GOLD STANDARD VERIFICATION REPORT

IMPROVED HOUSEHOLD CHARCOAL STOVES IN MALI

(Gold Standard ID Number GS414)

MONITORING PERIOD:
01 SEPTEMBER 2010 TO 31 DECEMBER 2011

REPORT NO. 2012-9173

REVISION NO: 02

DET NORSKE VERITAS

Gold Standard

Verification Report

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Client: E+Carbon	Client ref.: Catherine Diam-Valla

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Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the "Improved Household Charcoal Stoves in Mali" (Gold Standard Ref. No. GS414) for the period 01 September 2010 to 31 December 2011.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (Version 03) of 22 May 2012 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the GS approved monitoring methodology "Methodology for Improved Cook-stoves and Kitchen Regimes V.01" and the monitoring plan contained in the registered Project Design Document of 24 June 2011.DNV Climate Change Services AS is able to certify that the emission reductions from the "Improved Household Charcoal Stoves in Mali" project during the period 01 September 2010 to 31 December 2011 amount to 194,096 tonnes of CO_2 equivalent. Of this total, 39,574 tonnes of CO_2 equivalent were generated in 2010, and 154,522 tonnes of CO_2 equivalent were generated in 2011.

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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO_2e	Carbon Dioxide Equivalent
DNV	Det Norske Veritas
DOE	Designated Operational Entity
ER	Emission Reduction
GHG	Greenhouse Gas(es)
GS	Gold Standard
HH	Household
IAP	Indoor Air Pollution
KS	Kitchen Survey
KT	Kitchen Performance Test
MP	Monitoring Plan
NRB	Non-Renewable Biomass
PDD	Project Design Document
PP	Project Participant

GOLD STANDARD

VERIFICATION REPORT

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1 INTRODUCTION

E+Carbon has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the "Improved Household Charcoal Stoves in Mali" project (hereafter called "the project") during the period 01 September 2010 to 31 December 2011.

This report summarizes the findings of the verification and contains a certification statement for the verified emission reductions.

1.1 Objective

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

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

The objective of this verification was to verify and certify emission reductions reported for the "Improved Household Charcoal Stoves in Mali" project (hereafter called "the project") during the period 01 September 2010 to 31 December 2011.

1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

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

1.3 Description of the Project Activity

The project reduces greenhouse emissions by disseminating fuel-efficient charcoal Stoves that reduce fuel consumption within communities in Mali. The improved stove distributed under the project is commercialized under the name of SEWA, and reduces fuel consumption through the introduction of a ceramic liner that increases combustion efficiency and retains heat.

Five sizes of stoves are sold under the auspices of the project. These five sizes are:

- Extra-large charcoal stoves (SGF).
- Large charcoal stoves (GF).
- Medium charcoal stoves (MF).
- Small charcoal stoves (PF).

- Tea stoves (TF).

These improvements not only reduce greenhouse gas emissions, they also provide co-benefits to users and families in the form of relief from high fuel costs, reduced exposure to health-damaging airborne pollutants, faster cooking (resulting in time-savings), and increased cleanliness and convenience. Finally, they curb deforestation by decreasing demand for charcoal

The project start date is 27 November 2007, and a total of 53,070 stoves were disseminated prior to the current monitoring period. Another 33,427 stoves were disseminated during this monitoring period. The project has constructed and distributed only technology's included in the PDD. DNV can confirm that the project has been implemented in line with the plans contained in the registered PDD dated 24 June 2011.

Title of Project Activity	Improved Household Charcoal Stoves in Mali
Gold Standard ID Number	GS414
Baseline and monitoring methodology	GS approved methodology "Methodology for Improved Cook-stoves and Kitchen Regimes V.01" (version 1) and "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" (monitoring only)
Project Entity	E+Carbon 383 Franklin Street Bloomfield, NY USA 07903 +1 973-680-9100
Location of the project activity	Mali
Period verified in this verification	01 September 2010 to 31 December 2011

1.4 Methodology for determining emission reductions

The methodology used for the estimation of the emission reduction is in line with the GS approved methodology, *Methodology for Improved Cook-stoves and Kitchen Regimes,* Version 01./19/ According to the applied methodology, the emission reductions are determined as the difference between baseline emissions, project emissions and leakage:

$ER_y = BE_y - PE_y - LE_y$

BE_y is the sum of annual emissions from the use of baseline stoves. This scenario was estimated by assessing charcoal and fuel-wood supply, consumption patterns and environmental behaviors among households that use traditional charcoal stoves.

