




**Verification and certification report form for CDM programme of activities**  
(version 01.0)

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

**VERIFICATION AND CERTIFICATION REPORT**

<b>Title of the programme of activities (PoA)</b>	SimGas Biogas Programme of Activities	
<b>UNFCCC reference number of the PoA</b>	7734	
<b>Version number(s) of the PoA-DD(s) applicable to this report</b>	7.0	
<b>Version number of the verification and certification report</b>	1. <del>2</del> <sup>4</sup>	
<b>Completion date of the verification and certification report</b>	<del>31/03/2018</del> <sup>06/12/2017</sup>	
<b>Monitoring period number</b>	01	
<b>Duration of this monitoring period</b>	20/01/2013 to 31/12/2015 (including both days)	
<b>Number and version number of the monitoring report to which this report applies</b>	Number 1.0 Version 3. <del>4</del> <sup>3</sup>	
<b>Coordinating/managing entity (CME)</b>	SimGas IP BV	
<b>Host Party(ies)</b>	Host Party(ies) of the PoA	Is this a host Party to a CPA covered in this report?(yes/no)
	Kenya	Yes
<b>Sectoral scope(s)</b>	1 : Energy industries (renewable - / non-renewable sources) 15 : Agriculture	
<b>Selected methodology(ies)</b>	<a href="#">AMS-III.R. ver. 2</a> - Methane recovery in agricultural activities at household/small farm level <a href="#">AMS-I.E. ver. 4</a> - Switch from Non-Renewable Biomass for Thermal Applications by the User <a href="#">AMS-I.I. ver. 4</a> - Biogas/biomass thermal applications for households/small users	
<b>Selected standardized baseline(s)</b>	N/A	
<b>Total estimated GHG emission reductions or net GHG removals for this monitoring period in the included CPA(s) covered in this report</b>	126,322 tCO <sub>2</sub> e	
<b>Total certified GHG emission reductions or net GHG removals for this monitoring period for the included CPA(s) covered</b>	<del>2,5193,543</del> tCO <sub>2</sub> e	

in this report	
Name of DOE	EPIC Sustainability Services Private Limited (E-0062)
Name, position and signature of the approver of the verification and certification report	K. Sudheendra, Director and Head Operations 

## SECTION A. Executive summary

EPIC Sustainability Services Private Limited (EPIC) has been contracted by SimGas IP BV to undertake the initial periodic independent verification of the registered CDM programme of activity titled “SimGas Biogas Programme of Activities” (UNFCCC reference number: 7734). The objectives of this verification are to verify and certify emission reductions reported for project activity for the monitoring period of 20/01/2013 to 31/12/2015 (first and last day included); and to verify that the data reported are complete and transparent.

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board’s decisions.

The verification team has, based on the recommendations in the Validation and Verification Standard<sup>/1/</sup> version 9.0, and employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of CERs. The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

The scope of the verification is the independent and objective review and ex-post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the validated and approved project design document PoA-DD<sup>/5/</sup> version 7.0 dated 13/10/2016 (hereinafter referred to as PoA-DD), corresponding validation report<sup>/4/</sup>, validated CPA-DD<sup>/5/</sup> (CPA 1) version 7.0 dated 13/10/2016, corresponding validation report<sup>/4/</sup>. These documents were reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

The PoA involves the implementation of biogas digesters with stoves at households/SMEs/communities in The Republic of Kenya. The programme of activities reduces GHG emissions due to displacing non-renewable biomass and fossil fuels in cooking requirement by biogas digesters. The biogas systems are fed with a feedstock of manure and/or organic waste, which is anaerobically digested to produce biogas. Additionally, the biogas systems that use manure as a feedstock also reduces CH<sub>4</sub> emissions by diverting manure that would otherwise decompose without the capture and use of the methane. This verification covers CPA-1.

The Coordinating/Managing Entity of the SSC-PoA is SimGas IP BV. Upon sale of the biogas system, the end users sign a sales contract, transferring the rights to the CERs generated to SimGas IP BV.

The verification team determines the conformity of the actual project activity and its operation with the validated PoA-DD and CPA-DD. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM programme of activity are in place, and that the project participants have operated the CDM project activity as per the PoA-DD<sup>/5/</sup> and the CPA-DD. Thus the verification team has concluded that the project activity was implemented and operated as per PoA-DD<sup>/5/</sup> and the CPA-DD<sup>/5/</sup>, and that all physical features of the project are in place and comply with para 270 to 273 of VVS<sup>/1/</sup>. The start date of this monitoring period is 20/01/2013 which is in line with the CPA-DD<sup>/7/</sup>.

The monitoring report<sup>/6/</sup> for this monitoring period in general is in compliance with the monitoring plan of the PoA-DD<sup>/5/</sup> and the CPA-DD<sup>/5/</sup>. However, for this MR period temporary deviation is observed with respect to carrying out of annual survey monitoring, and this is reported as Post Registration Changes with respect to temporary deviation from registered monitoring plan without

requiring prior approval, and it is assessed as per Appendix 1 of PS Ver 9.0 and PRC report submitted along with this issuance request. The project activity was registered by applying the small scale methodologies<sup>/8/</sup> AMS-III.R. ver. 2, AMS-I.I. ver. 3 and AMS.I.E version 4.0, later the project applied the new version of the methodology AMS-I.I. ver. 4. The post registration changes for the application of new version of the meth (AMS-I.I) along with few other corrections to project information were approved on 08 Feb 2017 through prior approval track. The verification was carried out in accordance with the applied versions of the methodologies. It was confirmed during, the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodologies.

It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC's verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC's approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for this monitoring period.

The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

## **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 review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	Anbazhagan	Prabu Das	EPIC, Central office, Bangalore	√	√	√	√
2.	Team Member	ER	Mwangi	Monica	EPIC, Central office, Bangalore	√	√	√	√

### **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	Radhamadhavan	Vijayaraghavan	EPIC, Central office, Bangalore
2	Technical Expert	ER	Seshan	Ranganathan	EPIC, Central

	assisting TR				office, Bangalore
2.	Approver-Head Operations	IR	Krishnachar	Sudheendra	EPIC, Central office, Bangalore

## SECTION C. Means of verification

### C.1. Desk review

The verification was performed primarily based on the review of the monitoring report, registered PoA-DD<sup>/2/</sup> version 4.1, Generic CPA-DD<sup>/2/</sup> and the CPA-DD version 4.0<sup>/2/</sup> and its corresponding validation report<sup>/3/</sup>, revised PoA-DD<sup>/5/</sup> version 7.0 and the revised CPA-DD version 7.0<sup>/5/</sup> 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, paying particular attention to the frequency of measurements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reduction.

The monitoring report version 01 (hereinafter referred to as initial MR) submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CL) which are presented in Appendix 4 of this report. As a result of these findings, the MR is revised to MR version 03.~~34~~<sup>/6/</sup>. A complete list of all documents and records reviewed is as attached in Appendix 3 of this report.

**C.2. On-site inspection**

Duration of on-site inspection: 18/07/2016 to 21/07/2016				
No.	Activity performed on-site	Site location	Date	Team member
1.	<p>The verification team conducted visits to the project site between 18/07/2016 to 21/07/2016 to confirm the information and to resolve issues identified in the document review. An on-site assessment was conducted as a part of verification activity and involved:</p> <p>1) an assessment of the implementation and operation of the CDM programme of activity as per the PoA-DD and the CPA-DD's<sup>/5/</sup></p> <p>2) a review of information flows for generating, aggregating and reporting of the monitoring parameters</p> <p>3) interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan</p> <p>4) a cross-check between information provided in the MR and data from other sources</p> <p>5) a check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the PoA-DD and the applied methodology</p> <p>6) a review of calculations and assumptions made in determining the GHG data and ERs, and</p> <p>7) an identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters</p>	<p>SimGas office visit at Nairobi</p> <p>SimGas Kenya Ltd.</p> <p>P. O. Box 104699-00101 Nairobi, Kenya</p> <p>Five Star Road, South C Estate, House No. 11</p>	<p>18/07/2016 to 21/07/2016</p>	<p>Anbazhagan Prabu das, Mwangi Monica</p>

**C.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Kynaston	Oliver	COO (Chief Operating Officer), SimGas	18/07/2016 to 21/07/2016	Performance of project activity -Project Implementation, Monitoring, Data management and reporting, QA/QC systems, logistics, interactions with Biogas digesters end users	Anbzhagan Prabu das, Mwangi Monica
2.	Galt	Hilda	Senior Consultant, Climate Focus		Sampling, Internal quality, Documentation, MR, CER sheets, Sampling, Record keeping Customer complaints	Anbzhagan Prabu das, Mwangi Monica
3.	Moses	Ogeto Gekara	SimGas, Country Manager, Kenya		Construction, Agreements, complaint management Repairs, User trainings, spares availability, interactions with the end users, scheduled inspections	Anbzhagan Prabu das, Mwangi Monica
4.	Pan	Sabela	SimGas, Research and Development Officer		Sampling, survey, training to enumerators, Internal quality, Documentation, interactions with the end users	Anbzhagan Prabu das, Mwangi Monica
5.	Tanui	Pauline	SimGas, Human Resources and Customer Care Manager, Kenya		Internal quality, Documentation, employee training, records keeping	
6.	Households (26)	Sampled and non-sampled house holds		18/07/2016 to 21/07/2016	Status of Biogas digester operation and its usage, operation and maintenance, and availability of trained personnel, down times, (if any), reasons for non-usage, cattle availability, household numbers, spares availability etc	Anbzhagan Prabu das, Mwangi Monica

**C.4. Sampling approach**

During the on-site verification, a sampling approach has been used to verify the reported values for the monitored parameters. The verification team sampled the biogas digesters. The sampling approach is conducted according to the "Guidelines for Sampling and Surveys for CDM Project Activities and Programme Activities", Version 04.0<sup>13/</sup>. Acceptance sampling has been adopted for verification.

The PP had adopted the sampling approach as detailed in the validated PoA-DD/CPA-DD for this monitoring period. PP has adopted Multi-stage sampling approach with 90% confidence level and 10% margin of error. As required in the PoA-DD/CPA-DD the PP has conducted annual survey

and the data from the survey conducted during 29/02/2016 to 15/03/2016 has been adopted for emission reduction calculations for this monitoring period. The verification team confirms that the PP has chosen from geographical clusters and number of samples from each cluster was shown proportionate to the cluster size. The verification team checked the calculations done to calculate the minimum sample size and confirms that the calculations are in order. Even though the sample size calculated for the CPA 7734-0001 is 22, the PP to be conservative and to be more representative has considered a sample size of 52 for the CPA7734-0001. Since the PP has adopted a sampling approach, the verification team had adopted an acceptance sampling approach to verify the data. The verification team considered an Acceptable Quality Level of 1% and Unacceptable quality level of 20% and verified that data for samples against the sample size of 21 required as per calculation complying with *Guideline for Sampling and Surveys for CDM project activities and programmes of activities version 04.0<sup>13/</sup>*. The verification team found no variation in the samples considered. In view of this the verification team accepts the sampling done by the PP for the CPA 7734-0001 and confirms that the same is complying with the EB guidance on sampling. In total 26 households were visited during verification site visit. Further, the verification team also during the site visit, inspected few households that were not part of the sample considered by the PP, and found the digesters functional.

