

Ref. No.: CCIPL/Admin/CCL223/ENVIROFIT/VER/01/GHANA

Date: 26<sup>th</sup> March 2015

Dear CDM Team,

**RE: Request For Issuance Incomplete for “African Improved Cooking Stoves Programme of Activities” (PoA – 05342)**

This letter is in response to the information and reporting check comment raised by UNFCCC on the subject project received by Carbon Check on 23<sup>rd</sup> February 2015. Please find below point wise reply to the issue raised.

**Information and reporting check comment:**

**Issue 1**

**Scope:** The DOE shall identify any concerns related to the conformity of the actual project activity and its operation with the registered project design document and determine PS v7, para 271 (a)).

**Issue:** For CPA1, Verification report (p. 19) states the actual efficiency of the distributed ICS is 32.70% (weighted Average), while the ex-ante efficiency described on the registered CPA1-DD (p. 27) is 38.20% and 39.40% for ICSs model CH220 and CH2300 respectably, which is 7% higher compared with the actual efficiency. Furthermore, on page 46, the DOE has confirmed that *"The 4,500 stoves as indicated in the registered CPA 1 were the estimated number of stoves that were envisioned to be distributed under the micro-scale CPA. However, since the average energy saving per stove is lower than initially expected at the CPA-DD, 9,446 stoves distributed could be included under CPA 1 without reaching the micro-scale threshold and therefore keeping the CPA still additional."* However, the DOE is requested to provide further information on how the project implementation is in accordance with the description contained in the registered CPA-DD, considering that the efficiency of the ICSs has changed only 7%, while the number of distributed ICS has been doubled. (Please refer to VVS Ver. 7 para 314).

**PP's response:**

The following is mentioned in Section A.2, page 2 of the registered CPA-DD, version 3.2 dated 27/11/2012:

*"The CPA will have a maximum energy saving of less than or equal to 60 GWh<sub>th</sub>/year, thus staying within the micro-scale threshold. Based on the estimated energy savings, it is envisaged that around 4,500 stoves will be distributed under the CPA. By the start of the CPA crediting period, which as indicated in Section A.4.3.1 is expected to be 15 December 2012, it is **anticipated that all 4,500 of the ICS will be in operation.**"*

It is clearly stated in the CPA-DD that the ex-ante estimation of the number of cookstoves to be distributed under the CPA is only an indicative number based on the micro-scale annual energy saving threshold of 60GWh<sub>th</sub>/year. It also assumes that 100% of distributed stoves remain operational ex-post. Both these parameters i.e. total number of stoves installed (N<sub>all</sub>) and Stove Operation Fraction (SOF) are monitored parameters as per section B.6.1 of the registered CPA-DD and therefore subject to change based on ex-post monitoring activities. For example, the parameter values for 'efficiency of project stove ( $\eta_{new}$ )' in the CPA-DD for the various stove models are the lab-tested design values of stove efficiency for ex-ante baseline emissions calculations only. The actual in-field operating efficiency deteriorates over time due to ageing of stove. Thus, the actual applicable values for ex-post ER calculations over a given monitoring period are determined via field-based monitoring activities.

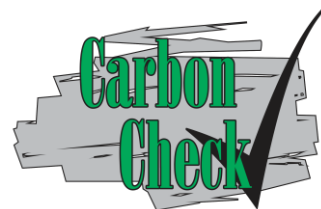
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Furthermore, the average energy savings per stove during the monitoring period depends not just on the thermal efficiency of the stoves ( $\eta_{\text{new}}$ ), but also on the other monitored parameters, including:

- “Stove Operation Fraction” (SOF);
- “the amount of woody biomass consumption that is consumed through the continued use of old stoves” ( $\mu_{\text{old}}$ );
- “the fraction of end users that are still using baseline (replaced) stoves” ( $f_{\text{old}}$ ); and,
- “calculated average stove operation years in the monitoring period” (Stove year).

The ex-post monitored values for these parameters were also found to be different from the ex-ante estimates provided in the registered CPA-DD. For instance, SOF was found to be 65.34% instead of the 95% anticipated in the CPA-DD. This is approximately 30% lower than initially assessed in section B.6.1 of the CPA-DD. Stove year was also estimated in the CPA-DD to be 1.00 while the monitored value is 0.87. The Stove year is lower due to the progressive distribution of cookstoves over the monitoring period. When considering the differences of the five parameter values together, not just the thermal efficiency, the average energy savings per stove is approximately 35.02% of what was initially estimated in the CPA-DD (refer CPA-DD section A.4.6). The 9,446 stoves included in the CPA results in 42.676 GWhth/year and therefore complies with the micro-scale threshold and the description contained in the CPA-DD, whereby “The CPA will have a maximum energy saving of less than or equal to 60 GWhth/year”.