PE_y represents the sum of annual emissions from the use of project stoves. As described in section 3.5, the emission factor varies by project stove. The improved stoves are installed

progressively over time, so project emissions are calculated based on the number of stoves installed and the assumed lifetime for each installation.

The emissions reductions calculation assumes an estimated leakage of zero (0) tCO_2e/year, based on Berkeley Air's 2010 Bi-annual Study /4/. As the leakage study was conducted in 2010, no leakage calculation was required for 2011.

2 METHODOLOGY

The verification of the emission reductions stated in the monitoring report has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- Review of project documentation /1//2//22/;

- Onsite inspections, including the review of performance records, interviews with project participants, observation of collection of measurements, established practices /(See Table 1)

- Review of monitoring results and verification of the correct application of the monitoring methodologies /3//4/.

Verification Team

Role/Qualification	*Last Name*	*First Name*	*Country*	*Type of involvement*					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA Competence
Project manager/Assessor under training	Silon	Kyle	USA			√	√		
CDM Verifier/Team Leader	Sandoval	Gonzalo	Mexico	√	√	√	√		√
Sector Expert (Forestry)	Kapambwe	Misheck Chomba	Australia	v		√	√		
Assessor Under Training	Magan	Carlos	USA	√	√	√			
CDM Technical reviewer	Yang	Weidong	USA					√	

Duration of Verification

Preparations: 01 January 2012 – 3 February 2012.

On-site verifications: 9 February 2012 – 11 February 2012.

Reporting, calculation checks and QA/QC: 13 February 2012 – 9 June2012.

2.1 Desk Review of the Project Design Documentation

This is the third verification for the project. The desk review was conducted prior to the site visit. The verification has been performed based on the review of the following documentation:

- The monitoring report /2/.
- The PDD, including the monitoring plan /1/.
- The approved baseline and monitoring methodology applied by the project /1//20//21/.
- The usage survey report for HH cook stoves, ages 0-1 years and 1-2 years /4/.
- Kitchen Performance Tests conducted to determine the amount of fuel consumed /1//23/.
- Sales Records /6/.
- Non-Renewable Biomass Study /3/.

During the desk review, DNV applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness,
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, sampling plan for survey and the quality assurance and quality control procedures; and
- An evaluation of data management, and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

2.2 Site Visit

A site visit was conducted on 9-11 February 2012. Different sets of interviews were conducted during the site visit on separate days, as summarized in Table 1.

Table 1: Summary of Site Visit Interviews

Date	Attendees	Discussion Topics
9 February 2012	Gonzalo Sandoval (DNV), Carlos Magan (DNV) Catherine Diam-Valla (E+Carbon)	1. Scope of verification 2. Review of site visit agenda 3. Review of project activity
9 February 2012	Gonzalo Sandoval (DNV) Carlos Magan (DNV) Catherine Diam-Valla (E+Carbon) Ousmane S. Samassekou (Katene, Manager), Salif Sidibe (Katene, Leader of ceramic units)	1. Review of calculations 2. Cross-check of invoices vs. Sales Database 3. Status of implementation of project activity 4. Review of QA/QC procedures 5. Method of recording sales 6. Methods of record upkeep/back-up
10/11 February 2012	Households/Project Beneficiaries	Sample of Household Survey Questions: 1. When and from whom did you receive your improved stove? 2. What type of stove/fuel did you use before this purchase? 3. How often do you use the improved stove? 4. Since purchasing your improved

		stove, do you still use your traditional stove? How often? 5. What benefit do you observe from the use of the new cook stove? • If you purchase/d wood, how much did you spend before/after purchase of the new stove? • If you collect wood, how much time does it take to collect wood before/after purchase of the new stove? • Have you observed improved air quality in the house? 6. How many people do you cook for?

During the site visit, DNV applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A cross-check between information provided in the monitoring report and data from other sources such as the sales database, kitchen surveys and kitchen tests;
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- A review of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.

DNV conducted 16 interviews of beneficiary households (HH). The minimum number of interviews needed to be conducted was determined using the "square-root approach", as is commonly accepted in the industry. Applied to the PP's survey sample size of 250, this approach requires a minimum of 16 surveys. Households interviewed were located within the cities of Niacomoro Cite and Faladie Sokoro, as this region had the greatest number of stove sales.