The verification team verified at site the data with respect to and finds that there is no variation with that provided by the PP in the sample considered and so the verification team concludes that the sampling done and the data used for calculation of emission reduction are in order.

#### C.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
<b>General</b>			
Compliance of the monitoring report with the monitoring report form	-	02	-
Remaining forward action requests from validation and/or previous verification	-	-	-
Specific-case CPA(s) considered for verification and covered in this report	-	-	-
<b>Programme of activities</b>			
Compliance of the programme implementation with the registered PoA-DD	-	-	-
Implementation and operation of the management system	-	-	-
Post-registration changes			
<ul style="list-style-type: none"> <li>Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Corrections</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Inclusion of a monitoring plan in a registered PoA-DD (including its generic CPA-DD(s))</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA</li> </ul>	-	-	-
<ul style="list-style-type: none"> <li>Types of changes specific to afforestation and reforestation activities</li> </ul>	-	-	-
<b>Component project activity(ies)</b>			
Compliance of the CPA implementation with the included CPA design document	02	01	-
Post-registration changes	-	-	-
<ul style="list-style-type: none"> <li>Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline</li> </ul>	-	-	-



• Corrections	-	-	-
• Changes to the start date of the crediting period	-	-	-
• Inclusion of a monitoring plan to an included CPA-DD	-	-	-
• Permanent changes to the monitoring plan as described in the included CPA-DD, applied methodology, or applied standardized baseline	-	-	-
• Changes to the programme design of the included CPA-DD	-	-	-
• Types of changes specific to afforestation and reforestation component project activities	-	-	-
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline	-	-	-
Compliance of monitoring activities with the registered monitoring plan	02	02	-
• Data and parameters fixed ex ante or at renewal of crediting period	-	-	-
• Data and parameters monitored	-	-	-
• Implementation of sampling plan	-	-	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	-	-	-
• Calculation of project GHG emissions or actual net GHG removals by sinks	-	-	-
• Calculation of leakage GHG emissions	-	-	-
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	-	-	-
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included specific-case CPA	-	-	-
• Remarks on difference from estimated value in registered PDD	-	-	-
Others (please specify)			
<b>Total</b>	<b>04</b>	<b>05</b>	<b>-</b>

## SECTION D. Internal quality control

After the completion of assessment by the verification team all the relevant documentation is submitted to a qualified, Independent Technical reviewer as part of EPIC' internal quality control system. A Technical reviewer team is appointed to review the draft final verification report (Draft FVR). The comments made by the Technical reviewer team are taken into consideration and incorporated in the final FVR. The technical reviewer team assesses whether all the reporting requirements have been fulfilled and whether all the issues raised were closed satisfactorily by the verification team with justification. The technical review process can also raise issues in this regard which is resolved further by the verification team to the satisfaction of the technical reviewer. The technical reviewer team either accepts or rejects the report made by the verification team. The final report (after resolutions of all findings) is then submitted to the Head-operations for review and approval.

## SECTION E. Verification opinion

EPIC Sustainability Services Private Limited (EPIC) has been contracted by SimGas IP BV to undertake the initial periodic independent verification of the registered CDM programme of activity titled "SimGas Biogas Programme of Activities" (UNFCCC reference number: 7734). The objectives of this verification are to verify and certify emission reductions reported for project

activity for the monitoring period of 20/01/2013 to 31/12/2015 (first and last day included); and to verify that the data reported are complete and transparent.

The verification team determines the conformity of the actual project activity and its operation with the registered project design document. EPIC has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the registered and validated PoA-DD and CPA-DD (CPA 01) are in place, and that the project participants have operated the CDM project activity as per the registered and validated PoA-DD and CPA-DD<sup>/5/</sup>. Thus the verification team has concluded that the project activity was implemented and operated as per registered and validated PoA-DD and CPA-DD<sup>/5/</sup>, and that all physical features of the project are in place.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the approved PoA-DD and CPA-DD<sup>/5/</sup>. The start date of this monitoring period is 20/01/2013 which is as per the CPA-DD (CPA-01).

The monitoring report for this monitoring period is in compliance with the monitoring plan of the approved PoA-DD and CPA-DDs<sup>/5/</sup>. The project activity was validated by applying the small scale methodologies<sup>/8/</sup> AMS-III.R. ver. 2, AMS I-E version 4.0 and AMS-I.I. ver. 4 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology.

The management of project participants is responsible for the preparation and reporting of GHG emissions data, and the reported GHG emission reduction on the basis set out within the project monitoring plan. The development and maintenance of records and reporting procedures in accordance with the monitoring plan, including the calculation and determination of GHG emission reduction from the project is the responsibility of the management of the project. It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC's verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC's approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for this monitoring period.

The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

The verification team has verified that the information included in the revised monitoring report is correct and that the emission reduction achieved has been determined correctly. Based on the information seen and evaluated, the verification team confirms the following:

Project title <sup>/2/</sup> :	SimGas Biogas Programme of Activities
UNFCCC ref no <sup>/2/</sup> :	7734
PoA-DD <sup>/5/</sup> :	Version 7.0, dated 13/10/2016
Monitoring report <sup>/6/</sup> :	Version 3.34, dated <del>28/11/2017</del> <u>30/03/2018</u> ; first verification
Methodology used for	AMS-III.R. ver. 2 - Methane recovery in agricultural

verification <sup>/8/</sup> :		activities at household/small farm level AMS-I.E. ver. 4 - Switch from Non-Renewable Biomass for Thermal Applications by the User AMS-I.I. ver. 4 - Biogas/biomass thermal applications for households/small users
Applicable period <sup>/8/</sup> :	monitoring	20/01/2013 to 31/12/2015 (including both days)
Emissions verified <sup>/7/</sup> :	reductions	<u>2,5193,543</u> tCO <sub>2</sub> e

**SECTION F. Certification statement**

&gt;&gt; Refer Section G

**SECTION G. Verification findings - General****G.1. Compliance of the monitoring report with the monitoring report form**

<b>Means of verification</b>	As per VVS version 9.0 <sup>/1/</sup> , 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.
<b>Findings</b>	Two CARs (CAR 01 and CAR 02) are raised in this section.
<b>Conclusion</b>	PP has used the version 1.0 of the MR template <sup>/6/</sup> which is current and active one. The monitoring report has been prepared as per the instructions provided in the template. EPIC has made the version 01.0 of the monitoring report <sup>/6/</sup> covering the monitoring period from 20/01/2013 to 31/12/2015; publicly available on 05 <sup>th</sup> July 2016 through its dedicated interface on the UNFCCC CDM website before undertaking the site visit for the verification. The verification team has concluded that the monitoring report was completed using the valid version of the applicable monitoring report form and is followed the guidelines given in the template itself.

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

>> The verification has reviewed the validation report and observed that there is no open issue i.e FARs was found from the validation. The verification team has not raised a forward Action Request (FAR) during this verification process.

**G.3. Specific-case CPA(s) considered for verification and covered in this report**

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Is the specific-case CPA considered for this verification? (yes/no)	Version number of the registered PoA-DD to which the specific-case CPA complies with	Confirmation that a request for issuance including the specific-case CPA has been published for the previous monitoring period (Y/N)
CPA 7734-0001	Yes	Version number: 7.0, Date: 13/10/2016	NA (as it is the first verification)

## SECTION H. Verification findings – Programme of activities

## H.1. Compliance of the programme implementation with the registered programme design document

Means of verification	As per VVS version 9.0 <sup>/1/</sup> , the verification team determined the conformity of the actual project activity and its operation with the registered project design document. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DD <sup>/5/</sup> are in place, and that the project participants have operated the CDM project activity as per the PDD <sup>/5/</sup> .																				
Findings	No CAR/CL is raised in this section.																				
Conclusion	<p>The verification team determines the conformity of the actual project activity and its operation with the approved project design document. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DD are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DD<sup>/5/</sup>.</p> <p>Project location:-</p> <table><tr><td>Host Country</td><td>Republic of Kenya</td></tr><tr><td>Region:</td><td>Various locations across Kenya</td></tr></table> <p>Technical details of digesters:-</p> <p>The technologies used in this CPA for the current MR period is <b>Manure-fed biogas systems</b> (“Rural systems”) with a sludge and gas holding capacity range from 2 to 16 m<sup>3</sup>. The different sizes of the digesters that are included in the CPA for the current MR period are of 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16 and 24 m<sup>3</sup> (each of the individual systems remains below the micro-scale limit). However, other sizes are also eligible under the programme as long as they meet the methodologies and micro-scale additionality guidelines. <b>Organic waste-fed biogas systems</b> (“urban systems”) are also applicable under the programme, but for this CPA-001 it is not implemented.</p> <p>The digester size, technology, usage, programme logo (SimGas) on the digesters, GPS coordinates of the digester location, baseline information, livestock, slurry applications are confirmed through physical inspections of the installed bio digesters, interview with the end users and the technology suppliers. Further, the owners name and address, size of the plant, installation/commissioning date and its operational status, utilisation of other fuels in the end users premises were verified through interview and visual observation. This information is also verified to be inline with the biogas user survey and Ke - Central GesiShamba Database report.</p> <p>Details of the CPA implemented under SimGas Biogas Programme covered in this MR period:-</p> <table><tr><th>Ref</th><th>CPA title</th><th>Year</th><th>Number of Digesters commissioned</th></tr><tr><td rowspan="3">CPA 7734-0001</td><td rowspan="3">SimGas Biogas Programme of Activities, Kenya (CPA KE1)</td><td>2013</td><td>70</td></tr><tr><td>2014</td><td>158</td></tr><tr><td>2015</td><td>48</td></tr><tr><td>Total</td><td></td><td></td><td>276</td></tr></table> <p>Sales contract<sup>/11/</sup> signed between supplier (SimGas) and the user,</p>	Host Country	Republic of Kenya	Region:	Various locations across Kenya	Ref	CPA title	Year	Number of Digesters commissioned	CPA 7734-0001	SimGas Biogas Programme of Activities, Kenya (CPA KE1)	2013	70	2014	158	2015	48	Total			276
Host Country	Republic of Kenya																				
Region:	Various locations across Kenya																				
Ref	CPA title	Year	Number of Digesters commissioned																		
CPA 7734-0001	SimGas Biogas Programme of Activities, Kenya (CPA KE1)	2013	70																		
		2014	158																		
		2015	48																		
Total			276																		

	commissioning log <sup>/09/</sup> , (Ke Central GesiShamba) database <sup>/14/</sup> maintained by the CME were reviewed for the implementation of the bio-digesters. Thus the verification team has concluded that the project activity was implemented and operated as per PoA-DD and CPA-DD, and that all physical features of the project are in place.
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## H.2. Implementation and operation of the management system

<b>Means of verification</b>	The verification team carried out onsite visits for the CPAs and interviewed key personnel and several households (sampled and non-sampled). Interviewees included the CME, project developer and the company who takes care of maintenance activity. It was established that the programme management system has been implemented and operated as described in the registered PoA-DD and CPA-DDs.
<b>Findings</b>	No CAR/CL is raised in this section.
<b>Conclusion</b>	Based on document review, stakeholder interview, on-site verification, the verification team confirms the implementation and operation of the management system included in the registered PoA-DD and CPA-DD.

