Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Bamako Clean Cookstoves – Improving livelihoods and fighting desertification in the Sahel zone
Version number of the PDD	Version 01
Completion date of the PDD	14/04/2016
Project participant(s)	Swiss Carbon Value Ltd. Katene Kadji
Host Party	Mali
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope 3 (Energy Demand) Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 2.0 (24/04/2015)
Estimated amount of annual average GHG emission reductions	116,723 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Fuel wood and charcoal (together referred to as wood fuel) meet between 80% and 90% of Mali's fuel requirements. Although wood continues to dominate national energy consumption, charcoal use in both rural and urban areas is increasing. Charcoal is the primary fuel in Bamako, and the positive trend is expected to continue. Fuel-switching from wood to charcoal in city centers is primarily due to changes in the socioeconomic characteristics of urban households that make charcoal a more attractive fuel.

The project described herein reduces greenhouse emissions by disseminating clean and fuel-efficient charcoal stoves known as Sewa stove. The project is initated by Katene Kadji, Mali. It is owned and managed by Ousmane Samassekou, a highly educated entrepreneur.

The stoves are manufactured in five different sizes, all of which are promoted by the project.

a. Extra Large (Super Grand Format, SGF)
b. Large (Grand Format, GF)
c. Medium (Moyen Format, MF)
d. Small (Petit Format, PF)
e. Tea (Thé Format, TF)

While these stoves significantly reduce greenhouse gas emissions, they simultaneously 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 and desertification by decreasing demand for charcoal and wood.

Currently, inefficient and polluting cooking regimes are deeply entrenched in Malian culture. With the support of carbon finance, this project is breaking this trend and moving large populations away from high GHG emissions, indoor air pollution, deforestation and desertification.

A.2. Location of project activity

A.2.1. Host Party

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Mali

A.2.2. Region/State/Province etc.

>>
Mali

A.2.3. City/Town/Community etc.

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Initially urban and peri-urban communities in the Greater Bamako region in Mali; the company's distribution network will gradually be expanded to cover major towns and market centers in all regions of the country, including Timbouctou, Kidal, Gao, Mopti, Segou, Sikasso, Koulikoro, and Kayes, and further more to cover the areas around the Sahel Zone, through the use of retail points and commission earning agents.

A.2.4. Physical/Geographical location

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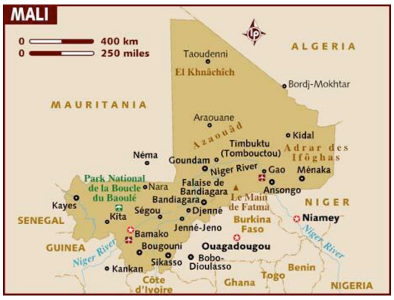

Coordinates: 14.8128˚N, 5.5030˚W
The majority of the project stoves are sold Bamako, the Capital City.

Katene is the implementing organization and will conduct the project from its offices in the capital city of Bamako.

Contact person(s):

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A.3. Technologies and/or measures

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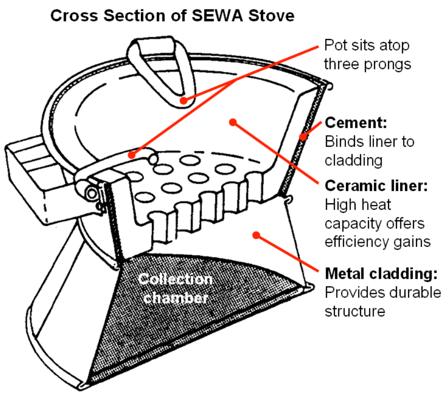
The Sewa stove consists of hourglass shaped metal cladding with perforated interior ceramic liner that allows ash to fall to the collection chamber at the base. A thin layer of cement is placed between the cladding and the liner. During use, a single pot rests at the top of the stove. See diagram below for further details. The design of all five sizes listed above is identical. The ceramic liner's capacity to increase combustion and retain heat is at the heart of the stove's efficiency. It consumes between 30% and 40% less charcoal than the traditional metal stove.



According to Katene staff, the charcoal burned in the SEWA stoves is normally sourced from the savannah zones of southern Mali. The Ministry of Energy in Mali defines the supply area as a basin radiating out 200km in each direction from the city. The primary production areas supplying Bamako are found in four administrative regions: Koulikoro, Sissako, Segou and Kayes. Production of charcoal tends to be small-scale and is often organized on a village level. Women are the primary agents in charcoal production, which is a dangerous and ill-paying profession.