Thus, there are no design changes from the registered CPA.

#### **DOE’s response:**

In opinion of the verification team the cited difference in number of cook-stoves and efficiency falls under the purview of assessment requirement contained in §273 c) of VVS Ver 07. The difference is due to the fact that the monitored values (actual) of the parameters are different from the ex-ante values as provided in registered CPA-DD and utilized for ex-ante estimation of ERs. Due to this very reason the number of stoves have changed from 4,500 (as stated in the registered CPA DD) to 9,375 (as recorded during actual monitoring), however the CPA still remains within micro-scale threshold.

The monitored (ex-post) parameters where there has been a change observed from the ex-ante values have been assessed below in accordance with §273 c) of VVS Ver 07:

Parameter	Ex-ante value in the CPA-DD	Actual operation for the reported monitoring period	Assessment by the verification team
Number of cook-stoves ( $N_{\text{all}}$ )	4,500	9,375	<p>Verification team noted that the actual number of cook-stove distributed under the CPA is higher than the number indicated in the registered CPA DD. This difference is acceptable based on the following:</p> <ul style="list-style-type: none"><li>→ CPA-DD does not restrict the number of cook stoves to 4,500 which is just an indicative value (as explained below)</li><li>→ The project energy saving is still less than 60 GWh<sub>th</sub>/year.</li><li>→ The emission reductions from the project during the reported monitoring period are less than that estimated in the registered CPA DD for the same period.</li></ul>

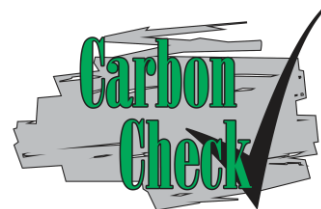
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			<p>Verification team further noted that the cookstove number as indicated in registered CPA DD is not a fixed number (thus this cannot be categorized under a design change) and this assessment has been based on review of following paragraphs of CPA DD:</p> <p><i>“The CPA will have a maximum energy saving of less than or equal to 60 GWh<sub>th</sub>/year, thus staying within the micro-scale threshold. Based on the estimated energy savings, it is envisaged that around 4,500 stoves will be distributed under the CPA.”</i> (Refer Section A.2, of the registered CPA-DD, version 3.2 dated 27/11/2012).</p> <p>The number of cookstoves stated in the CPA-DD is only an indicative number based on the micro-scale annual energy saving threshold of 60GWh<sub>th</sub>/year. The 9,375 stoves implemented in the CPA results in 42.676 GWh<sub>th</sub>/year of energy saving. The verification team noted that with the increase in number of stoves, the CPA still remains under the limit of micro scale and hence this is not deemed as any design change.</p> <p>Verification team during course of verification noted that the average energy savings per stove during the monitoring period depends not just on the thermal efficiency of the stoves (<math>\eta_{new}</math>), but also on the other monitored parameters, including:</p> <ul style="list-style-type: none"> <li>• “Stove Operation Fraction” (SOF);</li> <li>• “the amount of woody biomass consumption that is consumed through the continued use of old stoves” (<math>\mu_{old}</math>);</li> <li>• “the fraction of end users that are still using baseline (replaced) stoves” (<math>f_{old}</math>); and,</li> <li>• “Calculated average stove operation years in the monitoring period” (Stove year).</li> </ul> <p>The ex-post monitored values for these parameters were also found to be different from the ex-ante estimates provided in the registered CPA-DD. For instance, SOF was found to be 65.34% instead of the 95% anticipated in the CPA-DD. This is approximately 30%</p>
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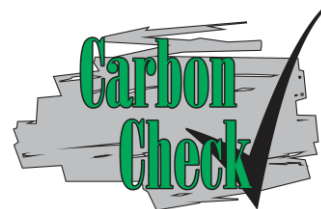
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			lower than initially assessed in section B.6.1 of the CPA-DD. Stove year was also estimated in the CPA-DD to be 1.00 while the monitored value is 0.87. The Stove year is lower due to the progressive distribution of cookstoves over the monitoring period. When considering the differences of the aforesaid five parameter values together, (and not just the thermal efficiency), the average energy savings per stove is approximately 35.02% of what was initially estimated in the CPA-DD (refer CPA-DD section A.4.6) substantiating the increase in number of cookstoves distributed under the CPA.
Efficiency of the ICS( $\eta_{new}$ )	36.3%	32.7%	The weighted average efficiency of the cookstoves ( $\eta_{new}$ ) monitored ex-post for the current monitoring period is less than the estimated ex-ante value in the CPA-DD. Verification team based on its sectoral expertise confirms that decrease in efficiency in actual project condition is a realistic condition and thus this issue does not require further assessment, as it does not lead to increase in emission reductions. This is also deemed acceptable to the verification team as the actual monitored efficiency is lower than the value indicated in the registered CPA DD and it does not lead to increase in emission reductions.
Stove Operation Fraction (SOF)	0.95	0.6534	Since, the monitored ex-post value of SOF for the current monitoring period is less than the estimated ex-ante value in the CPA-DD, this is acceptable to the verification team, as it does not lead to increase of emission reductions. This is deemed acceptable.
The amount of woody biomass consumption that is consumed through the continued use of old stoves ( $\mu_{old}$ )	217.8 kg	2,657 kg	Since, the amount of woody biomass consumption that is consumed through the continued use of old stoves monitored ex-post for the current monitoring period is higher than the estimated ex-ante value in the CPA-DD, this is acceptable to the verification team as it does not lead to increase of emission reductions. This is deemed acceptable.
The fraction of end users that are still	0.1	0.5362	Since, the fraction of end users that are still using baseline (replaced) stoves