## H.3. Post-registration changes

### H.3.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline

>> Temporary deviation is applicable for this MR period. Please refer to Validation report on Post Registration Changes, Ver 1.0<sup>1</sup> dated 31/03/2018~~06/12/2017~~, submitted along with this issuance, for assessment of Temporary deviation of the registered monitoring plan.

### H.3.2. Corrections

>>

Three corrections namely i) Removal of serial numbers on the biogas digesters, ii) Removal of tracking quantity of manure fed into digester and iii) Correction to the calculation of "PEleakage" were proposed and it was approved by CDM-EB on 08 Feb 2017<sup>/15/</sup> through prior approval track.

### H.3.3. Inclusion of a monitoring plan in a registered PoA-DD (including its generic CPA-DD(s))

>> Not applicable

### H.3.4. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

>> Updation of the applied methodology AMS-I.I from version 3.0 to 4.0 was approved by CDM-EB on 08 Feb 2017<sup>/15/</sup> through prior approval track. The only difference between the two versions is the ability to apply a default value for the parameter  $BS_{k,y}$  'The net quantity of renewable biomass or biogas consumed by the thermal application'.

### H.3.5. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

Following updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA was approved by CDM-EB on 08 Feb 2017<sup>/15/</sup> through prior approval track

- Change to the eligibility criteria relating to time induced boundary for inclusion of specific-case CPAs within the time frame in the PoA-DD is done. Registered PoA-DD required that

the biogas digesters are commissioned within the timeframe specified in the CPA-DD, this requirement is removed in the revised PoA-DD<sup>/5/</sup>.

- Reference to the requirement for serial numbers of the biogas digesters has been removed from the eligibility criteria table.

### H.3.6. Types of changes specific to afforestation and reforestation activities

>> Not applicable as the project does not involve afforestation and reforestation activity.

## SECTION I. Verification findings – Component project activity(ies)

### I.1. Compliance of the CPA implementation with the included CPA design document

<b>Means of verification</b>	As per VVS version 9.0 <sup>/1/</sup> , the verification team determined the conformity of the actual project activity and its operation with the registered project design document. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs <sup>/5/</sup> are in place, and that the project participants have operated the CDM project activity as per the PDD <sup>/5/</sup> .																		
<b>Findings</b>	Two CLs (CL 01 and CL 02) and a CAR (CAR 05) are raised in this section.																		
<b>Conclusion</b>	<p>The verification team determines the conformity of the actual project activity and its operation with the approved PoA-DD and CPA-DD. CPA-1 was also confirmed to be operational in accordance with the validated CPA-DD<sup>/5/</sup>, except for the <i>Organic waste-fed biogas systems</i> which is not implemented in the CPA-1 for the current MR period.</p> <p><b>Manure-fed biogas systems</b> of following nos are implemented:</p> <table border="1"> <thead> <tr> <th>Ref</th><th>CPA title</th><th>Year</th><th>Number of Digesters commissioned<sup>/9/</sup></th></tr> </thead> <tbody> <tr> <td rowspan="3">CPA 7734-0001</td><td rowspan="3">SimGas Biogas Programme of Activities, Kenya (CPA KE1)</td><td>2013</td><td>70</td></tr> <tr> <td>2014</td><td>158</td></tr> <tr> <td>2015</td><td>48</td></tr> <tr> <td>Total</td><td></td><td></td><td>276</td></tr> </tbody> </table> <p>The different sizes of the digesters that are included in the CPA-1 for the current MR period are of 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16 and 24 m<sup>3</sup> (each of the individual systems remains well below the micro-scale limit). The largest digester included in the CPA is 24 m<sup>3</sup> which produces only <del>9.067.00</del> kWth, which is far below the limit of 450 kWth.</p> <p>The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DD are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DDs<sup>/5/</sup>.</p>			Ref	CPA title	Year	Number of Digesters commissioned <sup>/9/</sup>	CPA 7734-0001	SimGas Biogas Programme of Activities, Kenya (CPA KE1)	2013	70	2014	158	2015	48	Total			276
Ref	CPA title	Year	Number of Digesters commissioned <sup>/9/</sup>																
CPA 7734-0001	SimGas Biogas Programme of Activities, Kenya (CPA KE1)	2013	70																
		2014	158																
		2015	48																
Total			276																

### I.2. Post-registration changes

#### I.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>> Temporary deviation is applicable for this MR period. Please refer to Validation report on Post Registration Changes, Ver 1.0<sup>1</sup> dated ~~31/03/2018~~~~06/12/2017~~, submitted along with this issuance, for assessment of Temporary deviation of the registered monitoring plan.

**I.2.2. Corrections**

>> Corrections namely i) Removal of serial numbers on the biogas digesters, ii) Removal of tracking quantity of manure fed into digester and iii) Generalisation of the size of the digesters but to meet the micro-scale limit were proposed and

**MCF and temperature**

The value of methane conversion factor (MCFs) varies depending on the national temperature. The registered CPA-DD<sup>/2/</sup> listed the temperatures per regions. However, for simplicity, this has been modified to use the MCF based on the national average temperature of 25.10C<sup>1</sup> for Kenya. This approach results in a higher ex-ante emission reduction calculation under AMS-III.R, but a lower ex-post emission reduction under AMS-III.R due to the actual observed baseline manure handling ratio techniques being different from those assumed ex-ante in the CPA-DD. The corrected (i.e. applying 25.1C) ex-ante MCF is 44.9%, whilst the ex-post MCF 6.14%. If regional values were applied as in registered CPA-DD, the ex-post MCF would be 6.52%. This is therefore a conservative correction and results in slightly lower emission reductions from AMS-III.R than estimated.

Relating to the above correction, some manure management techniques and their respective MCFs that were missing from the MCF table in Table 4 of the registered CPA-DD is therefore updated in the revised CPA-DD<sup>/5/</sup>, from the IPCC's Table 10.17 2006 IPCC Guidelines for National Greenhouse Gas Inventories based on the national average temperature of Kenya.

Above corrections were approved by CDM-EB on 08 Feb 2017<sup>/15/</sup> through prior approval track.

**I.2.3. Changes to the start date of the crediting period**

>> Not applicable

**I.2.4. Inclusion of a monitoring plan to an included CPA-DD**

>> Not applicable

**I.2.5. Permanent changes to the monitoring plan as described in the included CPA-DD, applied methodology, or applied standardized baseline**

>> Updation of the applied methodology AMS-I.I from version 3.0 to 4.0 was approved by CDM-EB on 08 Feb 2017 through prior approval track. The only difference between the two versions is the ability to apply a default value for the parameter BS<sub>k,y</sub> 'The net quantity of renewable biomass or biogas consumed by the thermal application'.

**I.2.6. Changes to the programme design of the included CPA-DD**

Following updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA was approved by CDM-EB on 08 Feb 2017<sup>/15/</sup> through prior approval track

- Time induced boundary - Change to the eligibility criteria relating to time induced boundary for inclusion of specific-case CPAs within the time frame in the PoA-DD is done. Registered PoA-DD required that the biogas digesters are commissioned within the timeframe specified in the CPA-DD, this requirement is removed in the revised PoA-DD<sup>/5/</sup>.

<sup>1</sup> As evidenced by World Bank, *Climate Change Knowledge Portal*, Average Monthly Temperature for Kenya from 1990 – 2012 [online] Available from: [http://sdwebx.worldbank.org/climateportal/index.cfm?page=country\\_historical\\_climate&ThisCCCode=KEN](http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCCode=KEN) . See also temperature analysis file 'World Bank Temp Data 10 year', cell A220



- Reference to the requirement for serial numbers of the biogas digesters has been removed from the eligibility criteria table.

### I.2.7. Types of changes specific to afforestation and reforestation component project activities

>> Not applicable as the project does not involve afforestation and reforestation activity.

### I.3. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

<b>Means of verification</b>	As per VVS version 9.0 <sup>/7/</sup> , the verification team determined whether the registered monitoring plan is in accordance with the applied methodologies <sup>/8/</sup> including applicable tools.
<b>Findings</b>	There is no CAR/CL raised in this section.
<b>Conclusion</b>	The verification team was able to confirm that the monitoring plan contained in the validated PoA-DD/CPA-DD <sup>/5/</sup> is in accordance with the approved methodologies applied by the project activity, i.e. AMS-III.R. ver. 2, AMS-I.I. ver. 3 and AMS.I.E version 4.0 and its applicable tools. The monitoring report for this monitoring period is in compliance with the monitoring plan of the CPA-DD <sup>/5/</sup> . The project activity was registered by applying the small scale methodologies <sup>/8/</sup> AMS-III.R. ver. 2, AMS-I.I. ver. 3 and AMS.I.E version 4.0 and the verification was carried out in accordance with the applied methodologies. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the applied methodologies <sup>/8/</sup> .

