

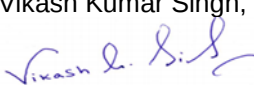


Verification and certification report form for CDM project activities

(Version 02.0)

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

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Nairobi River Basin Biogas Project UNFCCC reference number : 6549
Version number of the verification and certification report	03
Completion date of the verification and certification report	15/12/2017
Monitoring period number and duration of this monitoring period	2 31/12/2014 – 30/12/2016 (inclusive of both the days)
Version number of the monitoring report to which this report applies	4
Crediting period of the project activity corresponding to this monitoring period	Fixed crediting period (10 years) 31/12/2012 to 30/12/2022 (inclusive of both the days)
Project participants	Kenya (host): Sustainable Energy Strategies Ltd. Germany: atmosfair gGmbH
Host Party	Kenya
Applied methodologies and standardized baselines	AMS I.E. (version 04) Switch from Non-Renewable Biomass for Thermal Applications by the User
Mandatory sectoral scopes linked to the applied methodologies	1 : Energy industries (renewable - / non-renewable sources)
Conditional sectoral scope(s) linked to the applied methodologies	1
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	80,701
Certified amount of GHG emission reductions or GHG removals for this monitoring period	5,463
Name and UNFCCC reference number of the DOE	Carbon Check (India) Private Ltd. UNFCCC reference number of the DOE: E-0052
Name, position and signature of the approver of the verification and certification report	Vikash Kumar Singh, Compliance Officer 

SECTION A. Executive summary

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Purpose, general description and location of the project activity:

The Project Participant has commissioned the DOE, Carbon Check (India) Private Ltd. (CC IPL) to perform an independent verification of the CDM Project Activity “Nairobi River Basin Biogas Project” (UNFCCC reference number 6549) in Kenya (hereafter referred to as “Project Activity”). The Project Activity involves construction and operation of domestic biogas units which are fed with cow dung to produce renewable biogas used for cooking and water heating purpose. The project activity saves greenhouse gas emissions by replacing non-renewable biomass with renewable biogas. The project activity is designed to generate emission reductions by installation of the biogas units in the Kiambu county in Kenya.

This report summarises the findings of the verification of the project, performed on the basis of paragraph 62 of the CDM M & P, as well as criteria given to provide for consistent project operations, monitoring and reporting and the subsequent decisions by the CDM Executive Board. Verification is required for all registered CDM project activities intending to confirm their achieved emission reductions and proceed with request for issuance of CERs. This report contains the findings and resolutions from the verification and a certification statement for the certified emission reductions.

Verification is the periodic independent review and ex-post determination of both quantitative and qualitative information by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “Nairobi River Basin Biogas Project” in the host country “Kenya” for the period 31/12/2014 to 30/12/2016 (including both the days).

The purpose of verification is to review the monitoring results and verify that the monitoring methodology was implemented according to the monitoring plan and monitoring data, and used to confirm the reductions in anthropogenic emissions by sources, is sufficient, definitive and presented in a concise and transparent manner. CC IPL’s objective is to perform a thorough, independent assessment of the registered project activity.

In particular, the monitoring plan, monitoring report and the project’s compliance with relevant UNFCCC and host Party criteria are verified in order to confirm that the component project/s has/have been implemented in accordance with the previously registered/included component project design and conservative assumptions, as documented. It is also confirmed if the monitoring plan is in compliance with the registered PDD and the approved monitoring methodology.

Scope:

The scope of the verification is:

- To verify the project implementation and operation with respect to the registered PDD
- To verify the implemented monitoring plan with the registered PDD or approved revised PDD and applied baseline and monitoring methodology.
- To verify that the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that the reported emission reductions are complete and accurate in order to be certified.

Verification process:

The verification comprises a review of the monitoring report over the monitoring period from 31/12/2014 to 30/12/2016 and based on the registered PDD in part of the monitoring parameters and monitoring plan, emission reduction calculation spreadsheet, monitoring methodology and all related evidence provided by project participant.

On-site visit and stakeholders' interviews are also performed as part of the verification process.

Conclusion:

The verification team assigned by the DOE concludes that the PDD (Version 2.4, dated 11/06/2012) /B04/ and the Monitoring report (version 4, dated 14/12/2017) /2/, meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol and paragraph 62 of CDM M&P, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification has been conducted in-line with the CDM VVS for project activities, version 01.0 /B01-1/ requirements.

The project activity was correctly implemented according to selected monitoring methodology, monitoring plan and the registered PDD. The monitoring system was installed, maintained in a proper manner, while collected monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through the review and on site visit the verification team confirms that the project activity has resulted in the 5,463 tCO₂e emission reductions during the second monitoring period.

CCIPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader / Verifier / Technical Expert	IR	Agarwalla	Sanjay Kumar	CCIPL	X	X	X	X
2.	Local Expert	EI	Muriuki	Job N	CCIPL		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	IR	Dimri	Anubhav	CC IPL
2.	Approver	IR	Singh	Vikash Kumar	CC IPL