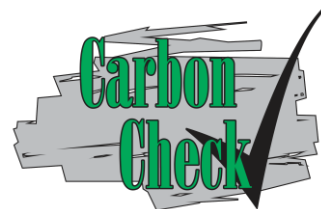
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using baseline (replaced) stoves ( $f_{old}$ )			monitored ex-post for the current monitoring period is higher than the estimated ex-ante value in the CPA-DD, this is acceptable to the verification team as it does not lead to increase of emission reductions. This is deemed acceptable.
Calculated average stove operation years in the monitoring period (Stove year)	1	0.87	Stove year monitored ex-post for the current monitoring period is lower than the estimated ex-ante value in the CPA-DD. This is deemed acceptable as it does not lead to increase of emission reductions.

Carbon Check wishes to submit here that during course of verification it had assessed the project in order to check any proposed or actual changes to the project design in accordance with § 314 of VVS Ver. 7. In the opinion of Carbon Check, there is no change to the project design. The cited paragraph of PS (v7) *i.e.*, § 271 (a) *is not applicable as there is no correction or changes to the project design*. This conclusion had been arrived based on the assessment of the project in line with the requirements of § 270 (a) and § 271 of the VVS Ver. 7.

Revised MR and VR being submitted addressing the issue raised in I & R.

## Issue 2

**Scope:** The DOE shall list each parameter required by the monitoring plan and state how it verified the information flow (from data generation, aggregation, to recording, calculation and reporting) for these parameters including the values in the monitoring reports. (VVS v7, para 281).

**Issue:** For CPA1, Verification report (p. 26) states that *"Verification team further noted that for the monitoring parameters "SOF", " $\mu_{old}$ " and " $f_{old}$ ", the desired precision of 10% was not met and hence correction have been applied for these parameters in a conservative manner as per the revised approved PoA-DD"*. However, the DOE is requested to provide further information on how the individual surveys and their results of the parameters "SOF", " $\mu_{old}$ " and " $f_{old}$ ", comply with the Standard for sampling and surveys for CDM project activities and programme of activities, since the same is not included in the verification report.

### ***PP's response:***

Justification on the calculations has been described in page 18 of MR, where the conservative calculation of each of the monitoring parameter value has been provided separately. The uploaded ER calculations also show in a transparent manner the calculations on the precision level.

### **DOE's response:**

Based on the issues raised by the UNFCCC during Information and Reporting check, DOE has revised the assessment in Verification report(section 4.5)on individual surveys and their results of the parameters "SOF", " $\mu_{old}$ " and " $f_{old}$ " and compliance with the Standard for sampling and surveys for CDM project activities and programme of activities as given below:

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter:	Stove Operation Fraction – used to determine the