Over-dependence by most of the population on charcoal and fuel wood as energy sources has heightened the threat of deforestation and desertification in many parts of the country. The burden of this reliance is carried by natural forests, as tree plantations have proved less lucrative in Mali than in neighbouring countries. More than 500,000 ha of forests disappear annually in the country. As sources, especially those in the periphery of large urban zones, become depleted and if proper forest management and practices are not implemented, it can be reasonably expected that Charcoal production in Mali, in addition to harvest for fuel wood, construction, agricultural clearing and other needs, presents an ongoing, increasing and significant threat to local forest resources.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mali (host)	Katene Kadji (Private entity)	No
Switzerland	Swiss Carbon Value Ltd. (Private entity)	No
…	…	

A.5. Public funding of project activity

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No public funding is received by the project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 2.0 (24/04/2015)
http://www.goldstandard.org/sites/default/files/revised-tpddtec-methodology_april-2015_final-clean.pdf

B.2. Applicability of methodology and standardized baseline

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The methodology is applicable to the project activity because:

1. The project activity is introducing the technology that reduces greenhouse gas (GHG) emissions from the thermal energy consumption of households and non-domestic premises. The project reduces GHG emissions by disseminating low emission charcoal stoves to replace relatively inefficient high-emission stoves from households, as evidenced by the results of the baseline study quantifies the fuel consumptions respectively in baseline scenario and in project scenario.
2. The project boundary can be and is clearly defined in section B.3 of this PDD.
3. The stoves counted in the project activity are not part of any other voluntary market or CDM project activity. Double counting is avoided by South Pole's legally robust system of ERPAs, whereby all participants in the efficient stove industry with whom Katene Kadji does business are asked to sign contracts that would reveal any possible double counting. A full paper trail of all ownership rights to emissions reductions can be produced.

4. Each stove has less than 150kW total output, as outlined in the calculations below:

Wood and Charcoal Net Calorific Values (IPCC 2006 GL)			
	NCV (TJ/Gg_ch or MJ/kg_ch)	lower 95%	upper 95%
Wood / Wood waste	15.6	7.9	31
Charcoal	29.5	14.9	58

Sample calculation (for large size stove)
NCV charcoal (MJ/kg) * thermal efficiency (%) * daily fuel consumption (kg/day) =29.5 MJ/kg * 0.35 * 2.2 kg/day = 22.715 MJ/day
22.715 MJ/day * 1 day/86,400 seconds *1000 KJ/MJ = 0.26 KJ/sec = **0.26 kW output**

Stove size	**Fuel consumption (kg/day) per fuel adjustment factors**	**Thermal capacity (kW)**
SGF	3.5	0.42
GF	2.2	0.26
MF	1.8	0.22
PF	0.7	0.08
TF	0.4	0.05

5. The project employs a system whereby end users are offered an additional discount on an efficient stove if the purchase is accompanied by surrendering a functioning inefficient stove of roughly similar cooking capacity. This provides an incentive to more quickly phase out inefficient stove use. Surrendered inefficient stoves are destroyed and sold for scrap metal to avoid them being resold into the market and used again. The initial discount is an additional 20% below the posted price, however, Katene reserves the right to adjust this rate based on market conditions.
6. Each end user, who is the default owner of emission reductions, is notified that they waive ownership of ERs upon sale of each stove. This is done via a rights waiver that is included inside each stove at point of sale to make the customer aware of them waiving ownership rights over emission reductions.
7. The project activity is not making use and will not make use of any new biomass feedstock in the project situation.

B.3. Project boundary

The project boundary here is defined as the domestic or institutional kitchens of the project population using Katene SEWA stoves. The target area and fuel collection area, as defined in the methodology being applied here, are outlined over the course of the project in the table below:

	Target area	Fuel collection and production area
Initial	Katene's current distribution network, mostly in Greater Bamako.	The 61 communes that supply fuel wood or charcoal to Bamako according to the "Scheman Report." Each commune is listed in that study, which was the primary source for the non-renewable biomass calculations.
Expanded over course of project	Will gradually expand to cover major towns and market centers in all regions of Mali, including Timbouctou, Kidal, Gao, Mopti, Segou, Sikasso, Koulikoro, and Kayes, and further more to cover the areas around the Sahel Zone	To be determined based on the monitoring procedures outlined in the methodology.