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human Error Human error in the monitoring surveys recording	Medium	Since the monitoring surveys related to the usage are to be conducted by monitoring personnel, it needs to be checked if the personnel responsible for conducting monitoring surveys are trained in conducting surveys and appropriately record such results. The questions in the questionnaire need to be appropriately interpreted by the monitoring personnel and then need to be conveyed accordingly to the survey participants.	The recording of the monitoring surveys is directly linked to the emission reductions based on the parameter N_y used for calculations. The verification audit plan for the project included checking the following during the on-site visit to mitigate the risk: 1. The training records of the personnel conducting the survey (if any). 2. Interview with the personnel conducting the survey. 3. Review of monitoring questionnaire The verification team mitigated the risk by checking the training records /12/ of the personnel during the on-site visit. These records have been provided to the verification team by the PP. Verification team also checked the monitoring questionnaires /16/ and found them to be acceptable. Further, data was crosschecked with the ER calculation spreadsheet /04/. Verification team, based on the above, confirms that the risk is appropriately mitigated.
2.	Human Error Recording and reporting of the information in the monitoring database.	Medium	Since the installation of the biogas plants related data is recorded manually into the monitoring database. This includes details related to the user, location and commissioning date.	The recording of the biogas plants related data is directly linked to the emission reduction calculations based on the parameter N_y used for calculations. The verification audit plan for the project included checking the following during the on-site visit to mitigate the risk: 1. The training records of the personnel recording and reporting the information in the monitoring database . 2. Interview with the recording and reporting the information in the monitoring database.

				3. Review of the monitoring database The verification team mitigated the risk by interviewing the personnel responsible for recording and reporting the information in the monitoring database and reviewed the monitoring database and also compared with the hard copy records of the installation. Verification team based on the interviews and reviews confirms that the personnel are well familiar with the process of recording and reporting the commissioning and installation records. The cross checks were also made with the ER spreadsheet to check the reported data /04/. Verification team confirms that the human error risk is appropriately mitigated.
3.	Human Error Recording and reporting of the information in emission reduction spreadsheet.	Medium	Since the information in the emission reduction spreadsheet is recorded manually, there is a human error risk involved while recording the values.	The recording of data in the emission reduction spreadsheet is directly linked to the emission reductions and involves a risk of reporting erratic values due to Human Error. The verification audit plan for the project included checking the following during the on-site visit to mitigate the risk: 1. Interviews with the personnel recording/reporting values in the ER spreadsheet. 2. Review of the ER spreadsheet. 3. Crosscheck of the ER spreadsheet with the other source documents. The verification team mitigated the risk by interviewing the personnel responsible for recording and reporting the information in the ER spreadsheet /04/ and reviewed the ER spreadsheet /04/ and also crosschecked with the survey records and monitoring database. Verification team based on the interviews and reviews confirms that the personnel are well familiar with the process of recording and reporting the monitored data. Verification team confirms that the human error risk is appropriately mitigated.

4.	Information System Use of spreadsheets without adequate controls related to data changes/updates, version tracking, traceability, security	Medium	Since, the emission reduction calculations are presented in the ER spreadsheet and monitoring database and sampling survey records are also reported in a spreadsheet, it needs to be checked if appropriate controls have been established. Otherwise, it could lead to material errors, omissions or misstatements.	The spreadsheets have been used for reporting ER calculations. To check that adequate controls related to data changes/updates, version tracking, traceability, security are followed, following details were checked in the documents and during the site visit: 1. Interview with the relevant personnel to ensure that roles and responsibilities according to section B.7.2 of the PDD are being followed. 2. Data and information flow procedures to be followed as per PDD and MR. 3. Check the established controls on the spreadsheets used. Verification team mitigated the risk by conducting interviews with personnel responsible for activities as provided in PDD and MR. Monitoring head is responsible for administering the electronic data storage, and data review. The data changes/updates are being maintained by monitoring head and a version tracking system is maintained for the ER spreadsheet. Further, the traceability and security of the spreadsheet is being maintained by keeping a protected copy of the files in the PP's network. The data and information flow requirements are being followed as stated in the PDD and the MR. Interviews with the monitoring personnel were conducted to confirm the established procedures. Verification team confirms that the information system risk is appropriately mitigated.
5.	Sampling Risk that the sample not being true representative of the population.	Low	The project activity's monitoring plan involves surveying users of the biogas units installed as a part of the project activity. There is a risk that the sample chosen is not a true representative of the population.	The sampling done as a part of monitoring surveys is directly linked to the emission reductions based on the parameter N_y used for calculations. The verification audit plan for the project included checking the following during the on-site visit to mitigate the risk: 1. Review of the sampling procedures including

				checking the sample number generator. Verification team checked the procedure of sampling, including the calculations and the sample number generator /13/ for the project activity. Verification team confirms that the sampling risk is appropriately mitigated.
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C.2. Consideration of materiality in conducting the verification

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The threshold of materiality was evaluated based on §13 of “Guideline: Application of materiality in verifications” Version 02.0 /B04/. It was concluded that the materiality threshold applicable to the project activity based on actual emission reductions achieved is 5% of 5,463 tCO₂e which is equal to 273 tCO₂e.

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. As explained above, the potential sources of error were:

Human error: In the monitoring surveys recording; Recoding and reporting of the information in the monitoring data base; Recording and reporting of the information in ER spread sheet

Information System: Use of spread sheets without adequate controls related to data changes / updates, version tracking, traceability and security

Sampling: Risk that the sample not being representative of the population

Mitigation of Human error risks: The verification team mitigated the risk by checking the training records /12/ of the personnel during the on-site visit. These records /12/ have been provided to the verification team by the PP. Verification team also checked the monitoring questionnaires /16/ and found them to be acceptable. Interviews with the responsible personnel for recording and reporting the information in the monitoring data base were conducted during the on-site visit and confirmed that the personnel were well familiar with the process of data recording and reporting. Further, data was crosschecked with the ER calculation spreadsheet /04/. Verification team, based on the above, confirms that the risk is appropriately mitigated.