### I.4. Compliance of monitoring activities with the registered monitoring plan

#### I.4.1. Data and parameters fixed ex ante or at renewal of crediting period

<b>Means of verification</b>	As per VVS version 9.0 <sup>/7/</sup> , the verification team has determined whether all ex-ante parameters used for emission reduction calculation stated in the monitoring report are used appropriately as per the PoA-DD and CPA-DD <sup>/5/</sup> .
<b>Findings</b>	One CL (CL 04) is raised in this section.
<b>Conclusion</b>	The following data and parameters fixed ex ante were checked by the verification team to be in line with validated CPA-DD <sup>/5/</sup> : CPA-01 <ul style="list-style-type: none"> <li>• <math>B_{y \text{ rural}}</math></li> <li>• <math>B_{y \text{ urban}}</math></li> <li>• <math>F_{NRB,y}</math></li> <li>• NRB</li> <li>• DRB</li> <li>• <math>SNU_{NRB \text{ switch}}</math></li> <li>• Capacity</li> <li>• <math>EF_{\text{projected\_fossilfuel}}</math></li> <li>• <math>NCV_{\text{biomass}}</math></li> <li>• <math>NCV_{\text{biogas}}</math></li> <li>• <math>EF_{\text{fossil fuel}}</math> (LPG and Kerosene)</li> <li>• <math>\eta_{BL}</math></li> <li>• <math>\eta_{PJ}</math></li> <li>• <math>VS_{\text{dairy cow}}</math></li> <li>• <math>VS_{\text{market swine}}</math></li> <li>• <math>VS_{\text{goat}}</math></li> </ul>



	<ul style="list-style-type: none"> <li>• <math>V_{S_{sheep}}</math></li> <li>• <math>B_{0dairy\ cow}</math></li> <li>• <math>B_{0market\ swine}</math></li> <li>• <math>B_{0goat}</math></li> <li>• <math>B_{0sheep}</math></li> <li>• <math>UF_b</math></li> <li>• <math>PE_{leakage}</math></li> <li>• <math>N_s</math></li> <li>• <math>D_{CH4}</math></li> <li>• <math>B_{sk,y}</math></li> </ul>
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#### I.4.2. Data and parameters monitored

<b>Means of verification</b>	As per VVS version 9.0 <sup>/1/</sup> , the verification team has determined whether the registered monitoring plan has been properly implemented and followed by the PP that the monitoring has been carried out in accordance with the registered monitoring plan.								
<b>Findings</b>	One CL (CL04) and a CAR (CAR 03) are raised in this section.								
<b>Conclusion</b>	<p>As per the registered monitoring plan, following parameters are monitored:-</p> <ol style="list-style-type: none"> <li>1) N “Number of biogas systems commissioned”. The values of the parameter is verified through the review of sales contract<sup>/11/</sup>, commissioning protocol<sup>/9/</sup> and the SimGas Project Database ‘Ke – Central GesiShamba Database<sup>/14/</sup>’ spreadsheet. Unique GPS coordinates of each digester avoid double counting and they are verified to be recorded upon commissioning of the digesters. <table border="1"> <thead> <tr> <th>Period</th><th>Number of biogas digesters commissioned</th></tr> </thead> <tbody> <tr> <td>20/01/2013 – 31/12/2013</td><td>70</td></tr> <tr> <td>01/01/2014 – 31/12/2014</td><td>158</td></tr> <tr> <td>01/01/2015 – 31/12/2015</td><td>48</td></tr> </tbody> </table> </li> <li>2) <math>MCF_j</math> – through Baseline survey completed on commissioning of installations</li> <li>3) <math>MS_{\%BI,j}</math> – through Baseline survey completed on commissioning of installations</li> <li>4) <math>n_{k,y}</math> Operational rate of the thermal applications installed - annual survey based on sample</li> <li>5) <math>Displacement_{NRB}</math> – annual survey based on sample</li> <li>6) <math>OP_{hours}</math> – annual survey based on sample</li> <li>7) <math>N_{da,y}</math> – annual survey based on sample</li> <li>8) <math>N_{p,y}</math> – annual survey based on sample</li> <li>9) <math>N_{LT,y}</math> – annual survey based on sample</li> <li>10) <math>WST_{generation,y}</math> – annual survey based on sample</li> <li>11) <math>WST_{fed,y}</math> – annual survey based on sample</li> <li>12) <b>Soil application</b> – annual survey based on sample</li> </ol> <p>The parameters in S.no 2 to 3 are determined through baseline survey which is done upon commissioning of digester installations. And the parameters in s.no 4 to 12 are obtained from annual biogas digesters survey. For this monitoring period, annual survey was not done and the survey was done only once (this is reported as temporary deviation. Please refer to Validation report on Post Registration Changes, Ver 1.01 dated <del>06/12/2017</del>31/03/2018, submitted along with this issuance, for assessment of Temporary deviation of the monitoring plan).</p> <p>Annual monitoring was not carried out for the following input parameters used in the emission reduction calculations under AMS-III.R:</p> <ul style="list-style-type: none"> <li>○ <math>n_{k,y}</math> Operational rate of thermal applications installed</li> </ul>	Period	Number of biogas digesters commissioned	20/01/2013 – 31/12/2013	70	01/01/2014 – 31/12/2014	158	01/01/2015 – 31/12/2015	48
Period	Number of biogas digesters commissioned								
20/01/2013 – 31/12/2013	70								
01/01/2014 – 31/12/2014	158								
01/01/2015 – 31/12/2015	48								

- $N_{da,y}$  Number of days animal is alive on the farm;
- $N_{p,y}$  Number of animals produced annually of type LT for year y;
- $N_{LT,y}$  Average number of animals of type LT in year y (population)

All other monitored parameters that are inputs in the emission reduction calculations were monitored on an ongoing basis as and when new customers were added to the programme, including:

- Number of biogas systems commissioned
- Methane conversion factor for each manure management system j
- Fraction of manure handled in the baseline animal manure management system j
- Global Warming Potential of methane

Other monitored parameters not mentioned above do not impact the calculation of emission reductions.

So inline with the Para 2 and 3 of Appendix 1 of Project Standard, the parameters ( $N_{da,y}$ ,  $N_{p,y}$ , and  $N_{LT,y}$ ) are reported as '0' and the parameter ( $n_{k,y}$  operational Rate) is assumed to be operated at maximum capacity for the full period of the missing data (see justification in sec I.2.1 of this report).

#### **Analysis of the parameter ( $n_{k,y}$ operational Rate):**

For estimating the emission reduction calculations in the earlier submission, consideration of digester to be operational when response in column N of sheet "160330 ke-carbon" is "yes", to calculate the parameter  $n_{k,y}$  (Operational rate of the thermal application installed) is based on the assurance that those digesters is made operational in the following month of the survey. Regular follow-up of customers is a prime commitment on the part of SimGas (CME) both for on-going operational and commercial reasons. But the documentary evidence to substantiate that those digesters are made operational is not made available. Hence, to be on the conservative side in the CER estimation the following approach is undertaken now. The correction is - If a customer responds 'No', in column M in sub-sheet "160330 ke-carbon", then their digester has not been operational for the past month' so the particular customer is considered to be dropped out of the program, only for this MR period. Accordingly, the value of the parameter  $n_{k,y}$  is revised to 75.93% from the earlier value of 87.04% which the verification team confirms to be appropriate. Additionally discount factor is also applied to the CER value when compliance to the requirement of 90/10 confidence level is assessed (Please refer to 'Analysis of survey results' for detailed analysis). For comparison and to demonstrate conservativeness, the recent monitoring survey in the year 2017 (15 September – 20 October 2017 (which employs the same analysis approach as described above) yielded an operational rate of 86.57% in response to the exact same question.

#### **Analysis of survey results in meeting the requirement of the 90/10 confidence level for each of the monitored parameters.**

As per the Guidelines for 'Sampling and surveys for CDM project activities and programmes of activities', Version 4.0 an outlier analysis is carried out on all mean (ie. non-proportional) data (refer sheet 'Outlier analysis' of the monitored data spread sheet titled "20180330 Monitoring Results KE MP1 + ANALYSIS"). An interquartile analysis was carried out to identify the 'inner fence' outliers via the most commonly applied method of analysis that identifies data points that are 1.5 times above or below the interquartile range. In order to identify true outliers, an 'outer fence' outlier analysis was also conducted to identify data points that are 3 times above or below the

interquartile range. Only data points that were identified as 'outer fence' outliers were carefully scrutinized to determine whether they should be excluded from the data analysis or not. The verdict for each data point identified as a possible outlier, and rational, is provided in the spread sheet titled "20180330 Monitoring Results KE MP1 + ANALYSIS", sheet "Outlier analysis" columns F, J, N, R and V entitled 'Verdict' of for each parameter evaluated.

Once the outlier analysis was completed, compliance with the 90/10 confidence level was evaluated for each monitored parameter. Please refer to the sheet 'Analysis' columns F to Q of the monitored data spread sheet titled "20180330 Monitoring Results KE MP1 + ANALYSIS".

This analysis revealed that all monitored data meet the 90/10 confidence level, apart from the following parameters (a. Operational rate of thermal application installed, b. Average annual hours of operation of a system, c. Average number of cows produced annually, d. Average number of pigs produced annually) which are listed below (see column N in sheet 'Analysis'), for which the discount factors/lower bound value following the Standard for Sampling & Surveys (v07) paragraph 17 (b) therefore needed to be applied. Paragraph 17 (c) states that the option to apply a discount factor is only permitted if 1) the survey is undertaken within the first two years of the crediting period and 2) when the attained confidence/precision from the actual samples is equal to or better than 90/15 for small-scale CDM project activities.

Since this is the first MR period, it is acknowledged that the project meets the first requirement as the discount factor is applied by the PP for the first time and not applied repeatedly. Further, it is also in compliance with the para 17 of the applied methodology AMS-I.E ver 4.0 which states that "In cases where survey results indicate that 90/10 precision... is not achieved, the lower bound of a 90 per cent... confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10... precision" without any further time boundary stated. This is the project's first monitoring report, the delayed periodical survey and the impact on the parameters is already assessed in the separate PRC report.

Compliance of the second requirement is assessed below:- The attained confidence/precision from the actual samples is equal to or better than 90/15 for all parameters listed below.

For the parameter '**Operational rate of thermal application installed**',  $n_{k,y}$ . The achieved precision is 11.3%, 1.3% higher than the 10 % target. Therefore the emission reductions were discounted by no less than three times the percentage precision points missed, inline with the Standard for Sampling & Surveys (V07), paragraph 17 (b) (i) (b). See the emission reduction calculation spreadsheet, sheet 'CDM CPA 1 Total ERs', rows 84 – 88. The operational rate applied in the ER calculations is 75.93%. For comparison and to demonstrate conservativeness, the more recent monitoring survey in the year 2017 (15 September – 20 October 2017) yielded a value of 86.57%.

For the parameter, '**Average annual hours of operation of a system**',  $OP_{hours}$ . The achieved precision was 12%, 2% higher than the 10% target. Therefore, the lower bound of the confidence interval was applied as per

Standard for Sampling & Surveys (V07), para 17, (b) (i) (a), and AMS-I.E (V 04), paragraph 17. For comparison and to demonstrate conservativeness, the more recent monitoring survey in the year 2017 (15 September – 20 October 2017) yielded a value of 1536 (or an average of 4.21 hours per day).