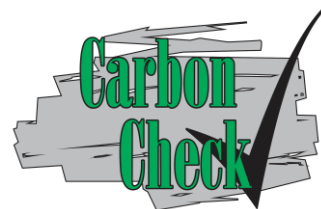
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(as in monitoring plan of CPA-DD):	share of distributed stoves that are still operating, measured ex-post through sampling (SOF)
Measuring frequency/Time Interval:	Yearly
Reporting frequency:	Yearly
Reported value:	0.6534
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from the monitoring survey of samples
Is accuracy of the monitoring equipment as stated in the CPA-DD? If the CPA-DD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA.
Is the calibration interval in line with the monitoring plan of the CPA-DD? If the CPA-DD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with CPA-DD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, reported data in MR has been compared with monitoring survey report and the ER sheet
How were the values in the monitoring report verified?	The values in the monitoring report were compared against the values in ER sheet
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.</p> <p>For SOF, 190 valid surveys were recorded out of which 125 showed that the users were still using the Envirofit stove, i.e. 65.79% of the sample.</p> <p>Now for this monitoring period of the PoA, the confidence/precision applicable is 95/10.</p> <p>Standard error of proportion has been calculated by using the formulae <math>\sqrt{(1-f)*p*q / n}</math>;</p> <p>where, f = sampling fraction  p = sample proportion  q=1-p  n = sample size</p>

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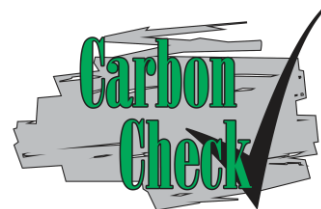
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	<p>This is deemed correct in line with paragraph 31, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/.</p> <p>Relative precision has been calculated using the formulae <math>z \times \text{standard error of proportion /fraction of operational stoves}</math></p> <p>This is deemed correct in line with paragraph 38 and 39, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p> <p>The precision achieved is calculated to be 10.15%, which is 0.15% above the required 10%.</p> <p>Based on paragraph 16 of "Standard for Sampling and surveys for CDM project activities and programme of activities" version 04.1 /B07/, the precision has not been met and option (b), has been applied,</p> <p>As per paragraph 16 (c) of the above Standard /B07/, paragraph 16 (b) is only eligible for application to the survey undertaken during the first two years of the crediting period of the project activity or CPAs which is satisfied for this PoA monitoring period.</p> <p>Accordingly PP has applied the option as per paragraph 16 (b), (i), (b) and discounted the sample result by three times the percentage of precision points missed, i.e. <math>0.15\% \times 3 = 0.45\%</math>.</p> <p>Hence PP has correctly subtracted 0.45% from the SOF determined via survey and applied SOF as 65.34% (<math>65.79 - 0.45</math>) for emission reduction calculations which is conservative hence deemed acceptable.</p>
<p>In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?</p>	<p>NA.</p>

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
<p>Data / Parameter: (as in monitoring plan of CPA-DD):</p>	<p>The amount of woody biomass consumption that is consumed through the continued use of old stoves (<math>\mu_{old}</math>)</p>

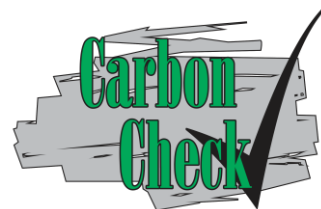
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Measuring frequency/Time Interval:	Annual
Reporting frequency:	Annual
Reported value:	2,657 kg/year
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey of samples
Is accuracy of the monitoring equipment as stated in the CPA-DD? If the CPA-DD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the CPA-DD? If the CPA-DD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with CPA-DD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of parameter has been calculated based on 2 other parameters and has been cross-checked with them.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.</p> <p>For the parameter, the amount of woody biomass that continues to be used in the replaced stoves (<math>\mu_{old}</math>), data could only be collected out of those sampled users that are still using the baseline cookstoves. During the monitoring activity, 42 stove users were identified using baseline stoves along with project stoves. Out of the same 34 valid surveys were recorded.</p> <p>The mean value of <math>\mu_{old}</math> thus obtained was 2.253 t/year.</p> <p>Now for this monitoring period of the PoA, the confidence/precision applicable is 95/10.</p> <p>Standard error of mean is calculated by using the</p>