Mitigation due to error in Information system: The risk due to error in information system was mitigated by conducting interview with the personnel responsible for activities. The data changes/updates are being maintained by monitoring head and a version tracking system is maintained for the ER spreadsheet. Further, the traceability and security of the spreadsheet is being maintained by keeping a protected copy of the files in the PP's network. The data and information flow requirements are being followed as stated in the PDD and the MR. Interviews with the monitoring personnel were conducted to confirm the established procedures. Verification team confirms that the information system risk is appropriately mitigated.

Mitigation due to error in Sampling: Verification team checked the procedure of sampling, including the calculations and the sample number generator /13/ for the project activity. Verification team confirms that the sampling risk is appropriately mitigated.

As no material errors, omissions or misstatements could be found, a reasonable level of assurance is achieved.

SECTION D. Means of verification**D.1. Desk/document review**

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The verification was performed primarily based on the review of the Monitoring report /1/ and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology. Documents reviewed or referenced during the verification are listed in Appendix 3 below.

D.2. On-site inspection

Duration of on-site inspection: 24/11/2017 to 25/11/2017				
No.	Activity performed on-site	Site location	Date	Team member
1.	An assessment of the implementation and operation of the registered project activity as per the registered PDD	Kenya, visit to sample biogas units	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
2.	A review of information flows for generating, aggregating and reporting the monitoring parameters	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
3.	Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
4.	A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
5.	A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology and corresponding tool(s), where applicable	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
6.	A review of calculations and assumptions made in determining the GHG data and emission reductions	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki
7.	An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters	Kenya, PP site office	24/11/2017 to 25/11/2017	Sanjay Kumar Agarwalla Job N Muriuki

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Machnik	Denis	Atmosfair gGmbH	24/11/2017 to 25/11/2017	Project implementation and operation, monitoring procedure, data and information flow, Survey records, Sales/Distribution records, CER calculation and	Sanjay Kumar Agarwalla, Job N Muriuki

					completeness of monitoring report, Electronic Monitoring system, Sampling Plan, QA/QC Procedures, Quality Assurance – Management and operating system	
2.	Karanja	David	Sustainability Energy Strategies Ltd.	24/11/2017 to 25/11/2017	Project implementation and operation, monitoring procedure, data and information flow, Survey records, Sales/Distribution records	Sanjay Kumar Agarwalla, Job N Muriuki
3.	Kuria	Wambui	Sustainability Energy Strategies Ltd.	24/11/2017 to 25/11/2017	Project implementation and operation, monitoring procedure, data and information flow, Survey records, Sales/Distribution records	Sanjay Kumar Agarwalla, Job N Muriuki
3.	Wangai	Mathew	Mason (Stakeholder)	25/11/2017	Employment status due to project implementation	Sanjay Kumar Agarwalla, Job N Muriuki
4.	Miruru	Douglas	Mason (Stakeholder)	25/11/2017	Employment status due to project implementation	Sanjay Kumar Agarwalla, Job N Muriuki

D.4. Sampling approach

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The total population size of the biogas units under this monitoring period are 607. The monitoring parameter required to be monitored through the sampling plan is “Statistically adjusted drop out from total population of units in period y” (DOy).

Simple random sampling was applied by the PP for selection of the monitoring samples with 95/5 confidence/precision which is deemed acceptable as per the registered PDD for biennial monitoring. Please refer to the Section E.6.3 of this report on detailed assessment on sampling plan opted by the PP.

DOE used sampling during verification for checking the operational status of the biogas units. PP had calculated the drop-out rate based on its 49 monitoring samples. Considering that the achieved annual emission reductions for the project activity are less than 100,000 tCO₂e, applying paragraph 33 (a) of the sampling standard, version 07 /B07/, a sample size of 8 HHs was chosen (with no discrepant records). A sample size of 8 was required, based on an AQL of 0.5 % and UQL of 20 %, producer risk 10 % and consumer risk 20 %. Acceptance number (c) thus determined for the sample is 0. It was observed that out of the 8 samples, all the 8 samples were found to be operational which matched with the PP’s records and hence no discrepant records were observed with the published MR /1/ and ER sheet /3/ and thus c=0. Thus, PP’s set of records has been accepted in line with § 32 of the sampling standard, version 07 /B07/.

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	-	-
Compliance of the project implementation and operation with the registered PDD	02	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	02	-	-

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

Means of verification	The verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form. The verification team has checked whether all the sections of the monitoring report follows the guidelines provided in the template itself.
Findings	-
Conclusion	Verification Team confirms that the latest available version of monitoring report template (06.0) /B03/ has been used by the PP and the MR /2/ is in compliance of the monitoring report with the relevant form and instructions therein. CCIPL had made the version 1, dated 09/10/2017 of the Monitoring report /1/ covering the monitoring period from 31/12/2014 to 30/12/2016 publicly available on 30/10/2017 through its dedicated interface on the UNFCCC CDM website before undertaking the site visit for the verification from 24/11/2017 to 25/11/2017. This confirms compliance with the §355 and §356 of CDM VVS for project activities, version 01.0 /B01-1/.

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

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This is the 2nd periodic verification of the project activity. There are not any forward action requests from validation or previous verification of the project activity.

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

Means of verification	The verification team determined the conformity of the actual project activity and its operation with the registered PDD /B04/. CCIPL has, by means of a desk review and an on-site visit, assessed that all physical features of the project activity proposed in the PDD are in place, and that the project participants have operated the CDM project activity as per the validated PDD.
Findings	CL 01 and CL 02 had been raised. Please refer Appendix 4 for further details.
Conclusion	The project activity includes construction and operation of biogas units using cow dung. The biogas thus produced is used for cooking purpose in the households. There were no changes observed during OSV from the technology stated during the validation.