For the parameter, **Number of animals produced annually of type LT for the year,  $N_{p,y}$**

- i. For average number of cows produced annually, the achieved precision was 15%, 5% higher than the 10% target. Therefore, the lower bound of the confidence interval was applied as per Standard for Sampling & Surveys (V07), para 17, (b) (i) (a). This is a conservative approach. For comparison and to demonstrate conservativeness, a more recent monitoring survey in the year 2017 (15 September – 20 October 2017) yielded a value of 5.65 cows.
- ii. For average number of pigs produced annually. The survey revealed that only 3 customers owned pigs, with significant variation in the number owned (from 0- 300). It is reported to be prohibitively expensive to carry out additional monitoring in order to meet the 90/10 confidence level for this parameter due to the large sample size that would be needed. The PP has therefore chosen to report this parameter as zero, in line with the Para 2 of Appendix 1 of Project Standard, version 9.0, which is accepted by the verification team.

For the parameter, **Amount of waste/animal manure generated on the farm in year y**

% pig manure fed into the digester. The survey revealed that only 3 customers owned pigs, with significant variation in the number owned (from 0- 300). It is reported to be prohibitively expensive to carry out additional monitoring in order to meet the 90/10 confidence level for this parameter due to the large sample size that would be needed. The PP has therefore chosen to report this parameter as zero, in line with the Para 2 of Appendix 1 of Project Standard, version 9.0, which is accepted by the verification team.

The Survey procedures adopted in determining the monitored value is verified to be as per the applicable standards and relevant requirement. QA/QC procedures followed for the MR period is appropriate. Kindly refer the ER sheet<sup>7/</sup> for the values of the parameters above.

Review of Survey spreadsheet titled "20180330 Monitoring Results KE MP1 + ANALYSIS Monitoring Results 160330\_KE + ANALYSIS"<sup>10/</sup> confirms that the values are correct, and it is further confirmed that the same values are applied in the ER spreadsheet<sup>7/</sup>.

The verification team verified at site the monitored data and parameters with respect to and finds that there is no variation with that provided by the PP in the survey sample considered, so the verification team concludes that the sampling followed in the survey, survey procedures followed and the resultant data used for calculation of emission reduction are in order.

#### I.4.3. Implementation of sampling plan

<b>Means of verification</b>	As per para 391 of VVS version 9.0 <sup>7/</sup> , the verification team assessed whether the compliance of the sampling efforts and surveys with the
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	registered sampling plan is in accordance with the “Guideline for sampling and surveys for CDM project activities and programme of activities” <sup>13/</sup> version 4.0, if the PP had applied a sampling approach to determine data and parameters monitored.								
Findings	One CL 03 and a CAR (CAR 04) are raised in this section								
Conclusion	<p>The following parameters are determined by annual survey, and the survey is done through sampling</p> <ol style="list-style-type: none"><li>1) <b>n<sub>k,y</sub></b> Operational rate of the thermal applications installed - annual survey based on sample</li><li>2) <b>Displacement<sub>NRB</sub></b> – annual survey based on sample</li><li>3) <b>OP<sub>hours</sub></b> – annual survey based on sample</li><li>4) <b>N<sub>da,y</sub></b> – annual survey based on sample</li><li>5) <b>N<sub>p,y</sub></b> – annual survey based on sample</li><li>6) <b>N<sub>LT,y</sub></b> – annual survey based on sample</li><li>7) <b>WST<sub>generation,y</sub></b> – annual survey based on sample</li><li>8) <b>WST<sub>fed,y</sub></b> – annual survey based on sample</li><li>9) <b>Soil application</b> – annual survey based on sample</li></ol> <p>As per the validated CPA-DD the monitoring and usage survey is to be carried out annually. But the CME has carried out the survey only in the year 2016 whereas the project implementation under the CPA-1 was in place since 2013. Out of the total 276 digesters that are considered for the current MR period under CPA-1, 70 were installed in the year 2013, 158 were installed in 2014 and 48 were in 2015. For this monitoring period, annual survey was not done and the survey was done only once (this is reported as temporary deviation. Please refer to Validation report on Post Registration Changes, Ver 1.10 dated <u>31/03/2018</u><del>06/12/2017</del>, submitted along with this issuance, for assessment of Temporary deviation of the monitoring plan).</p> <table><tr><th>CPA</th><th>No of digesters</th><th>Survey period</th><th>Total no of samples</th></tr><tr><td>CPA-1</td><td>276</td><td>24/02/2016 to 15/03/2016</td><td>5<del>42</del></td></tr></table> <p>Sample size was determined using Multi-stage sampling in consistent with the monitoring plan of the validated CPA-DD, and the <i>Guidelines for sampling and surveys for CDM project activities and programme of activities</i><sup>13/</sup>. The sampling was performed within the level of precision of 10% and a confidence level of 90% <u>(please refer to sec 1.4.2 above and excel spreadsheet titled “20180330 Monitoring Results KE MP1 + ANALYSIS” for detailed analysis of the monitored parameters)</u>. The verification team has reviewed the sampling approach through onsite visit interview and by the review of the methodology followed by the surveying. The sampling method adopted in the survey of the CPA 1 is verified to be in compliance with the guideline.</p> <p>Multistage sampling involves sampling from a number of groups (known as primary sampling units), and then to sample units within each group (known as secondary sampling units). In difference to cluster sampling where all of the secondary units are measured, in multi-stage sampling data are collected for only a sample of the secondary units. The survey was completed using face to face household (end users) interviews conducted</p>	CPA	No of digesters	Survey period	Total no of samples	CPA-1	276	24/02/2016 to 15/03/2016	5 <del>42</del>
CPA	No of digesters	Survey period	Total no of samples						
CPA-1	276	24/02/2016 to 15/03/2016	5 <del>42</del>						

	<p>by members of staff of Simgas Kenya Ltd. The survey was completed on a customised mobile phone application<sup>2</sup> designed and built by the CME. The results of the survey were automatically uploaded to the server of the CME and were checked for consistency and accuracy and then downloaded for analysis in Excel spreadsheet. During onsite visit, the verification team has reviewed the mobile application used by the CME for its robustness, ease of use, questionnaire, data capture, data duplication and data processing. The verification team gained confirmation that the survey carried out through mobile application can be accepted.</p> <p>Further, It is confirmed that the survey has been carried out as per EB Guidelines for sampling and surveys for CDM project activities and programme of activities. The training to the enumerators, questions used in the survey was verified by the verification team.</p> <p>It is observed that, all the biogas digesters sold are registered under Ke Central GesiShamba database<sup>14/</sup> and their operational performance is monitored through field surveys of a random sample of the installed digesters in the end users. The biogas production is the digester is not required to be metered. This approach is verified to be as per the validated PoA-DD and CPA-DD's.</p>
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#### 1.5. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	Not applicable as there is no monitoring equipment involved as per the registered monitoring plan in the PoA-DD and CPA-DD
Findings	Not applicable
Conclusion	Not applicable

#### 1.6. Assessment of data and calculation of emission reductions or net removals

##### 1.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	As per VVS version 9.0 <sup>17/</sup> , the verification team assessed whether the data and calculations of baseline emission resulting from the PoA-DD and CPA-DD is correct. The verification team has checked whether calculations of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the PoA-DD and CPA-DD.														
Findings	There is no CAR/CL raised in this section.														
Conclusion	<p><b>Calculation of baseline emissions under AMS-I.E (version 4.0)</b></p> <table border="1"> <tr> <td></td><td><math>ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected, fossilfuel}</math></td></tr> <tr> <td colspan="2">In which:</td></tr> <tr> <td><math>ER_y</math></td><td>Emissions Reductions during the year y (tCO<sub>2</sub>e)</td></tr> <tr> <td><math>B_y</math></td><td>Quantity of woody biomass that is substituted or displaced in tonnes</td></tr> <tr> <td><math>f_{NRB,y}</math></td><td>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 (percentage)</td></tr> <tr> <td><math>NCV_{biomass}</math></td><td>Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, <b>0.015 TJ/tonne</b>. The value is according to the methodology AMS I.E.</td></tr> <tr> <td><math>EF_{projected-fossilfuel}</math></td><td>Emission factor for substitution of non renewable woody biomass by similar consumers. Use a value of <b>81.6tCO<sub>2</sub>/TJ</b>.</td></tr> </table>		$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected, fossilfuel}$	In which:		$ER_y$	Emissions Reductions during the year y (tCO <sub>2</sub> e)	$B_y$	Quantity of woody biomass that is substituted or displaced in tonnes	$f_{NRB,y}$	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 (percentage)	$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, <b>0.015 TJ/tonne</b> . The value is according to the methodology AMS I.E.	$EF_{projected-fossilfuel}$	Emission factor for substitution of non renewable woody biomass by similar consumers. Use a value of <b>81.6tCO<sub>2</sub>/TJ</b> .
	$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected, fossilfuel}$														
In which:															
$ER_y$	Emissions Reductions during the year y (tCO <sub>2</sub> e)														
$B_y$	Quantity of woody biomass that is substituted or displaced in tonnes														
$f_{NRB,y}$	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 (percentage)														
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, <b>0.015 TJ/tonne</b> . The value is according to the methodology AMS I.E.														
$EF_{projected-fossilfuel}$	Emission factor for substitution of non renewable woody biomass by similar consumers. Use a value of <b>81.6tCO<sub>2</sub>/TJ</b> .														

<sup>2</sup> As permitted via the Guidelines for 'Sampling and surveys for CDM project activities and programmes of activities (version 4.0), Section 9.1.1

The baseline emissions per biogas digester were therefore:

$$BE_y = 7.42 * 95.1\% * 0.015 * 81.6 = 8.64 \text{ tCO}_2\text{e/year}$$

The ex-ante values applied in the formula are as per the validated CPA-DD and the applied methodology and the ex-post value is as per the monitored value, which the verification team consider as appropriate.

#### Calculation of baseline emissions under AMS-I.I (version 4.0)

$$ER_y = \sum_k N_{k,0} * n_{k,y} * BS_{k,y} * EF * \eta_{PJ/BL} * NCV_{\text{biogas}} - LE_y$$

Where:

$ER_y$  Emission reductions from fossil fuel use during the year  $y$  in  $\text{tCO}_2\text{e}$

$N_{k,0}$  Number of thermal applications  $k$  commissioned

$n_{k,y}$  Proportion of  $k,0$   $N$  that remain operating in year  $y$  (fraction)

$BS_{k,y}$  The net quantity of renewable biogas consumed by the thermal application  $k$  in year  $y$ . A default biogas generation rate of  $0.13 \text{ Nm}^3 \cdot \text{m}^3 \cdot \text{day}^{-1}$  is applied. This is equivalent to 0.3080 tonnes per year

$EF$  Mean  $\text{CO}_2$  emission factor, in tonnes/TJ (calculated as the mean of  $EF_{\text{fossil fuel}}$ )

$\eta_{PJ/BL}$  Ratio of efficiencies of project equipment and baseline equipment

$NCV_{\text{biogas}}$  Net calorific value of the biogas, use default value:  $0.0215 \text{ GJ/m}^3$  of biogas. This is equivalent to 0.0182 TJ/tonne

The baseline emissions per biogas digester were therefore:

$$BE_y = 75.93\% * 87\% * 0.3080 * 70.8 * 3.67 * 0.0182 = 1.1127 \text{ tCO}_2\text{e/year}$$

The ex-ante values applied in the formula are as per the validated CPA-DD and the applied methodology and the ex-post value is as per the monitored value, which the verification team consider as appropriate.