Through the above-mentioned activities, the following aspects of the Gold Standard project activity were confirmed:

- The implementation and operation of the project activity are as described in the monitoring plan in the registered PDD/1/;
- The information flow for generating, aggregating and reporting of the monitored parameters; and
- The operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD; as well as
- Procedures to avoid double-counting.

2.3 Report of findings

A corrective action request (CAR) is issued, where:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable GS requirements have been met. The list of CLs and CARs has been described in detail in Appendix A.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period. One corrective action request (CAR), six clarification requests (CL), and two forward action requests (FAR) have been raised as part of the verification crediting period. All the CARs and CLs have been closed based on the response by the customer. FARs will need to be followed up during the next verification period.

3 VERIFICATION FINDINGS

This section summarizes the findings from the verification of the emission reductions reported for the Project during the period 01 September 2010 to 31 December 2011.

3.1 Remaining issues, CARs, FARs from previous validation/verification

This is the third periodic Gold Standard verification for the Project. There were three follow-up action requests remaining from the verification stages. /25/

3.2 Project Implementation

DNV was able to confirm that the project is implemented in accordance with the project description contained in the registered PDD dated 24 June 2011. The starting date of operation of the project activity was 27 November 2007. The PDD assumes that 18,000 stoves would be disseminated in the first year of the project, with dissemination increasing by about 10% per year for each subsequent year of the crediting period. The project is ahead of schedule in meeting its objectives as stated in the PDD and as confirmed from the sales records provided by E+Carbon. Prior to the current monitoring period, a total of 53,070 stoves were sold, and 33,427 stoves were sold during this monitoring period. The breakdown of these stoves is shown in Table 2.

Table 2: Stove sales by year and model

Stove Model	Year	Total sales in monitoring period	Cumulative sales since project start
SGF	2010	1,541	15,370
	2011	8,327	23,697
GF	2010	2,879	28,431
	2011	13,343	41,774
MF	2010	1,239	11,840

	2011	5,581	17,421
PF	2010	12	620
	2011	76	1251
TF	2010	167	2,092
	2011	262	2,354

The verification team confirmed, through visual inspection that all physical features of the proposed project activity including data collection systems and storage have been implemented in accordance with the PDD. DNV confirmed during the on-site visit that the project was completely operational in this monitoring period.

During the monitoring period, the PP sought approval from the Gold Standard to incorporate several features of the new methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" /5/ into the existing project activity. These features include:

- Update the NRB fraction using the alternative approach outlined in the new methodology, section A 1.3 of Annex 1.
- Apply the "90/30 rule" in the context of future monitoring periods and issuance request, which will allow calculating emission reductions on the basis of the estimated mean fuel savings if the test results are such that the endpoints of the 90% confidence interval lie within +/- 30% of the estimated mean.
- Carry out annual Kitchen Surveys in place of quarterly surveys.

These requested revisions were approved by the Gold Standard /5/, and incorporated into the PDD. The revised PDD dated 24 June 2011 was accepted by the Gold Standard, and is therefore the basis for this verification DNV can confirm that they are accurately reflected in the monitoring report.

3.3 Compliance of monitoring plan with monitoring methodology

DNV can confirm that the monitoring plan contained in the registered PDD of 24 June 2011, including the revisions discussed above, is in accordance with the approved methodology applied by the project activity.

3.4 Compliance of monitoring with monitoring plan

DNV can confirm that the monitoring is done in compliance with the updated monitoring plan contained in the PDD dated 24 June 2011.

The monitoring procedure includes several tasks that require continuous monitoring, as well as other tasks that require less frequent monitoring. The general tasks that require continuous monitoring are described in Table 3, while those that require less frequent monitoring are described in Table 4. Finally, specific parameters that are estimated for this monitoring period based on the tasks in Table 3 and Table 4 are outlined below.