CC IPL by means of an on-site inspection and document review, assessed that all physical features (technology, project equipment, and monitoring) of the registered PDD are in place and that the project participants have operated the project as per the registered PDD.

In accordance with § 359 (c) of CDM VVS for project activities, version 01, information (data and variables) provided in the monitoring report that are different from that stated in the registered PDD /B04/, have been assessed. The assessment is summarized below:

Parameter	Ex-ante value in the PDD	Actual operation for the reported monitoring period	Assessment by the verification team
Adjusted total number of biogas units deployed until monitoring period y of end users who confirmed that non-renewable biomass was displaced/substituted (N_y)	In 2015 – 3,000 numbers In 2016 – 3,125 numbers	UUpto 2016 – 607 numbers (and the value of N_y calculated after adjusting the operational time period is 545) /4/	Verification team noted that the actual number of biogas units installed under the project for the monitoring period is much less than the value estimated in the PDD which is deemed acceptable as it does not lead to increase of emission reductions.
Statistically adjusted drop out from total population of units in period y (DO_y)	1%	0 %	The monitored ex-post value of DO_y for the current monitoring period is less than the ex-ante estimated value in the PDD. This is deemed acceptable to the verification team, as it is based on actual monitoring data based on sampling. The relevant monitoring survey documents and the calculations were verified during the OSV interviews and found to be appropriate.

It was confirmed through the monitoring database /7/ that the project activity involves installation of 603 biogas units till the end of the monitoring period. During the reported monitoring period survey, it was found that out of the total samples of 49 households, all of them were operational.

The total annual installed thermal capacity during the monitoring period was 2.014 MW /4/ which is less than 45 MW_{th} and thus the project activity remains under the small scale limit /B02/.

The biogas units have been distributed at different locations in Kiambu county in Kenya. As confirmed through the monitoring database provided in the ER spread sheet, first unit for the project was commissioned on 09/10/2010 and last unit on 29/12/2016 /5/. All the biogas units that were checked during verification site visit were found to be working and the unique identification was traceable through the agreement copies with the respective end users /6/.

CC IPL's verification team considers the project description to be complete and accurate.

In summary, the monitoring period is reasonable and the operation of the project activity is in accordance with the registered PDD. The verification team took

	cognizance of §341 (b)(i), §357, §358 and §359 of CDM VVS for project activities, version 01 /B01-1/.
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E.4. Post-registration changes**E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines**

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There are no temporary deviations for this monitoring period from the registered PDD.

E.4.2. Corrections

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There are no corrections for this monitoring period.

E.4.3. Change to the start date of the crediting period of the project activity

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The Board had approved the change of the start of crediting period prior to the submission of the request of the issuance for the first monitoring period. The start date of crediting period was changed from 01/06/2012 to 31/12/2012 as visible on the project page at UNFCCC web site (<https://cdm.unfccc.int/Projects/DB/RWTUV1340886479.47/view>)

E.4.4. Inclusion of a monitoring plan

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Monitoring plan has not been included to the registered project activity during the monitoring period.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

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No permanent changes from the registered monitoring plan or the monitoring methodology have either been approved by the Board during the monitoring period or being submitted with the request of issuance.

E.4.6. Changes to the project design

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No project design changes from the registered project activity have either been approved by the Board during the monitoring period or being submitted with the request of issuance.

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

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Not applicable

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	The verification team determined whether the registered monitoring plan /B04/ is in accordance with the applied methodology /B02/ (AMS.I.E, version 04)
Findings	-
Conclusion	The verification team is able to confirm that the monitoring plan contained in the registered PDD /B04/ is in accordance with the approved methodology applied by the project activity, i.e. AMS-I.E (version 04) /B02/. The verification team took cognizance of §360, 361 and §362 of CDM VVS for project activities, version 01 /B01-1/.

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

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /B04/. This conclusion has been made based on assessment below in section E.6.1, E.6.2 and E.6.3 below.

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

Means of verification	The verification team has determined whether the registered monitoring plan in the PDD /B04/ has been properly implemented and followed by the PP; whether all parameters fixed ex ante for emission reduction calculation are as per the registered PDD /B04/
Findings	-
Conclusion	Verification team confirms that the Data and parameters fixed ex ante are in compliance with the registered PDD and monitoring plan /B04/. Please refer to the Annex 1 for assessment of each parameter. The verification team took cognizance of §363 of CDM VVS for project activities, version 01 /B01-1/.

E.6.2. Data and parameters monitored

Means of verification	The verification team has determined whether the registered monitoring plan in the PDD /B04/ has been properly implemented and followed by the PP; whether all the ex post monitoring parameters for emission reduction calculation are as per the registered PDD /B04/
Findings	-
Conclusion	Verification team confirms that the Data and parameters monitored are in compliance with the registered PDD and monitoring plan /B04/. Please refer to the Annex 2 for assessment of each of the monitoring parameters. Assessment of Data information flow: The biogas unit population was arranged chronologically by the PP and each unit was assigned a serial number for sampling. A random number generator was used to generate random numbers and the unit with the same serial number were sampled from population for monitoring. 1. The verification team checked the random numbers generated and verified that the samples selected for monitoring were adhering to the same random numbers in the population. 2. The verification team checked the survey records and verified that the records mentioned in the ER spread sheet for were consistent with the primary records. 3. The verification team interviewed personnel involved in monitoring survey and found them competent. Thus, it is confirmed that the verification team assessed the data / information flow from the point of monitoring to emission reduction calculation and found no gap in the same. The verification team took cognizance of §363, §364 and 367 of CDM VVS for project activities, version 01 /B01-1/.