#### Calculation of baseline emissions under AMS-III.R (version 2.0)

$$BE_y = GWP_{\text{CH}_4} * D_{\text{CH}_4} * UF_b * \sum_{j,LT} MCF_j * B_{O,LT} * N_{LT,y} * VS_{LT,y} * 365 * MS\%_{BI,j}$$

Where:

$BE_y$  Baseline emissions from manure handling during the year  $y$  in  $\text{tCO}_2\text{e}$

$GWP_{\text{CH}_4}$  Global Warming Potential of methane

$D_{\text{CH}_4}$   $\text{CH}_4$  density ( $0.00067 \text{ t/m}^3$ )

$UF_b$  Model correction factor to account for model uncertainties (0.94)

$LT$  Index for all types of livestock



$J$	Index for animal manure management system
$MCF_j$	Annual methane conversion factor (MCF) for the baseline manure management system $j$
$B_{0,LT}$	Maximum methane producing capacity for manure produced by livestock category LT in $m^3 CH_4/kg\ dm$
$N_{LT,y}$	Annual average number of animals of type LT in year $y$ (numbers)
$VS_{LT}$	Daily volatile solid excreted for livestock category LT in kg/day
$MS\%_{BI,j}$	Fraction of manure handled in the baseline animal manure management system $j$

Calculation of  $N_{LT,y}$

$N_{LT,y}$  was calculated using the following formula:

$$N_{LT,y} = N_{da,y} * \left( \frac{N_{p,y}}{365} \right)$$

Where:

$N_{da,y}$	Number of days animal is alive in the farm in year $y$
$N_{p,y}$	Number of animals produced annually of type LT for year $y$

$N_{LT,y}$  for cows is therefore:

$$N_{cow,y} = 343 * (4.787.22/365) \\ = 4.496.78$$

$N_{LT,y}$  for market swine is therefore:

$$N_{market\ swine,y} = 336 * (6.26/365) \\ = 5.76$$

The baseline emissions per biogas digester were therefore:

$$BE_y = (25 * 0.00067 * 0.94 * 6.14\% * ((0.13 * 4.496.78 * 1.9) + (0.29 * 5.760 * 0.3)) * 365 * 100\%) \\ = 0.397687\ tCO_2e/year$$

The operational % observed by the verification team during the site visit is on the higher side, thus the value considered in the CPA 1 is deemed as conservative.

The ex-ante values applied in the formula are as per the validated CPA-DD and the applied methodology and the ex-post value is as per the monitored value, which the verification team consider as appropriate.

Calculations, applied formulae and method for calculation of baseline emission are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology. Further, the assessment of data and the calculation of baseline emission reduction in the MR<sup>/6/</sup> and the CER excel sheet<sup>/7/</sup> have been verified as per the set of supporting documents listed in Appendix 3.

Hence, the verification team confirms that the baseline emissions<sup>/7/</sup> for the current



	monitoring period calculated as <u>2,758.033,696.79</u> tCO2 is in order
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**I.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks**

<b>Means of verification</b>	As per VVS version 9.0 <sup>17</sup> , the verification team assessed whether the data and calculations of project emission resulting from the PoA-DD and CPA-DD is correct. The verification team has checked whether calculations of project GHG emissions have been carried out in accordance with the formulae and methods described in the PoA-DD and CPA-DD.
<b>Findings</b>	There is no CAR/CL raised in this section.
<b>Conclusion</b>	<p><b>Calculation of project emissions under AMS-I.E (version 4.0)</b> Non consideration of project emission for the project activity is as per the monitoring plan of validated PoA-DD and CPA-DD</p> <p><b>Calculation of project emissions under AMS-I.I (version 4.0)</b> As Option 2 is chosen to calculate the baseline emissions, no project emissions are accounted for.</p> <p><b>Calculation of project emissions under AMS-III.R (version 2.0)</b> Project emissions due to physical leakage of biogas from the animal manure management are accounted for in accordance with option (b) listed in paragraph 13 from AMS-III.D version 18, where a default factor of 0.05m<sup>3</sup> per 1m<sup>3</sup> of produced biogas.</p> $PE_y = X * GWP_{CH_4} * D_{CH_4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * 365 * MS\%_{BI,j}$ <p>Where:</p> <p>X                      Physical leakage of biogas, where a default factor of 0.05m<sup>3</sup> per 1m<sup>3</sup> of produced biogas.</p> <p>BE<sub>y</sub>                      Baseline emissions from manure handling during the year y in tCO<sub>2</sub>e</p> <p>GWP<sub>CH<sub>4</sub></sub>              Global Warming Potential of methane</p> <p>D<sub>CH<sub>4</sub></sub>                      CH<sub>4</sub> density (0.00067 t/m<sup>3</sup>)</p> <p>UF<sub>b</sub>                      Model correction factor to account for model uncertainties (0.94)</p> <p>LT                      Index for all types of livestock</p> <p>J                      Index for animal manure management system</p> <p>MCF<sub>j</sub>                      Annual methane conversion factor (MCF) for the baseline manure management system j</p> <p>B<sub>0,LT</sub>                      Maximum methane producing capacity for manure produced by livestock category LT in m<sup>3</sup> CH<sub>4</sub>/kg dm</p> <p>N<sub>LT,y</sub>                      Annual average number of animals of type LT in year y (numbers)</p> <p>VS<sub>LT</sub>                      Daily volatile solid excreted for livestock category LT in kg/day</p> <p>MS%<sub>BI,j</sub>                      Fraction of manure handled in the baseline animal manure management system j</p>

	<p>The project emissions are therefore:</p> $PE = 0.05 * (25 * 0.00067 * 0.94 * 6.14\% * ((0.13 * 4.496.78 * 1.9) + (0.29 * 05.76 * 0.3)) * 365 * 100\%)$ $= 0.0196384 \text{ tCO}_2\text{e/year}$ <p>The ex-ante values applied in the formula are as per the validated CPA-DD and the applied methodology and the ex-post value is as per the monitored value, which the verification team consider as appropriate.</p> <p>Calculations, applied formulae and method for calculation of project emission are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology. Further, the assessment of data and the calculation of baseline emission reduction in the MR and the CER excel sheet<sup>7/</sup> have been verified as per the set of supporting documents listed in Appendix 3.</p> <p>Hence, the verification team confirms that the project emissions<sup>7/</sup> for the current monitoring period calculated as 3.768.46 tCO<sub>2</sub> is in order</p>
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### I.6.3. Calculation of leakage GHG emissions

<b>Means of verification</b>	As per VVS version 9.0 <sup>7/</sup> , the verification team assessed whether the data and calculations of leakage emission resulting from the PoA-DD and CPA-DD is corrected. The verification team has checked whether calculations of leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
<b>Findings</b>	There is no CAR/CL raised in this section.
<b>Conclusion</b>	<p><b>Calculation of leakage under AMS-I.E (version 4.0)</b> In accordance with the methodology, leakage is accounted for by multiplying emission reductions by a net to gross adjustment factor of 0.95 to account for leakages.</p> <p><b>Calculation of leakage under AMS-I.I (version 4.0)</b> In accordance with the methodology, leakage is not considered if the biogas digesters are part of a Type III CDM project activity. Leakage is therefore accounted for under AMS-III.R since all biogas digesters under the project apply this methodology.</p> <p><b>Calculation of leakage under AMS-III.R (version 2.0)</b> In accordance with the methodology no leakage is considered as the biogas digesters are not transferred from another activity.</p> <p>Hence, the verification team confirms that the leakage emissions<sup>7/</sup> for the current monitoring period calculated as 13274.49 tCO<sub>2</sub> is in order</p>

### I.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

<b>Means of verification</b>	As per VVS <sup>7/</sup> version 9.0, the verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the registered CDM project activity. The verification team has checked whether calculations of GHG emission reduction have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
<b>Findings</b>	There is no CAR/CL raised in this section.
<b>Conclusion</b>	The verification team analysed all factors and issues that constitute the basis for emission reductions from the project activity for the current monitoring period. The verification team checked the formulae and data used in the emission reduction calculations and confirms that the same are

correct.

No lack of evidence and missing data were detected during this monitoring period. The verification team confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors and default values are explicitly mentioned in the monitoring report<sup>/6/</sup>.

According to the validated PoA-DD and CPA-DD<sup>/5/</sup> and validated monitoring plan<sup>/5/</sup> as explained in sec I.6.1 to I.6.3 above, emissions reductions are calculated for this MR period.

Therefore, the net emission reductions ER = 2,621.783,513<sup>/7/</sup>. After discounting for the parameter Nk,y, for which the precision points missed were 1.3% the net value is 2621.78 – 102.25 = 2,519 tCO<sub>2</sub>e.  
Note: Discount applied is (3\*1.3%) on the total emission reductions

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (tCO <sub>2</sub> e)		
				Results achieved in the period up to 31 December 2012	Results achieved in the period from 1 January 2013 onwards	Results achieved in the entire monitoring period
7734-0001	<u>3,696.792,758.03</u>	<u>8.463.76</u>	<u>13274.49</u>	0.00	<u>3,5132,621.78</u>	<u>2,621.783,513</u>
				<u>Discounting by 3x the % precision points missed for Nk,y (Operational rate)</u>		<u>-102.25</u>
<b>Total</b>	<u>2,758.033,696.79</u>	<u>3.768.46</u>	<u>132.49174.49</u>	0.00	<u>3,5132,519</u>	<u>2,5193,513</u>

#### I.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included specific-case CPA

<b>Means of verification</b>	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
<b>Findings</b>	There is no CAR/CL raised in this section
<b>Conclusion</b>	The verification team analysed the emission reductions reported during the subject monitoring period in comparison with the estimate in the registered CPA-DD, and found that the ex-ante determined value is on the higher side in comparison to the actual realised value.

Specific-case CPA reference number	Value estimated in ex ante calculation in the included specific-case CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
9572-0001	126,322	<u>2,5193,513</u>

<b>Total</b>	<b>126,322</b>	<b><u>2,5193,513</u></b>
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**I.6.6. Remarks on difference from estimated value in registered PDD**

<b>Means of verification</b>	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
<b>Findings</b>	There is no CAR/CL raised in this section
<b>Conclusion</b>	The ex-ante determined value is on the higher side in comparison to the actual value, this variation is due to the reported lesser implementation of the bio digesters for the current MR period. CPA-DD assumed the implementation of 4,000 manure-fed and 6,000 organic-waste fed digesters in 2013. Whereas the implemented digesters upto 31/12/2015 were only 276. The pace of implementation has been slower during the current MR period, and no organic-waste fed digesters are installed and so the actual values are less than ex-ante values.