Table 3: Continuous Monitoring Requirements

Methodology Requirement	DNV Assessment

Maintenance of a Total Sales Record	DNV has reviewed the sales records /6/ which the PP has maintained in both electronic and paper form. The records include all data required by the updated monitoring plan. Furthermore, DNV crosschecked randomly selected electronic records to ensure that they accurately reflected the respective paper records of each sale and further verified a sample of these while conducting the Site Visit.
Maintenance of a Detailed Customer Database and Monitoring KS's	The PP has maintained a detailed customer database which includes the baseline KS, as well as the quarterly monitoring KS's. It should be noted that the PP conducted monitoring KS's on a quarterly basis /13//14//15//16//17//18/, despite getting approval to conduct them annually. As quarterly monitoring is more rigorous than annual monitoring, DNV concluded that this was acceptable. The monitoring plan requires 120 KS annually, or 180 over the 1.5 year monitoring period. The PP met this requirement, surveying 180 HH (/13//14//15//16//17//18/). These surveys included sustainability and qualitative fuel-wood use data. Interviews were conducted in person by Berkeley Air Monitoring Group staff. The questions asked during the interviews included all questions required by the methodology, as well as all additional project-specific questions as required. All results have been compiled in an electronic database for the monitoring period. Finally, the results of the monitoring KS suggest that the characteristics of the population in the total sales record are equivalent to the characteristics of the HH included in the KTs. Therefore, the baseline and project values determined during this monitoring period are appropriate for use in the calculation of emission reductions.
Updating of Project Database	The Project Database includes all information required by the methodology, including sales by cluster, results of the KSs and KTs, factors

	affecting emission reductions, and adjustments to emission reduction calculations.

In addition, the following periodic monitoring tasks required are found in Table 6:

Table 6: Periodic Monitoring Requirements included in Monitoring Report

Monitoring Requirement	DNV Assessment
NRB fraction should be re-assessed at least every 2 years	The NRB value was updated for this monitoring period by Berkeley Air Monitoring Group, an expert, independent third-party. The PP was granted approval to update the NRB fraction using the alternative approached outline in section A 1.3 of Annex I of the new methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption". /20/ The f_{NRB} value resulting from the Berkeley analysis is 94%, which represents a significant increase compared to the previous value of 73%. The methodology used for this current analysis is very different from the previous methodology, and requires a higher burden of proof in order to demonstrate the renewability; thereby resulting in a lower DRB value. For comparison purposes, DNV calculated f_{NRB} using the approach recommended by the CDM-SSC WG 35 and FAO Global Forest Resource Assessment data to be 98%. This confirms the validity of the methodology employed, and the data selected. DNV can confirm that the methodology employed correctly applies the approach outlined in section A 1.3 of Annex I of the new methodology.
Leakage estimates should be re-assessed at least every 2 years	This value of 0, which was last assessed and corroborated during the 2010 Bi-annual Study, was not required to be assessed for this monitoring period /4/.
A usage survey should be undertaken at least every 2 years	The usage survey is required to be conducted biennially. The survey was last conducted and verified in the 2010 Bi-annual Study /4/, and was not required to be assessed for this monitoring period.

Aging Stove KT should be undertaken not less frequently than every 2 years for sales made in the first year	This value was not required to be assessed for this monitoring period as it was corroborated during validation, and in the 2010 Bi-annual study. /4/
Baseline monitoring KT, as required	The monitoring plan requires baseline monitoring KTs to be conducted if the monitoring KS reveals that baseline parameters have changed significantly. The monitoring KSs did not suggest that the baseline parameters changed during the monitoring period,/2/3//13//14//15//16//17//18// and therefore the PP was not required to conduct a KT.
New Stove KT	No new stoves were introduced during the monitoring period.
Social and economic impact of the project should be investigated biannually.	As described in Section 3.6, the PP has investigated the social and economic impact of the project, and found that the project is making a positive contribution to sustainable development. Physical records besides electronic ones were verified during Site Visit.

DNV confirms that the monitoring plan has been properly implemented by the project participant. All parameters stated in the monitoring plan, the cook stove methodology (version .01) and the relevant Gold Standard requirements have been sufficiently monitored and updated as necessary. The table below shows the monitored parameters and the data units used for this monitoring period. As shown in the table, several parameters must be updated if the monitoring KSs suggest that the characteristics of the sales population differ from the characteristics of the KT population. DNV can confirm that the characteristics of the HH sampled for this verification do not differ from the characteristics of the HH sampled for the KT, and therefore a new KT was not required. Further, the stoves assessed during the site visit were all found to be properly labeled, and the PP continues to the use legal documentation (described in the PDD) to ensure that legal ownership of the emission reductions is clear. Therefore, DNV can confirm that the project is not double-counting emission reductions