E.6.3. Implementation of sampling plan

Means of verification	The verification team assessed whether the compliance of the sampling efforts and surveys with the validated sampling plan in the registered PDD /B04/ to determine data and parameters monitored has been followed in the monitoring report /1/
Findings	-
Conclusion	The total population of the biogas units installed are 607 in the current monitoring period. The monitoring parameter required to be monitored through the sampling plan is the "Statistically adjusted drop out from total population of units in period y" (DO _y).

	Simple random sampling was applied for selection of the monitoring samples with 95/5 confidence/precision which is deemed acceptable as per the registered PDD /B04/ for biennial monitoring. The number of samples was calculated as 49 /4/. Calculation procedure of the sample size was checked by the verification team and found to be in accordance with the registered PDD /B04/ and the Sampling Standard /B07/. The monitoring parameter was collected following a specially designed survey form. It was found that the desired 95/5 confidence/precision was met (section E.6.2 above may be referred for more details). Further the verification team used sampling during verification for checking the operational status of the biogas units. PP had calculated the drop-out rate based on its 49 monitoring samples. Considering that the achieved annual emission reductions for the project activity are less than 100,000 tCO₂e, applying paragraph 33 (a) of the sampling standard, version 07 /B07/, a sample size of 8 HHs was chosen (with no discrepant records). A sample size of 8 was required, based on an AQL of 0.5 % and UQL of 20 %, producer risk 10 % and consumer risk 20 %. Acceptance number (c) thus determined for the sample is 0. It was observed that out of the 8 samples, all the 8 samples were found to be operational which matched with the PP's records and hence no discrepant records were observed with the published MR /1/ and ER sheet /3/ and thus c=0. Thus, PP's set of records has been accepted in line with § 32 of the sampling standard, version 07 /B07/. Verification team confirms that the sampling approach applied by the PP is in accordance with the registered PDD /B04/ including the Guidelines: Sampling and surveys for CDM project activities and programmes of activities, Version 04.0 /B06/ and Standard: Standard for sampling and surveys for CDM project activities and programme of activities, version 07.0 /B07/.
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E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The verification team determined whether the calibration of the measuring equipment that has an impact on the claimed emission reductions is conducted by the PP at a frequency specified in the registered monitoring plan /B04/.
Findings	-
Conclusion	No measuring equipment was used for the monitoring.

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

In line with the requirement of § 375 of CDM VVS for project activities, version 01.0, verification team has reviewed the Monitoring report and ER spread sheet to check the arithmetic calculation of the emission reductions. The equation used for the calculation is compared with those provided in the registered PDD /B05/ and the applied methodology AMS-I.E, version 04 /B02/ and found to be correct.

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

Means of verification	The verification team assessed whether the calculation of baseline GHG emissions as presented in the monitoring report /1/ and the emission reduction spread sheet /2/ are in accordance with the formulae and methods described in the registered monitoring plan /B04/.
Findings	-
Conclusion	The equations for baseline emissions, as provided in the monitoring report /1/ and confirmed with the registered PDD /B04/ and the methodology AMS-I.E, version 04 /B02/, are: $ER_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossilfuel}$

	$B_y = N_y \times B_y \text{ (net per unit)} \times (1 - DO_y)$ $B_y \text{ (net per unit)} = B_y \text{ (gross per unit)} \times LE_{NRB}$ Where: ER_y = Emission reductions during the year y in tCO₂e $B_y \text{ (gross per unit)}$ = Quantity of fuelwood and woodfuel consumption for charcoal that is substituted or displaced in tonnes (fixed ex ante as 4.482 tonnes/year/household) $B_y \text{ (net per unit)}$ = Quantity of fuelwood and woodfuel consumption for charcoal that is substituted or displaced in tonnes including potential leakages (fixed ex ante as 4.257 tonnes/year/household) LE_{NRB} = Net to gross adjustment factor for leakage (0.95 default value) $f_{NRB,y}$ = Fraction of non renewable woody biomass used in the absence of the project activity in year y (fixed ex ante as 96.2%) $NCV_{biomass}$ = Net calorific value of the non-renewable woody biomass that is substituted (fixed ex ante as 0.015 TJ/tonne) (IPCC default for wood fuel, 0.015 TJ/tonne) $EF_{projected_fossilfuel}$ = Emission factor for the substitution of non-renewable woody biomass by similar consumer (Default value of 81.6 tCO₂/TJ). N_y = Adjusted total number of biogas units deployed until year y of end users who confirmed that non-renewable biomass was displaced/substituted (monitored values is 545) DO_y = Statistically adjusted drop out from total population of units in period y (monitored value of 0 %) From the above equation and the parameter values, $ER_y = 5,463 \text{ tCO}_2\text{e}$ The verification took cognizance of § 375 of CDM VVS for project activities, version 01.0) /B01-1/.
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E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	The verification team assessed whether the calculation of project GHG emissions as presented in the monitoring report /1/ and the emission reduction spread sheet /2/ are in accordance with the formulae and methods described in the registered monitoring plan /B04/.
Findings	-
Conclusion	There are no project emissions identified in the monitoring methodology /B02/ and the PDD /B04/.

E.8.3. Calculation of leakage GHG emissions

Means of verification	The verification team assessed whether the calculation of leakage GHG emissions as presented in the monitoring report /1/ and the emission reduction spread sheet /2/ are in accordance with the formulae and methods described in the registered monitoring plan /B04/.
Findings	-
Conclusion	A default (0.95) Net to gross adjustment factor to account for leakages (LE_{NRB}) has been considered by the project and thus it is in line with the requirement of monitoring methodology /B02/ and the PDD /B04/.