## Appendix 1. Abbreviations

Abbreviations	Full texts
AMS	Approved Methodology Small Scale
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reductions
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
CL	Clarification Request
DOE	Designated Operational Entity
ESSPL	EPIC Sustainability Services Private Limited
FAR	Forward Action Request
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
MoV	Means of Verification
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PRC	Post Registration Changes
PS	Project Standard
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

## Appendix 2. Competence of team members and technical reviewers

The following validation team has been assigned to carry out the verification of the project.

Name	Ms Monica Mwangi	Mr. A. Prabu Das	Mr. R. Vijayaraghavan	Mr. Seshan Renganathan
Role	Team Member	Auditor- team member	Technical Reviewer	Expert in TR team
Competence in relevant sectors	Sector 1	Sector 1, Sector 15	Sector 1 and Sector 13	Sector 1, Sector 15
Responsibility	Document review, Participation in site visit	Document review, DVR preparation, DVR resolution, FVR preparation	Technical review	Technical review

**Mr. A Prabu Das**, holds a M. Tech Degree in Energy Conservation and Management and B. Tech Degree in Petro-chemical Technology. He is a certified Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has around 8 years of work experience in Design of biomass Power plants, preparing Techno Economic Feasibility Reports (TEFR), carrying out energy audits, of which last six years have been in CDM consultancy and validation services. He has undergone extensive training on CDM validation and verification and is a qualified lead auditor for Sectoral Scope 1 and 15 in accordance with procedures of EPIC Sustainability Services Pvt. Ltd. He is also an ISO 26000 lead auditor certified by Professional Evaluation and Certification Board (PECB).

**Ms. Monica Mwangi**, from Kenyan, holds a Bachelor of Business Science (BBS) in Financial Economics from Strathmore University and Bachelors in Community Resource Management from Kenyatta University. She has participated in surveys as freelancer expert providing technical solutions and general assistance for the construction of sustainable water, renewable energy and sanitation systems to be used in marginalized neighbourhoods in Africa for CDM projects. She has experience in Monitoring cooking experiments from marginalized households to determine fuel carbon emission factors and working with farming community in monitoring biogas projects and is qualified for Sector 1 and 13 in accordance with procedures of EPIC Sustainability Services Pvt. Ltd

**Mr. R. Vijayaraghavan**, holds BE in Mechanical Engineering, M. Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 12 years of working experience in energy sector including 6 years as validator. He has successfully completed around hundred CDM, VCS/GS projects. He has been qualified as Lead Auditor for Sectoral Scope 1 and 13.

**Mr. Seshan Ranganathan**, holds a Bachelor's Degree in Chemical Engineering and has done diploma course in Management and completed the graduate ship course in Industrial Engineering and has an overall working experience of around thirty two years with twenty four years' experience in Chemical process industry (fertilizer & petrochemical manufacturing) covering production, technical services including energy audits and efficiency studies, waste heat -recovery, efficiency studies of boilers, power plants, safety audits and pollution control activities including waste water treatment, project management, corporate planning, sales, logistics in fertilizer & petrochemical industry. With respect to the thermal power plant the job assignment included the monitoring of flue gas exit temperatures, excess air used efficiency of fuel additives, condition of boiler refractory, insulation of steam lines etc. The experience also includes 5 years in process

design & engineering for chemical process industry. He is qualified validator, verifier and technical reviewer and has eight years' experience working with leading certification bodies. He is involved in the validation/verification of over 100 projects in various roles. He is a qualified expert under Technical Area TA 3.1, TA 1.1 and TA 15 in accordance with procedures of EPIC sustainability services Pvt. Ltd. He is also involved GS validation/verifications of various sectors and participated in webinars conducted by GS foundation time to time.

### Appendix 3. Documents reviewed or referenced

No	Author	Title	Reference s to the document	Provider
1	UNFCCC	Validation and Verification Standard version 9.0 <a href="https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225165215954/accr_stan02.pdf">https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225165215954/accr_stan02.pdf</a> Project Standard version 9.0 <a href="https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225165159970/reg_stan01.pdf">https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225165159970/reg_stan01.pdf</a> Project Cycle Procedure version 9.0 <a href="https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150226145113383/pc_proc01.pdf">https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150226145113383/pc_proc01.pdf</a>	1	Publicly available
2	CME	Registered PoA-DD, Generic CPA-DD, CPA-DD and its corresponding validation report  <a href="http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/BZVSOCK5G9WD-EQF3A7TRMYJ2IPHU0N/view">http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/BZVSOCK5G9WD-EQF3A7TRMYJ2IPHU0N/view</a>	2	Publicly available
3	AENOR (DoE)	Validation report of Registered PoA-DD and CPA-DD <a href="http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/BZVSOCK5G9WD-EQF3A7TRMYJ2IPHU0N/view">http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/BZVSOCK5G9WD-EQF3A7TRMYJ2IPHU0N/view</a>	3	Publicly available
4	EPIC (DoE)	Validation opinion on Revised PoA-DD, version 7.0 and revised CPA-DD, version 7.0	4	Publicly available
5	CME	Revised PoA-DD, version 7.0 and revised CPA-DD, version 7.0	5	CME
6	CME	MR, Version 3.43	6	CME
7	CME	ER sheet, Version 1.32	7	CME
8	UNFCCC	<a href="#">AMS-III.R. ver. 2</a> - Methane recovery in agricultural activities at household/small farm level <a href="#">AMS-I.E. ver. 4</a> - Switch from Non-Renewable Biomass for Thermal Applications by the User <a href="#">AMS-I.I. ver. 4</a> - Biogas/biomass thermal applications for households/small users	8	Publicly available
9	CME & owner of the digester	Commissioning Protocols prepared by SimGas at the time of commissioning the digesters	9	CME
10	CME	Annual Monitoring survey documents – titled “20180330 Monitoring Results KE MP1 + ANALYSIS” conducted in 2016Ke + ANALYSIS	10	CME
11	CME and owner of the digester	Sales Agreements copies signed between digester owners and SimGas	11	CME
12	World Bank	World Bank, <i>Climate Change Knowledge Portal</i> , Average Monthly Temperature for Kenya from 1990 – 2012 [online] Available from: <a href="http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&amp;ThisCCCode=KEN">http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&amp;ThisCCCode=KEN</a>	12	CME
13	UNFCCC	Guidelines for sampling and surveys for CDM project activities and programme of activities (version 04.0)	13	Publicly available
14	CME	Ke - Central GesiShamba Database + ANALYSIS	14	CME
15	EPIC (DoE)	Validation opinion on PRC (ver 1.01 dt 3106/4203/20178) with respect to temporary deviation in the monitoring plan for the current MR period	15	EPIC (DoE)
15	CME	<a href="#">Annual Monitoring survey documents conducted in the year 2017</a>	15	CME
16	UNFCCC	<a href="#">Standard of Sampling and surveys for CDM project activities and programmes of activities (version 07.0)</a>	16	Publicly available



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

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

FAR ID	xx	Section no.		Date: DD/MM/YYYY
Description of FAR				
<i>Not applicable</i>				
CME response				Date: DD/MM/YYYY
<i>Not applicable</i>				
Documentation provided by the CME				
<i>Not applicable</i>				
DOE assessment				Date: DD/MM/YYYY
<i>Not applicable</i>				

Table 2. CL from this verification

CL ID	01	Section no.	I.1	Date: 02/09/2016
Description of CL				
PP to conform the individual sub-systems capacity/limit applicable under each of the applied methodology as discussed under De-bundling in Sec B.1 of the MR.				
CME response				Date: 14/12/2016
<b>CME response 01 (19/09/2016)</b> <i>Further calculations demonstrating compliance with the various scale limits of the CPA and respective methodologies has been added to the Emission Reduction (ER) calculation spreadsheet, see tab 'Capacity Calculations'. Section B.1 of the Monitoring Report has also been updated.</i>				
<b>CME response 02 (14/12/2016)</b> <i>Correction to the above: see tab 'Capacity limit' in the ER spreadsheet.</i>				
Documentation provided by the CME				
<i>Spreadsheet 'ER calculations CDM 13Oct2016 (Verification) V1.0'</i>				
DOE assessment				Date: 03/07/2017
<b>DoE assessment 01</b> The response provided is not as per the submission.				
<b>DoE assessment 01</b> The individual sub-systems capacity applicable under each of the applied methodology is updated. Review of submitted MR, ER sheet confirms the updation.				
<b>CL 01 Closed</b>				

CL ID	02	Section no.	I.1	Date: 02/09/2016
Description of CL				
It is observed that the 'commissioning date' is after the 'installation date' and the two dates are different, for the customer reference number E00301 (Issac Kemei) the commissioning date as per the MR and Ke – central GesiShamba Database is 13/01/2013, but the 'commissioning log' spreadsheet in the central Gesishamba database indicate the installation date as 19/12/2013. PP to conform the dates indicated for this customer, also re-conform for other customers for possible errors.				
CME response				Date: 19/09/2016

<b>CME response 01 (19/09/2016)</b>	
<i>Customer E00301 (Issac Kemei) is not included in the CPA since the digester was installed prior to the start date of the VPA crediting period (see columns AM and AR of the Project Database, sheet 'Carbon').</i>	
<i>The commissioning date should always fall AFTER the date of installation, since a digester must first be installed, then filled with manure and time taken to finally produce biogas. All entries in the database have been reviewed to show the date entry. The problem arose due to date format issues e.g. 10/02/2015 should have been 02/10/2015.</i>	
<i>The Emission Reduction calculation spreadsheet and respective Monitoring Report have been updated to reflect the corrected commissioning dates of all digesters.</i>	
<b>CME response 02 (31/01/2017)</b> In the Project Database, the Tab 'Carbon' details whether digesters are included in the first MP or not. The column AR specifies if the digester is included, and AS provides a reason for exclusion if applicable. The Tab 'Analysis' counts the digesters included, and it is only these values that are input into the ER calculation spreadsheet. The values in the ER sheet and the Database are identical. Values have also been cross-check in the Monitoring Report.	
<b>CME Response 03 (28 March 2017)</b> The number of digesters commissioned, digesters of different sizes and the allocation of digesters to different methodologies have been crossed checked with the Project Database (see tab 'Analysis'), the ER calculations and the Monitoring Report. No inconsistencies are found.	
<b>Documentation provided by the CME</b>	
<i>Spreadsheet 'ER calculations CDM 13Oct2016 (Verification) V1.0'</i> <i>Project Database, 'Ke – Central GesiShamba Database 18Jan2017'</i>	
<b>DOE assessment</b>	<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>	
The explanation provided is not consistent with the 'MR' and 'Ke – central GesiShamba Database'. CME to re-conform the dates and support it with documentary evidence.	
<b>DoE assessment 02</b>	
The responses provided do not match with the MR and 'Ke – central GesiShamba Database'.	
<b>DoE assessment 03</b>	
The error in the Ke – central GesiShamba Database' is rectified, the respective installation date and the commissioning date for the Customer E00301 is 19/12/2013 and 13/01/2014, it is part of the CPA. The customer E00010 is the only entity that is not part of the CPA, since it was installed before the start of the crediting period. The information is as per the commissioning evidence submitted. Similarly, the data for the other customers are verified to be as per the evidence.	
<b>CL 02 Closed</b>	