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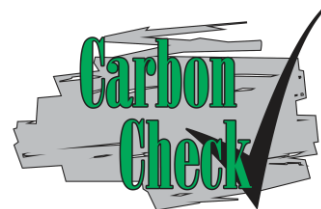
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	<p>formulae <math>\sqrt{(1-f)*s^2/n}</math>;</p> <p>where, f = sampling fraction s = standard deviation n = sample size</p> <p>This is deemed correct in line with paragraph 11, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p> <p>Precision reliability is calculated using the formulae <math>z * \text{standard error of mean} / \text{mean}</math></p> <p>This is deemed correct in line with paragraph 16 and 17, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p> <p>The precision achieved by the sample has been calculated as 17.91% and thus the desired 10% precision is not met.</p> <p>Based on paragraph 16 of "Standard for Sampling and surveys for CDM project activities and programme of activities" version 04.1 /B07/, the precision has not been met and option (b), has been applied,</p> <p>As per paragraph 16 (c) of the above Standard /B07/, paragraph 16 (b) is only eligible for application to the survey undertaken during the first two years of the crediting period of the project activity or CPAs which is satisfied for this PoA monitoring period.</p> <p>Accordingly PP has applied the option as per paragraph 16 (b), (i), (a) and taken the higher bound value which is conservative.</p> <p>The higher bound value is calculated by using the formulae = mean + (Standard error or mean * z value) = 2.657 t/year which is conservative and hence deemed acceptable as per paragraph 84, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p>
<p>In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?</p>	<p>NA</p>

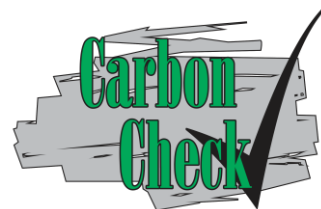
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Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter: (as in monitoring plan of CPA-DD):	The fraction of end users that are still using baseline (replaced) stoves ( $f_{old}$ )
Measuring frequency/Time Interval:	Annual
Reporting frequency:	Annual
Reported value:	53.62%
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey of samples
Is accuracy of the monitoring equipment as stated in the CPA-DD? If the CPA-DD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the CPA-DD? If the CPA-DD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with CPA-DD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, reported data in MR has been compared with monitoring survey report and the ER sheet
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.</p> <p>96 of the 125 surveys where Envirofit stoves were still in operation provided valid results on the use of baseline stoves along with the Envirofit stoves. Of the 96 samples, 54 of them were not using the baseline stoves, i.e. 56.25% of the total.</p> <p>Now for this monitoring period of the PoA, the confidence/precision applicable is 95/10.</p> <p>Standard error of proportion is calculated by using the formulae <math>\sqrt{(1-f)*pq/n}</math>;</p>

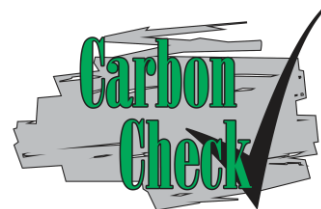
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	<p>where, <math>f</math> = sampling fraction  <math>p</math> = sample proportion  <math>q=1-p</math>  <math>n</math> = sample size</p> <p>This is deemed correct in line with para 31, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p> <p>The Relative precision has been calculated using the formulae <math>z * \text{standard error of proportion} / \text{fraction of operational stoves}</math></p> <p>This is deemed correct in line with paragraph 38 and 39, Appendix 4 of Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 03.0 /B10/</p> <p>The precision achieved by the sample is calculated to be 17.55%, which exceed the required precision of 10%.</p> <p>Based on paragraph 16 of "Standard for Sampling and surveys for CDM project activities and programme of activities" version 04.1 /B07/, the precision has not been met and option (b), has been applied,</p> <p>As per paragraph 16 (c) of the above Standard /B07/, paragraph 16 (b) is only eligible for application to the survey undertaken during the first two years of the crediting period of the project activity or CPAs which is satisfied for this PoA verification.</p> <p>Accordingly PP has applied the option as per paragraph 16 (b), (i), (a) and taken the lower bound value for the households not using the baseline stoves.</p> <p>Hence PP has correctly calculated this values as <math>\{56.25\% - (z * \text{standard error of proportion})\} = 56.25\% - (1.96 * 5.04\%) = 46.38\%</math>.</p> <p>Accordingly the fraction of users still using the baseline stoves has been calculated using the formula <math>f_{old} = 1 - f_{non,old}</math>, = 53.62% and this is conservative and hence deemed acceptable by the verification team.</p>
In case only partial data are available because activity levels or non-activity parameters have not	NA

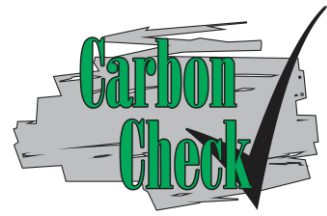
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been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	
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Revised VR being submitted with the above stated changes addressing the I & R issue raised. We apologise as the previous documents were not transparent on the above issues, however during the course of verification the above concerns were considered by the verification team. We are hereby submitting the revised MR (clean and track) and verification report (clean and track). We hope that the revised documents are inline with the requirements and will find acceptance.

Please do not hesitate to contact us should you require any further information or clarification.

Kind regards,

Amit Anand

**CEO**

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