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

Means of verification	The verification team has checked whether calculations of GHG emissions reductions have been carried out in accordance with the formula and methods
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	described in the registered monitoring plan /B04/ and the monitoring methodology /B02/.
Findings	-
Conclusion	Verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence and calculations are done in accordance with the pre-defined formulae from registered PDD /B04/. The total number of CERs achieved during the monitoring period is 5,463 tCO₂e. In summary, verification team confirms that actual emission reduction is lower than the estimate of the registered PDD for the current monitoring period.

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

Means of verification	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings	-
Conclusion	The ex ante estimated value of the emission reductions for the monitoring period as per the registered PDD is 80,701 tCO₂e and the actual emission reductions achieved for the monitoring period is 5,463 tCO₂e. Verification team confirms that actual emission reduction is lower than the estimate of the registered PDD for the current monitoring period. The verification team took cognizance of \$375 of CDM VVS for project activities, version 01 /B01-1/.

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

Means of verification	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings	-
Conclusion	Verification team confirms that actual emission reduction is lower than the estimate of the registered PDD for the current monitoring period.

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

Means of verification	The verification team has determined the CER achieved during first commitment period and second commitment period
Findings	-
Conclusion	CER achieved upto 31st Dec 2012 = 0 tCO₂e. CER achieved from 1st Jan 2013 = 5,463 tCO₂e

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

Means of verification	Not applicable
Findings	-
Conclusion	-

E.10. Global stakeholder consultation

Means of verification	Not applicable
Findings	-
Conclusion	-

SECTION F. Internal quality control

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The final verification report passed a technical review before being submitted to the UNFCCC Executive Board. The technical review was performed by a technical reviewer qualified in accordance with CCIPL's qualification scheme for CDM validation and verification.

SECTION G. Verification opinion

>>

Carbon Check (India) Private Ltd. (CC IPL) has performed the second periodic verification of the registered CDM Project Activity "Nairobi River Basin Biogas Project" having UNFCCC reference number as 6549.

The verification team assigned by the DOE concludes that the project activity as described in the registered PDD (Version 2.4, date 11/06/2012) /B04/ and the Monitoring report (version 4, dated 14/12/2017) /2/, meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol and paragraph 62 of CDM M&P, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification has been conducted in-line with the CDM VVS for project activities, version 01.0 requirements /B01-1/.

Verification methodology and process:

The Verification team confirms the contractual relationship signed on 07/07/2017 between the DOE, Carbon Check (India) Private Ltd. and the Project Participant, (atmosfair gGmbH). The team assigned to the verification meets the CC IPL's internal procedures including the UNFCCC requirements for the team composition and competence. The verification team has conducted a thorough contract review as per UNFCCC and CC IPL's procedures and requirements.

The verification has been performed as per the requirements described in the CDM VVS for project activities, version 01.0 and constitutes the review and completion of the following steps:

- Reviewing the registered PDD (version 2.4, date 11/06/2012), including the monitoring plan and the corresponding validation report /B04/;
- Publication of the MR (version 1, 09/10/2017) /1/ on the UNFCCC website on 30/11/2017
- Desk review of the validation report, MR and other relevant documents including documents related to the projects activities in emission reductions
- Review of the applied monitoring methodology (AMS-I.E version 04) /B02/;
- Review of any CMP and EB decisions, clarifications and guidance /B05/;
- On-site assessment (24/11/2017 – 25/11/2017)
- Resolution of CARs and CLs raised during verification
- Issuance of Verification Report

The project activity was correctly implemented according to selected monitoring methodology, monitoring plan and the registered PDD. The monitoring system was installed, maintained in a proper manner, while collected monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through the review and on site visit the verification team confirms that the project activity has resulted in the 5,463 tCO₂e emission reductions during the second monitoring period.

Verified emission reductions for the project activity: 5,463 tCO₂e.

The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:

Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO ₂ e)	0	5,463

CC IPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION H. Certification statement

Carbon Check (India) Private Ltd., the DOE, has performed the verification of the registered project activity “Nairobi River Basin Biogas Project” having UNFCCC Registration Number 6549. The project activity involves installation of domestic biogas units which are fed with cow dung to produce renewable biogas used for cooking and water heating purpose. The project activity is saving greenhouse gas emissions by replacing non-renewable biomass with renewable biogas.

The project activity is designed to generate emission reductions by installation of the biogas units in the Kiambu county in Kenya. The PP is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions. It is DOE’s responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity. The DOE does not express any opinion on the selected baseline scenario or on the validated and registered PDD. The verification is carried out in-line with the requirements of CDM VVS for project activities.

The verification was performed to identify the compliance with implementation and monitoring requirements, and to verify the actual amount of achieved emission reductions, through obtaining evidence and information on-site that included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

The verification is based on:

- PDD version 2.4 dated 11/06/2012 and the corresponding validation report;
- Approved monitoring methodology AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User”, version 04;
- Monitoring reports versions 1, version 2, version 3 and version 4 dated 09/11/2017, 29/11/2017, 06/12/2017 and 14/12/2017 respectively.

This statement covers verification period from 31/12/2014 and 30/12/2016 (including both the dates). The DOE had raised 02 clarification requests, all of which have been resolved by the PP.

The DOE considers necessary to give reasonable assurance that reported GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology and the monitoring plan contained in the registered PDD are fairly stated.

