 with calibration validity until 01/09/2017.</p> <p>Verifier's action: By means of checking the technical description and calibration certificate, technical manual and interview with personnel during site visit.</p> <p>Conclusion: The thermocouple is calibrated however delay in calibration has been identified from 01/08/2016 until 02/09/2016. A related FAR has been raised during last verification which could be closed as a new equipment has been installed which was factory calibrated. Further, thermocouples have been exchanged prior to the one-year expiry of the calibration validity. Therefore, no further delay in calibration has been identified and besides the delay in the beginning of the monitoring period the parameter is duly calibrated.</p>	CAR 04 FAR 04	Ok
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	/MR/ /XLS/ /RAW/ /RP/	<p><input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment)</p> <p>Description: The value is monitored to determine the flare efficiency.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports.</p> <p>Conclusion: No inconsistency or mistake has been identified.</p>	Ok	Ok
F. fVCH₄,FG,h		Concentration of CH ₄ in the exhaust gas of the flare		

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p>a) <i>Measurement / Determination method</i> (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	<p>/IM01/ /POADD/ /ACM001 / /TS/ /TA/</p>	<p>Description: The concentration of CH₄ in the exhaust gas of the flare is measured by a Servomex Servopro 4900 gas analyser serial number 653383.</p> <p>This parameter is monitored to determine the flare efficiency. As a simplified approach during determination of the flare efficiency only CH₄ is monitored. The remaining gas is considered as N₂ in line with related tool.</p> <p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: The parameter is monitored as per CPA-DD. However, CAR 05 has been raised.</p>	<p>CAR 05</p>	<p>Ok</p>
<p>b) <i>Accuracy and QA/QC Procedure</i> (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i></p>	<p>/CAL/ /MM/ /MR/ /TS/</p>	<p>Description: The analyzer has an accuracy of 1.0% of reading or 0.5 ppm at auto-calibration. Further, the factory calibration has been conducted on 15/06/2015 and is in use since 01/08/2015 as well as recalibrated on 16/03/2016. However, the analyzer is set to auto-calibration mode and the manual does not state that further calibration is required if the auto-calibration is conducted.</p> <p>Inert gas used is N₂, certificate S107685, valid until 14/01/2019 and standard certified gas used is 0.69% CH₄ / 10% O₂, certificate S107684, valid until 14/01/2019.</p>	<p>CAR 05</p>	<p>Ok</p>

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i>		<p>Verifier's action: by means of checking MR, CPA-DD, technical data sheet and onsite inspection.</p> <p>Conclusion: As per onsite check the analyzer conducts a zero calibration against inert gas (N2) and a value calibration against standard gas.</p> <p>The meter has been duly calibrated for this entire monitoring period considering that the project has started operation from 01/08/2015 onwards. However, CAR 05 has been raised.</p>		
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner. In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	<p>/MR/ /XLS/ /RAW/</p>	<p><input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment)</p> <p>Description: The parameter is used to determine the flare efficiency.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports.</p> <p>Conclusion: No inconsistency or mistake has been identified.</p>	Ok	Ok
G. to2,h		Volumetric fraction of O₂ in the exhaust gas of the flare		
<p>a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)). Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	<p>/IM01/ /POADD/ /ACM001 / /TS/ /TA/</p>	<p>Description: The volumetric fraction of O₂ in the exhaust gas of the flare is measured by a Servomex Servopro 4900 gas analyser serial number 653383.</p> <p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician is downloading the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p>	CAR 05	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: Parameter is monitored as per DD. However, CAR 05 has been raised.</p>		
<p>b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>	<p>/CAL/ /MM/ /MR/ /TS/</p>	<p>Description: The analyzer has an accuracy of 1.0% of reading or 0.5 ppm at auto-calibration. Further, the factory calibration has been conducted on 15/06/2015 and is in use since 01/08/2015 as well as recalibrated on 16/03/2016. However, the analyzer is set to auto-calibration mode and the manual does not state that further calibration is required if the auto-calibration is conducted.</p> <p>Inert gas used is N₂, certificate S107685, valid until 14/01/2019) and standard certified gas used is 0.69% CH₄ / 10% O₂, certificate S107684, valid until 14/01/2019.</p> <p>Verifier's action: by means of checking MR, CPA-DD, and technical data sheet and onsite inspection.</p> <p>Conclusion: As per onsite check the analyzer conducts a zero calibration against inert gas (N₂) and a value calibration against standard gas.</p> <p>The meter has been duly calibrated for this entire monitoring period considering that the project has started operation from 01/08/2015 onwards. However, CAR 05 has been raised.</p>	CAR 05	Ok
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	<p>/MR/ /XLS/ /RAW/</p>	<p><input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment)</p> <p>Description: This parameter is used to determine and calculate the flare efficiency.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports.</p> <p>Conclusion: No inconsistency or mistake has been identified.</p>	Ok	Ok
H. ECP_{J,y}		Quantity of electricity consumed by the CPA in the year y		