<b>CL ID</b>	03	<b>Section no.</b>	I.4.3	<b>Date:</b> 02/09/2016
<b>Description of CL</b>				
It is mentioned that survey and monitoring are carried out by SimGas staff assisted by Climate Focus, PP to demonstrate whether the staff involved are well informed about the applicable guidelines/standard to carry out the survey and monitoring.				
<b>CME response</b>				<b>Date:</b> 19/09/2016
<b>CME response 01</b>				
<i>Staff managing the survey monitoring process were well-informed as to the requirements of the CDM guidelines and standards applicable to the CPA. They worked closely with Climate Focus to a) determine the sample group to be surveyed, b) develop the survey questionnaire to ensure all monitored parameters are covered and c) cross-check that no errors in data entry and recording occurred. Support from Climate Focus included multiple email exchanges, bi-weekly conference calls and exchange of supporting documentation (e.g. survey questionnaires, project database)</i>				
<b>Documentation provided by the CME</b>				
<i>Survey questionnaires, project database</i>				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017

<b>DoE assessment 01</b>
The review of evidence related to survey eg survey questionnaire, survey results and the interview of the survey team and the trainer confirms that the survey team and monitoring team are well trained and are knowledgeable about the survey guidelines. The team were aware of the data to be assessed and the implications of the data collected. The verification team accepts the survey results generated as an outcome of the survey.
<b>CL 03 Closed</b>

<b>CL ID</b>	04	<b>Section no.</b>	I.4	<b>Date:</b> 02/09/2016
<b>Description of CL</b>				
PP to clarify the following:-				
<ul style="list-style-type: none"> <li>The ex-ante parameter '<math>N_s</math>' is indicated as ex-post parameter in sec G of the MR.</li> <li>Parameter <math>GWP_{CH_4}</math> is not indicated as ex-post parameter as in CPA-DD</li> <li>Parameter <math>HG_{p,y}</math> is indicated as ex-post parameter in the revised CPA-DD but not captured in the MR</li> </ul>				
<b>CME response</b>				<b>Date:</b> 19/09/2016
<b>CME response 01</b>				
<p>The parameter '<math>N_s</math>' has been moved as it was incorrectly listed as a fixed parameter in the CPA-DD. However, it is now re-listed in Section G.1</p> <p>The GWP of <math>CH_4</math> is listed in Section D.7.1 of the CPA-DD (monitored parameters). This is to allow for any future updates from the IPCC as to the GWP of methane over the crediting period of the CPA.</p> <p>The parameter <math>HG_{p,y}</math> has been added to section G.2 of the Monitoring Report, although it is not applicable to this CPA.</p>				
<b>Documentation provided by the CME</b>				
Revised MR				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>				
The error identified is rectified in the revised submission, hence accepted.				
<b>CL 04 Closed</b>				

Table 3. CAR from this verification

<b>CAR ID</b>	01	<b>Section no.</b>	G.1	<b>Date:</b> 02/09/2016
<b>Description of CAR</b>				
Section A.1 of the MR indicate Gold Standard involvement of the project activity, indicate the GS registration ID/title of the project activity				
<b>CME response</b>				<b>Date:</b> 19/09/2016
<b>CME response 01 (19/09/2016)</b>				
The Gold Standard registration IDs for the PoA and respective CPA have been added.				
<b>CME response 02 (16/12/2016)</b>				
Evidence of the GS registration date indicated in the MR is provided via a screenshot of the Registry entry (10 November 2015)				
<b>Documentation provided by the CME</b>				
SimGas GS Registration Date				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>				
Provide evidence for the date of GS registration indicated in the MR				
<b>DoE assessment 02</b>				
GS registration of the project is verified and accepted.				
<b>CAR 01 Closed</b>				

<b>CAR ID</b>	02	<b>Section no.</b>	G.1	<b>Date:</b> 02/09/2016
<b>Description of CAR</b>				
The MR shall refer the sections of the revised PoA documents as appropriate (considering the documents are revised as part of PRC)				
<b>CME response</b>				<b>Date:</b> 19/09/2016
<b>CME response 01 (19/09/2016)</b>				
<i>Any references to sections of the PoA-DD and CPA-DD listed in the Monitoring Report have been updated to reflect the version 05.0 of the POA-DD and CPA-DD forms</i>				
<b>CME response 01 (16/11/2016)</b>				
<i>Any references to sections of the PoA-DD and CPA-DD listed in the Monitoring Report have been updated to reflect the version 07.0 of the POA-DD and CPA-DD forms</i>				
<b>Documentation provided by the CME</b>				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>				
Version no of the document indicated is not correct.				
<b>DoE assessment 02</b>				
The revised MR submitted, correctly refers the appropriate sections of the PRC approved PoA-DD and CPA-DD version 7.0				
<b>CAR 02 Closed</b>				

<b>CAR ID</b>	03	<b>Section no.</b>	I.4.2	<b>Date:</b> 02/09/2016
<b>Description of CAR</b>				
PP to conform the value applied for the parameter <b>PE<sub>leakage</sub></b> in sec G.1 of the MR, as PRC is proposed for this parameter. Further, PP is requested to conform the application of this value in the emission reductions calculation spreadsheet.				
<b>CME response</b>				<b>Date:</b> 19/09/2016
<b>CME response 01</b>				
<i>Section G.1 of the MR for PE<sub>leakage</sub> has been updated. The emission reduction calculation spreadsheet details the full calculation for this value in the sheet 'sheet 'CDM CPA1 AMS-III.R ERs', cell D51.</i>				
<b>CME Response 02 (28 March 2017)</b> The PRC has been approved by the CDM EB. The approved approach is already reflected in the ER calculations.				
<b>Documentation provided by the CME</b>				
<i>Spreadsheet 'ER calculations CDM 13Oct2016 (Verification) V1.0'</i>				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>				
To verify and conform once the PRC is approved				
<b>DoE assessment 02</b>				
The parameter <b>PE<sub>leakage</sub></b> in sec G.1 of the MR is as per the PRC approved PoA-DD and CPA-DD version 7.0				
<b>CAR 03 Closed</b>				

<b>CAR ID</b>	04	<b>Section no.</b>	I.4.3	<b>Date:</b> 02/09/2016
<b>Description of CAR</b>				
<i>As per PoA-DD and CPA-DD, annual survey are to be done – PP to conform whether this requirement is met for the current monitoring period.</i>				
<b>CME response</b>				<b>Date:</b> 19/09/2016

**CME response 01**

The project achieved registration in December 2012, but conducted the first monitoring and verification in 2016. This was due to the exceptionally low CER prices making little financial sense to go through a monitoring and verification for the CME. The monitored parameters for 2016 have therefore been applied to the years 2013, 2014 and 2015. This is a conservative approach since the Operational rate value of 87% is applied equally across all years of the Monitoring Period. Had the monitoring been conducted annually, it is likely that the operational rate would have been higher since the digesters surveyed would be of a younger age.

The only other monitored parameters that could impact the ER calculations include:

- Nda,y Number of days animal is alive on farm
- Np,y Number of animals produced annually of type LT for year y
- T hours per day of stove usage

All of these values are not likely to change significantly from year to year. In addition, they impact only the calculations under AMS-III.R: the ERs from which are small.

**CME response 02**

- Monitoring frequency of the parameters is now updated as per the revised approved CPA-DD
- The CME accepts non-monitoring annual as deviation from the registered monitoring plan and now report it as temporary deviation, and accordingly updated the sections E.1 of the MR and the ER sheet. Conservative estimate of ER is done, pls refer to revised MR ver 3.3 and ER sheet.

**Documentation provided by the CME**

Revised MR ver 3.3, and ER spreadsheet

**DOE assessment**

**Date:** 03/12/2017

**DoE assessment 01**

- The MR states that monitoring will be done "once per monitoring period (through monitoring survey) - Annually". This is not in line with the revised approved CPA-DD which clearly states that monitoring frequency is annual and not once per monitoring period."

**DoE assessment 02**

- Monitoring frequency of the parameters is now verified to be updated as per the revised approved CPA-DD.
- Please refer to Validation report on Post Registration Changes, Ver 1.0 dated 06/12/2017 for the assessment of Temporary deviation of the monitoring plan

**CAR 04 Closed**

<b>CAR ID</b>	05	<b>Section no.</b>	I.1	<b>Date:</b> 02/09/2016
<b>Description of CAR</b>				
The "Ke- Central GesiShambha database" does not contain values for 'digester size' and 'GPS coordinates' of all the digesters that are part of the CPA, eg E00463 (it is indicated to be part of MP), E00128.				
<b>CME response</b>				<b>Date:</b> DD/MM/YYYY
<b>CME response 01</b>				
The data gaps in the database have been corrected.				
<b>CME response 02</b>				
The links to GPS coordinates in the project database 'Carbon' Tab had been incorrectly calculated. This meant that some GPS coordinates that were recorded in the 'OpsStatus' tab of the database did not appear in the 'Carbon' Tab. This has been amended.				
<b>Documentation provided by the CME</b>				
Ke – Central GesiShamba Database 18Jan2017				
<b>DOE assessment</b>				<b>Date:</b> 03/07/2017
<b>DoE assessment 01</b>				
Eg: E00648 it is indicated as operational and for E00699 installation date is provided, but GPS coordinates not provided. Likewise for all the digesters, which have the installation date and or commissioning date, the GPS coordinates to be provided in the database.				
<b>DoE assessment 02</b>				
In the revised submission the digester size and GPS coordinates is verified to be updated for all the digesters in the database.				
<b>CAR 05 Closed</b>				

Table 4. FAR from this verification

<b>FAR ID</b>	xx	<b>Section No.</b>	NA	<b>Date:</b> DD/MM/YYYY
<b>Description of FAR</b>				
NA				
<b>CME response</b>				<b>Date:</b> DD/MM/YYYY
NA				
<b>Documentation provided by the CME</b>				
NA				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY
NA				

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
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