The DOE, hereby certifies that the project activity, achieved emission reductions by sources of GHG equal to 5,463 tCO₂ equivalent and all monitoring requirements have been fulfilled and is substantiated by an audit trail that contains evidence and records. The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:

Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO ₂ e)	0	5,463

Appendix 1. Abbreviations

Abbreviations	Full texts
AQL	Acceptable Quality Limit
CL	Clarification Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CAR	Corrective Action Request
CC IPL	Carbon Check (India) Private Ltd.
CER	Certified Emission Reduction
CL	Clarification Request
CME	Co-ordinating and Managing entity
CO ₂	Carbon Dioxide
CO _{2e}	Carbon Dioxide Equivalent
DR	Document review
DOE	Designated Operational Entities
DVR	Draft Verification Report
EB	CDM Executive Board
EF	Emission Factor
EI	External individual
FA	Final Approval
FAR	Forward Action Request
FVR	Final verification Report
GHG	Greenhouse gas(es)
I	Interview
IPCC	Intergovernmental Panel on Climate Change
IR	Internal resource
PP	Project Participant
OSV	On Site Visit
QC/QA	Quality control/Quality assurance
RMP	Revised Monitoring Plan
TA	Technical Area
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
UQL	Unacceptable Quality Limit
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers



Carbon Check (India) Private Ltd.

Sanjay Agarwalla

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 06.0):

For following functions:

Validator	☒	Team Leader	☒	Technical reviewer	☒
Verifier	☒	Technical Expert	☒	Local Expert ¹	☒

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☒	TA 9.2	☒	TA 13.2	☐
TA 1.2	☒	TA 4.1	☒	TA 8.1	☐	TA 10.1	☐	TA 14.1	☐
TA 2.1	☒	TA 5.1	☒	TA 9.1	☒	TA 13.1	☒		

Vikash K. Singh
Mr. Vikash Kumar Singh
Compliance Officer

Amit
Mr. Amit Anand
CEO

Date of Approval
23/12/2016

Valid Till
22/12/2017

Revision History of the Document

26/12/2014	Initial Adoption
24/12/2015	Annual Revision
20/01/2016	Interim Revision for office address change
23/12/2016	Annual Revision

¹India

CARBON CHECK (INDIA) PRIVATE LIMITED

Registered in India: U74930DL2012PTC232495

Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005

Corporate off: G 49 & 50, 3rd Floor, Sector - 3, NOIDA (Uttar Pradesh) - 201301

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Carbon Check (India) Private Ltd.

Anubhav Dimri

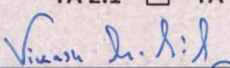
has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 06.0):

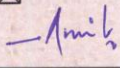
For following functions:

Validator	☒	Team Leader	☒	Technical reviewer	☒
Verifier	☒	Technical Expert	☒	Local Expert ¹	☒

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☐	TA 9.2	☐	TA 13.2	☐
TA 1.2	☒	TA 4.1	☐	TA 8.1	☐	TA 10.1	☐	TA 14.1	☐
TA 2.1	☐	TA 5.1	☐	TA 9.1	☐	TA 13.1	☒		


 Mr. Vikash Kumar Singh
 Compliance Officer


 Mr. Amit Anand
 CEO

Date of Approval
 23/12/2016

Valid Till
 22/12/2017

Revision History of the Document

26/12/2014	Initial Adoption
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¹India, South Africa

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Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	atmosfair	1. Webhosted Monitoring report 2. Monitoring report 3. Monitoring report	Version 1, dated 09/10/2017 Version 2, dated 29/11/2017 Version 3, dated 06/12/2017	PP
2	atmosfair	Final Monitoring report	Version 4, dated 14/12/2017	PP
3	atmosfair	Emission reduction calculation spread sheet corresponding to /1/	Version 1, dated 09/10/2017	PP
4	atmosfair	Emission reduction calculation spread sheet, corresponding to /2/	Version 4, dated 14/12/2017	PP
5	atmosfair	Evidence for the commissioning of the first biogas unit on 09/10/2010	-	PP
6	atmosfair	Evidence for unique identification of the biogas units (agreement copies)	-	PP
7	atmosfair	Evidence for the total number of biogas units distributed during the monitoring period for the determination of the monitoring parameter "N _y "	-	PP
8	atmosfair	Evidence for determination of the monitoring parameter "DO _y " during the monitoring period	-	PP
9	atmosfair	Copies of the monitoring survey records for the monitoring period including "traceable check" evidence of the units visited during sampling	-	PP
10	atmosfair	Evidence for the biogas units technical specifications	-	PP
11	atmosfair	Sample biogas units sales receipt	-	PP
12	atmosfair	Training records	-	PP
13	atmosfair	Sampling plan along with sample number generator evidence	-	PP
14	atmosfair	Sample agreement copies with the end users	-	PP
15	atmosfair	Copy of the monitoring manual for the project activity	-	PP
16	atmosfair	Copy of the monitoring questionnaires	-	PP
/B01/	UNFCCC	1. CDM validation and verification standard for project activities, version 01.0 2. CDM project standard for project activities, version 01.0 3. CDM project cycle procedure for project activities, version 01.0	http://cdm.unfccc.int/	Others
/B02/	UNFCCC	Applied baseline and monitoring methodology, AMS-I.E, version 04	http://cdm.unfccc.int/	Others
/B03/	UNFCCC	Instructions for filling out the monitoring report form for CDM project activities, version 06.0	http://cdm.unfccc.int/	Others
/B04/	UNFCCC	Registered PDD (version 2.4 dated 11/06/2012), and corresponding validation report.	http://cdm.unfccc.int/	Others
/B05/	Web sites	Websites: http://cdm.unfccc.int/	--	Others
/B06/	UNFCCC	Guidelines: Sampling and surveys for CDM project activities and programmes of activities, version 04.0	http://cdm.unfccc.int/	Others
/B07/	UNFCCC	Standard: Standard for sampling and surveys for CDM project activities and programme of activities, version 07	http://cdm.unfccc.int/	Others
/B08/	UNFCCC	Guideline on the application of Materiality in verifications, version 02.0	http://cdm.unfccc.int/	Others