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p>a) <i>Measurement / Determination method</i> (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	<p>/IM01/ /POA-DD/ /ACM001/ / /TS/ /TA/</p>	<p>Description: The quantity of electricity consumed by the CPA is measured by an electricity meter type Siemens Sentron PAC3200 serial number LQN1315.</p> <p>The parameter is measured continuously and data is recorded every 5 minutes by an automatic monitoring system (AEMS). Data is obtained by the AEMS storing the data in a remote server. The biogas technician downloads the data from the remote server weekly and monthly. These data and reports are checked on weekly basis by the monitoring manager. The raw data is extracted and then aggregated values are prepared on weekly basis. Those weekly and monthly reports are generated and forwarded to CME even though the CME as well as the consultant, the World Bank have access to all data and information of the project via drop box. The monitoring manager is sending an Email to the CME and the consultant attaching the weekly and monthly report and the raw data.</p> <p>Further, additional electricity consumption attributable to the project activity has been considered. For dewatering of the landfill compressors or pumps have been used during this monitoring period. For those, the rated capacity times full operation during entire monitoring period has been considered. This is highly conservative as the compressors or pumps are only operated for dedicated hours as observed during onsite inspection interview with operation personnel.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p> <p>Conclusion: Parameter is monitored as per DD. However, CAR 06 is raised.</p>	CAR 06	Ok
<p>b) <i>Accuracy and QA/QC Procedure</i> (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that</i></p>	<p>/CAL/ /MM/</p>	<p>Description: The meter has an accuracy of 0.5%. Further the electricity meter is factory calibrated and is in use since 01/08/2015. No subsequent calibration is required as indicated in the technical data sheet of the manufacturer.</p>	Ok	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>the most conservative assumptions theoretically possible have been made for calculating ERs. Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i>		Verifier's action: by means of checking MR, CPA-DD, technical data sheet and onsite inspection and interview with technicians. Conclusion: The monitoring equipment is duly calibrated for this entire monitoring period considering the start of this project activity from 01/08/2015 onwards.		
c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner. In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>	/MR/ /XLS/ /RAW/	<input type="checkbox"/> Correct <input checked="" type="checkbox"/> Not correct (initial assessment) Description: The electricity consumption is required to calculate related project emissions. Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets as well as monthly reports. Conclusion: No inconsistency or mistake has been identified however CAR 06 has been raised.	CAR-6	Ok
I. Other flare operation parameter		Data and parameters required to monitor whether the flare operates within the range of operating conditions according to the manufacturer specifications		
a) Measurement / Determination method (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)). Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/IM01/ /POADD/ /ACM001/ / /TS/ /TA/	Description: The Data and parameters required to monitor whether the flare operates within the range of operating conditions according to the manufacturer specifications are volumetric flow rate and volumetric methane content of the LFG. Please refer to the related parameter assessment $V_{t,wb}$ and $V_{CH_4,t,wb}$. Further the minimum volumetric flow and methane content as per MR are indicated with $V > 150 \text{ m}^3/\text{h}$ and $v > 20 \%_{CH_4}$. For further details refer to related parameter assessments. Verifier's action: By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets. Conclusion: The parameter is monitored as per DD and as per technical data sheets. CAR 01, CAR 02 and CAR 16 have been raised.	CAR 01 CAR 02 CAR 16	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p><i>b) Accuracy and QA/QC Procedure</i> (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.</i> <i>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>	/CAL/ /MM/	Description: Please refer to the related section for the parameters $V_{t,wb}$ and $V_{CH4,t,wb}$.	N/A	N/A
<p><i>c) Correctness</i> (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.</i> <i>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	/MR/ /TS/	<p><input checked="" type="checkbox"/> Correct <input checked="" type="checkbox"/> Not correct (initial assessment)</p> <p>Description: Data is indirectly monitored and checked against technical data sheet.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets, monthly reports as well as technical data sheet.</p> <p>Conclusion: No inconsistency or mistake has been identified. Please see above raised CAR 1, CAR 2 and CAR 16.</p>	CAR 01 CAR 02 CAR 16	Ok
J. $M_{t,wb}$, T_t, P_t, $p_{H2O,t,sat}$, $EC_{BL,k,y}$, and Operation hours of the energy plant				
<p><i>a) Measurement / Determination method</i> (VVS, §§ 346-350) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</i></p>	/IM01/ /POADD/ /ACM001 / /TS/ /TA/	<p>Description and conclusion:</p> <p>The parameters are correctly mentioned in MR as they are not monitored as no engine is installed yet and therefore nothing is or can be monitored.</p> <p>Verifier's action:</p> <p>By means of checking MR, CPA-DD, PoA-DD, methodology, tools as well as onsite inspection and technical data sheets.</p>	Ok	Ok