Parameters that were verified specifically for this monitoring period include:

Data / Parameter:	**Stove Sales**
Data unit:	Number of stoves
Description:	Identification of household/commercial end-user with project stove
Measured/Calculated/ Default:	Measured
Source of data:	Sales Records /6/
Means of Verification	During site visit, DNV confirmed that the original sources of data, as

	well as the in-office database, matched with the stove sales contained in the Sales Database. In addition, during the site visit, DNV reviewed a sample of the invoices to ensure that stove sales were accurately stated.
Cross-check	N/A

Data / Parameter:	**Xnrb,bl,y**
Data unit:	Fraction
Description:	Non-renewability status of woody biomass fuel in year y in baseline scenario
Measured/Calculated/ Default:	Measured
Source of data:	2012 NRB study /3/
Means of Verification	DNV conducted a desk review of the 2012 NRB report conducted by Berkeley Air, an independent third party. The report demonstrates that the conditions meet the applicability conditions which must be present. DNV reviewed the calculations and data within the report, and found them to promote a conservative result.
Cross-check	N/A

3.5 Assessment of data and calculation of emission reductions

The PP submitted all the necessary data and parameters required to be monitored to DNV along with the monitoring report. All the parameters required to be monitored as per the registered PDD have been monitored and reported in the monitoring report. DNV reviewed the calculation worksheet /7//8//9//10//11/ for the emission reduction calculation for the monitoring period 01 September 2010 to 31 December 2011. DNV confirms that the formulas, conversions, aggregations and factors are consistent with the monitoring plan in the PDD. The reported data was checked as follows:

- All the necessary data and all the parameters required to be monitored in the registered PDD /1/ were reviewed to ensure accuracy;
- The Project Sales Database kept electronically by E+Carbon /6/ was reviewed to confirm the number of stoves sold during the monitoring period.

Emission Reductions

In accordance with the applied methodology, annual emission reductions are calculated as follows:

Step 1 – Calculate stove-days, or the number of days that each stove is operational based on stove sales date.

Step 2 –To account for potential declines in stove usage over time, stove-days is discounted based on the length of time the stove has been in operation; drop-off rates of 2.5%, 5% and 15% were applied to stoves that have been in operation for 1, 2, and 3 years, respectively /4/.

Step 3 – Stove-days are aggregated, and converted to stove-years.

Step 4 – Emission reductions are calculated as stove-years multiplied by the appropriate stove emission factor.

Stove emission factors are listed in Table 5 below. The number of stoves distributed is shown in Table 2.

Total emission reductions are based on the total of 33,427 stoves disseminated during this monitoring period, plus 53,070 stoves disseminated prior to the current monitoring period. .

Table 5: Stove model emission factors

Stove Model	Emission Factor (tCO_2e/stove-yr)
SGF	3.19 /9/
GF	2.32 /7/
MF	1.58 /8/
PF	0.59 /10/
TF	0.37 /11/

An aging stove KPT was conducted during the previous verification, and thus a new study was not required. The previous aging stove test found that per person fuel consumption did not increase as compared to the fuel consumption measured at validation. Therefore, stove efficiency in the second year was assumed to be constant.

DNV reviewed the spreadsheets provided by the PP /7//8//9//10//11/ and is able to confirm that the calculation of emission reductions for the appropriate technology has been conducted properly, and that all parameter values have been correctly input into the spreadsheet. Thus, DNV can confirm that the final calculation of emission reductions as stated in the monitoring report is correct. The emission reductions from the project during the period 01 September 2010 to 31 December 2011 amount to 194,096 tonnes of CO_2 equivalent. Of this total, 39,574 tonnes of CO_2 equivalent were generated in 2010, and 154,522 tonnes of CO_2 equivalent were generated in 2011.

3.6 Monitoring of Gold Standard Sustainability Indicators

Additional parameters monitored are in accordance with the monitoring plan for sustainability indicators, as per the requirements stated in the Gold Standard Passport (June 2010) and the monitoring report (Version 03) dated 22 May 2012.