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

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

FAR ID	xx	Section no.	E.2	Date: DD/MM/YYYY
Description of FAR				
-				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				
				Date: DD/MM/YYYY

Table 2. CL from this verification

CL ID	01	Section no.	E.3	Date: 29/11/2017
Description of CL				
PP has not provided the sample size, precision and the monitoring parameter “DOy” calculations in the ER spread sheet.				
Project participant response				Date: 29/11/2017
The ER spread sheet has been updated and is now including the spreadsheet ‘Sample size + Precision MP2’ and ‘DOy MP2’. The first includes the calculation of the sample size and precision based on the amount of biogas systems installed until the end of MP2 and a 95% confidence level and 5 % Precision. The later includes the calculation of the dropout rate (DOy) based on the results from the monitoring campaign.				
Documentation provided by project participant				
- Kenya_MP2_CER calculation_DM_V2_29112017				
DOE assessment				Date: 07/12/2017
PP has provided revised ER spread sheet containing the monitoring parameter “DOy” and the sample size calculation sheets which has been checked and found to be appropriate. Hence the CL is closed.				

CL ID	02	Section no.	E.3	Date: 29/11/2017
Description of CL				
On page 5 of the published MR, the total number of biogas units till the end of monitoring period has been stated as 457 which does not match with the records provided.				
Project participant response				Date: 29/11/2017
The number of biogas units installed until the end of Monitoring Period 2 (30/12/2016) is 607. Page 5 of the Monitoring Report has been updated accordingly.				
Documentation provided by project participant				
- MR_Kenia CDM 6549_V2_DM_29112017.docx				
DOE assessment				Date: 07/12/2017
PP has submitted revised MR with correct numbers of biogas units installed till the end of monitoring period. Hence the CL is closed.				

Table 3. CAR from this verification

CAR ID	xx	Section no.		Date: DD/MM/YYYY
Description of CAR				
-				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				
				Date: DD/MM/YYYY

Table 3. FAR from this verification

FAR ID	xx	Section No.		Date: DD/MM/YYYY
--------	----	-------------	--	------------------

Description of FAR	
-	
Project participant response	Date: DD/MM/YYYY
Documentation provided by project participant	
DOE assessment	
Date: DD/MM/YYYY	

Annex 1: Assessment of data and parameters fixed ex-ante at the time of validation

Parameter	Quantity of fuelwood and woodfuel consumption for charcoal that is substituted or displaced in tonnes (B_y)
Data unit:	tonnes/year/household
Default values used:	4.257
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non renewable biomass using survey methods ($f_{NRB,y}$)
Data unit:	Fraction
Default values used:	0.962
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	Net calorific value of the non-renewable woody biomass that is substituted ($NCV_{biomass}$)
Data unit:	TJ/tonne
Default values used:	0.015
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	Emission factor for the substitution of non-renewable biomass by similar consumers ($EF_{projected_fossilfuel}$)
Data unit:	tCO ₂ /TJ
Default values used:	81.6
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Annex 2: Assessment of data and parameters monitored

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter: (as in monitoring plan of PDD):	Adjusted total number of biogas units deployed until monitoring period y of end users who confirmed that non-renewable biomass was displaced/substituted (N_y)
Measuring frequency/Time Interval:	Continuous monitoring and recording
Reporting frequency:	Yearly
Reported value:	545 The total number of units commissioned until period y has been calculated from the end user agreements where owner and location of the biogas unit is stated. $N_{i,y} = \sum_{j=1}^y n_i \cdot OT_{adjusted,i,y}$ Where n_i = Number of units commissioned in period i $OT_{adjusted,i,y} = \begin{cases} 1 & , i < y \\ \frac{d_{average,y}}{mp_{length}} & , i = y \end{cases}$ Where $OT_{adjusted,i,y}$ = Adjustment factor for reduced operational time of appliances deployed in period y $d_{average,y}$ = Average number of days that appliances deployed in period y have been operational in period y as determined by respective commissioning dates mp_{length} = Length of monitoring period y From the above equation and the respective commissioning dates of the individual biogas units, the values of N_y are calculated as 545 for the monitoring period. The calculation has been checked by the verification team in the emission reduction spread sheet and found to be correct /4/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Sales database
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	An electronic sales database has been maintained for the project activity.
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA

Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of parameter has been cross-checked with the monitoring database and sample households and the hard copy records were also checked during the OSV.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter: (as in monitoring plan of PDD):	Statistically adjusted drop out from total population of units in period y (DO_y)
Measuring frequency/Time Interval:	Annual
Reporting frequency:	Annual
Reported value:	0 %
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from the monitoring survey of samples
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA.

Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, reported data in MR has been compared with monitoring survey report and the ER sheet
How were the values in the monitoring report verified?	The values in the monitoring report were compared against the values in ER sheet
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place. The confidence/precision applicable is 95/5. Standard error of proportion is calculated by using the formulae $\sqrt{(1-f)*pq/n}$; where, f = sampling fraction p = sample proportion q=1-p n = sample size This is deemed correct in line with paragraph 31, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 04.0 /B06/. The Relative precision has been calculated using the formulae $z * \text{standard error of proportion} / \text{fraction of operational stoves}$. This is deemed correct in line with paragraph 38 and 39, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 04.0 /B06/. The precision achieved by the samples is calculated to be 4.05 %, which is less than the required precision of 5 % and hence deemed acceptable.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA.

Document information

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