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Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>				
<p>b) Accuracy and QA/QC Procedure (VVS, §§ 351-357) <i>In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs. Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i></p>		<p>Description: As currently no monitoring equipment has been installed this time is not applicable.</p>	Ok	Ok
<p>c) Correctness (VVS, §§ 346-350) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner. In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i></p>	/MR/ /TS/	<p><input checked="" type="checkbox"/> Correct <input type="checkbox"/> Not correct (initial assessment)</p> <p>Description and conclusion: The parameter is correctly mentioned as they are not monitored as no engine is installed yet and therefore there is nothing to be monitored.</p> <p>Verifier's action: By means of checking MR, CPA-DD, PoA-DD as well as onsite inspection as well as ER spreadsheet and raw data sheets, monthly reports as well as technical data sheet.</p>	Ok	Ok

Appendix 6. Calibration dates and validity of installed monitoring equipment

Table A-6: Periodic Verification Checklist – Calibration details

Monitoring equipment	Related monitoring parameter as per applicable registered monitoring plan	Serial number	Type	Accuracy or accuracy class	Previous calibration (last calibration before start of this monitoring period)	Calibration date(s) during this monitoring period	Validity of calibration(s)	Delay in calibration: yes/no	Period of delayed calibration
Thermal mass flow meter	V _{t, wb}	K3262219000	Endress+Hauser Proline Prowirl R 200	± 0.75 %	15/04/2015	15/04/2015	Lifelong calibration	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
Gas analyser	VCH4, t, wb	GA14466	Geotech FAU	2% 0.2% with auto-calibration	18/04/2015 Start of use 01/08/2015	31/05/2016 09/06/2017 23/02/2018 (exchanged by GA14465 on 23/04/2016 18/04/2017 27/08/2018)	One year	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
Gas analyser	VCH4, t, wb	GA14465	Geotech FAU	2% 0.2% with auto-calibration	08/04/2016 Start of use 23/04/2016	14/03/2017 29/06/2018 (exchanged by GA14466 on 27/12/2016 13/03/2018)	One year	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
Thermocouple	T _{flare}	05-2038721 0-0500	Günther Type S	±1.0°C	27/07/2015 Start of use 01/08/2015	-	01/08/2015 to 31/07/2016	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	From: 01/08/2016 To: 01/09/2016
		05-2038721 0-0500			02/09/2016	-	02/09/2016 to 01/09/2017	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
		05-2038721 0-0500			18/05/2017	-	18/05/2017 to 17/05/2018	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
		05-2038721 0-0500			29/03/2018	-	29/03/2018 to 28/03/2019	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:

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Monitoring equipment	Related monitoring parameter as per applicable registered monitoring plan	Serial number	Type	Accuracy or accuracy class	Previous calibration (last calibration before start of this monitoring period)	Calibration date(s) during this monitoring period	Validity of calibration(s)	Delay in calibration: yes/no	Period of delayed calibration
Gas analyser	f _{CH4,FG,h}	653383	Servomex Servopro 4900	1% of reading or 0.5 ppm	15/06/2015 16/03/2016 Start of use 01/08/2015	Besides Auto calibration against inert gas and standard every 15 days.	Auto calibration against inert gas and standard gas every 15 days.	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
Gas analyser	t _{O2,h}	653383	Servomex Servopro 4900	0.05%	15/06/2015 16/03/2016 Start of use 01/08/2015	The standard and inert gas validity are until 14/01/2019	The standard and inert gas validity are until 14/01/2019	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:
Electricity meter	EC _{PJ,y}	LQN1315	Siemens Sentron PAC3200	0.5%	initial factory calibration	N/A	N/A	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	From: To:

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM validation and verification standard for programmes of activities” (CDMEB93-A08-STAN); • Make structural and editorial improvements.
02.0	29 December 2017	Revision to align with the requirements of the “CDM validation and verification standard for programme of activities” (version 01.0).
01.0	5 June 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: programme of activities, verifying and certifying		