Indicator	Monitoring Source	Variables, Units and Frequency of	DNV Assessment

		Measurements	
Air quality	Survey results reported in Berkeley Air's 2010 bi-annual Study	Reduced indoor air pollution (IAP), measured as ambient IAP concentration.	Charcoal and fuelwood savings are reported biannually, and were last reported in the Berkeley Air's 2010 Biannual Monitoring Report /4/. Therefore, this value was not re-assessed for this verification period.
Livelihood of the poor	Survey results reported in Berkeley Air's 2010 bi-annual Study	Money saved due to reduced fuel consumption.	Charcoal and fuelwood savings are reported biannually, and were last reported in the Berkeley Air's 2010 Biannual Monitoring Report /4/. Therefore, this value was not re-assessed for this verification period.
Employment	New Employment	Jobs created, salaries executed	DNV reviewed the employment records of the project participant during the site visit. These records confirm the results presented in the monitoring report.
Employment Quality	Periodic assessment of employment conditions at stove manufacturers	Salary and employment conditions	During the site visit, DNV spoke with employees and confirmed that wages are above the local norms, and that they are paid overtime.
Access to energy services	Extrapolation based on total sales and average HH size	People/yr receiving access to improved stoves	DNV was able to confirm the average HH size and the total sales during the site visit.
Other Pollutants	Periodic qualitative assessment of conditions	Proper disposal of waste at production facilities	During the site visit, DNV was able to confirm that old stoves are gathered and stored in facilities for proper disposal.

3.7 Management system and quality assurance

The project's management system was reviewed to determine the effectiveness of its implementation. In accordance with the registered PDD dated 24 June 2011, the monitoring plan has clearly prescribed the management and operational procedures for monitoring, recording, data management, and training. DNV has verified through document reviews and site visit

interviews the management system and quality assurance procedures and has found them to be appropriate and effective. However, one FAR was issued to be attended to in the future as there are no records demonstrating that manufacturing staff have been properly trained in the art of stove manufacturing. The PP is requested to improve this practice during the next monitoring period.

4 CERTIFICATION STATEMENT

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the "Improved Household Charcoal Stoves in Mali" project (Gold Standard Registration Reference No.GS414) for the period 01 September 2010 to 31 December 2011.

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

DNV conducted the verification on the basis of the GS approved monitoring methodology "Methodology for Improved Cook-stoves and Kitchen Regimes V.01", the monitoring plan contained in the registered Project Design Document of 24 June 2011 and the monitoring report (Version 03) dated 22 May 2012. The verification consisted of checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and the collection of evidence to support the data reported in the monitoring report.

DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the "Improved Household Charcoal Stoves in Mali" project (Gold Standard Registration Reference No.GS414) for the period 01 September 2010 to 31 December 2011 are fairly stated in the monitoring report (Version 03) dated 22 May 2012.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology GS approved monitoring methodology "Methodology for Improved Cook-stoves and Kitchen Regimes V.01", the monitoring plan contained in the registered Project Design Document of 24 June 2011 and the monitoring report (Version 03) dated 22 May 2012.

DNV Climate Change Services AS is able to certify that the emission reductions from the "Improved Household Charcoal Stoves in Mali" project during the period 01 September 2010 to 31 December 2011 amount to 194,096 tonnes of CO_2 equivalent. Of this total, 39,574 tonnes of CO_2 equivalent were generated in 2010, and 154,522 tonnes of CO_2 equivalent were generated in 2011.

The following table outlines the documentation assessed during the verification:

/1/	E+Carbon: Project Design Document - "Improved Household Charcoal Stoves in Mali", version 04.0 dated 24 June 2011.
/2/	E+Carbon, Monitoring Report - "Improved Household Charcoal Stoves in Mali", Version 03 dated 22 May 2012, and previous versions.
/3/	Berkeley Air Monitoring Group, Non-Renewable Biomass Baseline Assessment for Mali, for E+Carbon, January 2012.
/4/	Berkeley Air Monitoring Group, Bi-Annual Monitoring of the Sewa Charcoal Stove, Katene Kadji, Mali, August 2010
/5/	Gold Standard, Deviation authorization letter – GS 414, 20 July 2011
/6/	E+Carbon, Master Sales database.xls,
/7/	E+Carbon, Katene projector_grand.xls
/8/	E+Carbon, Katene projector_medium.xls
/9/	E+Carbon, Katene projector_super grand.xls
/10/	E+Carbon, , Katene projector_tea.xls
/11/	E+Carbon, Katene projector_small.xls
/12/	Berkeley Air Monitoring Group, Email correspondence re: Air quality monitoring, 16 February, 2012
/13/	Berkeley Air Monitoring Group, Q1 2011 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, May 2011
/14/	Berkeley Air Monitoring Group, Q2 2011 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, August 2011
/15/	Berkeley Air Monitoring Group, Q3 2011 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, January 2012
/16	Berkeley Air Monitoring Group, Q4 2011 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, January 2012
/17/	Berkeley Air Monitoring Group, Q3 2010 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, February 2011
/18/	Berkeley Air Monitoring Group, Q4 2010 Quarterly Carbon Monitoring of Katene Kadji, Bamako, Mali, May 2011

Background documentation reviewed:

/19/	Gold Standard Foundation, Gold Standard, version 2.1
/20/	Gold Standard Foundation, "Methodology for Improved Cook-Stoves and Kitchen Regimes," Version 01,", V.01, May 2010

/21/	Gold Standard Foundation, "Technologies and practices to displace decentralized thermal energy consumption," V.01, April 2011
/22/	CDM Executive Board, Tool for the demonstration and assessment of additionality, version 5.2, 26 August 2008
/23/	IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories
/24/	TUV SUD, Gold Standard Validation Report: "Improved Household Charcoal Stoves in Mali", 24 Aug 2009, v3.
/25/	TUV NORD, Verification Report: E+Carbon - Improved Household Charcoal Stoves in Mali", 27 May 2010, v1.

APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Table A-1 Forward Action Requests (FARS) Raised During This Verification

No.	Reference	Project Participant Response
FAR 1. Even though there is a training manual, the supervisor is responsible for training new staff during a three month time period in order to become an expert for manufacturing totally a new stove. However there are no records of qualified personnel or personnel rejected. Project participant is requested to improve this practice.	PDD Section A.2 Sustainable Development Matrix	PP takes note of this FAR. Procedures will be put in place to track trainees' performance.

Table A-2 Forward Action Requests (FARS) Raised During the Previous Verification /25/

Forward Action Request from previous monitoring period	Reference	How FAR has been addressed by project participant	Validation conclusion
FAR 1. The ER calculation is based on the sales data provided by Katene Kadji and resellers. However data on ceramic liner delivery from Katene Kadji and sales of stoves is not clearly traceable. The monitoring system from manufacture of ceramics with all ceramic losses, delivery to the reseller/blacksmith and sales to the end user has to be further improved. This has to be checked during the next periodic verification.	Second monitoring period Verification Report	Ceramic liner information now is kept in hardcopy and electronic files. Both versions include the following information: finalization date of manufacture of ceramic liner, liner losses, quantity delivered to resellers/blacksmith and sales to the end user (considering complete stove units).	This FAR is considered closed.
FAR 2. During the onsite visit differences between the declared deliveries to reseller and	Second monitoring	Project participant showed a procedure called "Distribution scheme" (coded as	This FAR is considered closed.

Forward Action Request from previous monitoring period	Reference	How FAR has been addressed by project participant	Validation conclusion
sold stoves were found. The reseller maintained rudimentary records of delivery. Even though the questioned data was not used in the ER calculation, troubleshooting procedures in case of differences between the delivery from Katene to reseller/blacksmiths and sales record of stoves by reseller/blacksmiths has to be developed and provided to all parties. This has to be checked during the next periodic verification.	period Verification Report	R06-001) where it is explained how to solve differences between delivery from Katene to reseller/blacksmith and sales record of stoves by reseller/blacksmith. In this procedure it is stated that in case of difference Katene's information will prevail.	
FAR 3. The data from the monitoring has to be stored for at least two years beyond the monitoring period. During the onsite visit, it was found that no proper data storage and handling was in place. Data storage and handling has to be improved. This has to be checked during the next periodic verification.	Second monitoring period Verification Report	Project participant now uses folders and binders for organizing and storing documents. These folders and binders are stored in a dedicated file cabinet.	This FAR is considered closed.

Table A-3 Corrective Action Requests

Corrective action and/ or clarification requests	Reference	Response by project participants	Validation conclusion
CAR 1. Project participant is requested to provide documental evidence why they have not performed quantitative monitoring of ambient carbon monoxide and particulate matter concentrations in	PDD Section A.2 Sustainable Developme	The PP has not conducted quantitative air quality monitoring because of their high cost and their difficult implementation. An e-mail exchange with Berkeley Air	*21 February 2012* Project participant provided an article about "Design considerations for field studies of changes in indoor air

Corrective action and/ or clarification requests	Reference	Response by project participants	Validation conclusion
households with improved and unimproved cook stoves.	nt Matrix	Monitoring Group confirming this fact as well as the article "Design Considerations for Field Studies of Changes in Indoor Air Pollution Due to Improved Stoves" are provided to the DOE as documental evidence. *23-Feb-2012* The PP has resubmitted its e-mail exchange with Berkeley Monitoring Group stating the cost of quantitative air quality monitoring. The cost range between $40,000 and $125,000 which represents a significant expense for this project. Comparatively, this type of study cost at least 40% more than a periodic verification and could possibly constitute the highest project expense	pollution due to improved stoves". In this document it is demonstrated what factors can influence the indoor concentrations, what factors produce an increase in variability for air pollution monitoring. Article provides guidelines for sample design as well as strategies for reducing the sample size, thus the article provides how to make feasible the quantitative monitoring of ambient carbon monoxide and particulate matter concentrations, however the article states "it is likely to be too costly in sample size requirements to plan to detect a 10% difference and even 20% may be too ambitious in many circumstances, depending on resources". Article is considered a proper evidence of obstacles related to sample size for performing the air pollution monitoring. E-mail evidence was not found in the information package sent by project participant. *29 Feb 2012* Project participant has submitted the e-mail from Berkeley Air. According with

Corrective action and/ or clarification requests	Reference	Response by project participants	Validation conclusion
			the information provided this expense is very high compared with the cost of a periodic verification (in the cheapest case it may reach 40% of the cost of the verification). Most importantly, the monitoring plan does not require the PP to quantitatively assess IAP. Instead, a qualitative assessment by the PP conducted is sufficient. **This CAR is considered closed.**
CL 1. Project participant did not show the on-site electronic back up to DNV of the project activity information. Project participant is requested to provide the information of what sort of backing up system is using in the site of the project activity and to explain whether this system is properly stored and protected and who is in charge of the system.	PDD Section D.2.1.1.	The on-site electronic backup is an external hard-drive with the following characteristics: LG brand, External HDD HXD5; Capacity: 320GB. The Administrative Supervisor is in charge of backing up the data and the device is stored at the local participant's residence.	Project participant has explained properly the type of backup system used, who is in charge of the system and how the system is stored for information protection. **This CL is considered to be closed.**
CL 2. During the survey it was found that there is a household that occasionally uses a gas stove for cooking and another household that occasionally uses a traditional and a gas stove for cooking. Project participant is requested to explain	Site visit Niomoucono Cité, commune 6.	The use of other fuels such as liquefied petroleum gas (LPG) is taken into account in the Kitchen Surveys (KS) and the Kitchen Performance Tests (KPT). Because a KPT measures fuel savings at the kitchen level rather than the stove level, the impact	Bi-annual study report by Berkeley Air states that KPT weighted charcoal and, where applicable, fuelwood and liquefied petroleum gas were weighed daily during daily households visits for four days, thus the changes in fuel use

Corrective action and/ or clarification requests	Reference	Response by project participants	Validation conclusion
how these practices are considered for the calculation of emission reductions.		of LPG in the overall biomass usage of household is reflected in the results and is therefore taken into account in the calculation of emission reductions.	are taken into account by the aging stove KPT. **This CL is considered to be closed.**
CL 3. Project participant calculated an estimation of emission reductions for the 2010-2011 period in the PDD of 57 813 tCO_2e and in the monitoring report emission reductions are stated to be 160 468.7 tCO_2e. Project participant is requested to explain this difference between real and estimated emission reductions.	PDD Section A.4.4. Monitoring report Section D.4.2.	The difference between estimated emissions reductions (ER) in the PDD and actual ER in the Monitoring Report is explained by three main factors: 1)The estimated ER for 2011 are based on the sale of 26,620 stoves while actual sales were 27,589 stoves 2) The estimated ER are based on a Non-Renewable Biomass fraction of 51% for charcoal and 54% for wood while the current NRB for both is 98.5% 3) In the PDD the project proponent had estimated that 20% of stoves will drop out of the project annually (through breakage or other reasons), however the last usage rate surveys revealed an average drop off rate of around 5% annually.	*21 February 2012* Project participant has explained properly the difference between emission reductions estimated in the PDD and actual emission reductions claimed in the monitoring report. **This CL is considered to be closed.**