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Combustion of charcoal and wood for cooking	CO_2	Yes	Important source of emissions
		CH_4	No	Minor emissions
		N_2O	No	Minor emissions
	Production and transport of charcoal	CO_2	Yes	Important source of emissions
		CH_4	No	Minor emissions
		N_2O	No	Minor emissions
Project scenario	Combustion of charcoal and wood for cooking	CO_2	Yes	Important source of emissions
		CH_4	No	Minor emissions
		N_2O	No	Minor emissions
	Production and transport of charcoal	CO_2	Yes	Important source of emissions
		CH_4	No	Minor emissions
		N_2O	No	Minor emissions

B.4. Establishment and description of baseline scenario

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According to the applied GS methodology, a baseline scenario is defined by the typical baseline fuel consumption patterns in a population that is targeted for adopting the new project technology.

The baseline scenario is identified and established using the following baseline studies:

- <u>Baseline non-renewable biomass (NRB) assessment</u>

As woody biomass is one of the baseline fuels (fuelwood and charcoal), the fractional non-renewability of biomass needs to be established. The approach of CDM methodology AMS-II.G is adopted to calculate f_{NRB}. According to the GS methodology, the non-renewable biomass fraction can be fixed based on the results of the NRB assessment. Over the course of a project activity the project proponent may at any time choose to re-examine renewability by conducting a new NRB

assessment. In case of a renewal of the crediting period and as per GS rules, the NRB fraction must be reassessed as any other baseline parameters and updated in line with most recent data available.
The calculating result is 94% here for the project, which is fixed during the first crediting period.

- Baseline survey (BS) of target population characteristics

The baseline survey requires in person interviews with a robust sample of end users without project technologies that are representative of end users targeted in the project activity.

Following the guidelines below regarding minimum sample size:

Group size < 300: Minimum sample size 30 or population size, whichever is smaller
Group size 300 to 1000: Minimum sample size 10% of group size
Group size >1000: Minimum sample size 100

Initially about 95% of Katene's Sewa charcoal stoves are sold in Bamako, therefore baseline survey was conducted on stoves end users in this area. More than 100 end users were sampled using clustered random sampling from Katene Kadji's sales records. The survey included questions about basic household characteristics including the number of people living in the household, the number of meals cooked per day, education, source of income, stove and fuel use before and after purchase of the Sewa stove, and season variations of stove and fuel use patterns. Other critical information on target population characteristics, such as the addresses or locations, mobile telephone numbers and so on, was also collected.

The baseline survey identified two potential clustering criteria for Sewa stove user, that of daily usage of fuelwood or not. The size of Sewa stove was the other factor considered as a clustering criterion for estimating fuel savings.

- Baseline performance field test (BFT) of fuel consumption (Kitchen performance test (KPT) in case of cook stoves)

As per the GS methodology, as the project activity is to deploy improved cook stove for the reduction of non-renewable biomass use, the baseline fuel and project fuel are the same, and the statistical analysis can be conducted with respect to fuel savings per unit. The baseline survey and baseline KPT can be conducted concurrently with the same end users.

There are two valid options for the statistical analysis. In all cases, sample sizes must be greater than 20:

a. 90/30 rule. When the sample sizes are large enough to satisfy the "90/30 rule", i.e. the endpoints of the 90% confidence interval lie within +/- 30% of the estimated mean, overall emission reductions can be calculated on the basis of the estimated MEAN annual emission reduction per unit or MEAN fuel annual savings per unit.
b. 90% confidence rule. When the sample sizes are such that the "90/30 rule" is not complied with, the emission or fuel saving result is not the mean (or average) test result, but a lower value, i.e. the LOWER BOUND of the one-sided 90% confidence interval.

Paired sampling for KPT – sampling the same users before and after beginning use of a new cook stove – was performed. The KPT was performed in more than 30 households (HHs) in Bamako, which were selected using screening criteria based on the over 100 end users in the baseline survey. The KPT was performed on households with similar socioeconomic and demographic characteristics as Katene customers (as defined by the results from the BS), but who did not have stoves prior to the test. They were then provided with a stove for purposes of the test. Any households that already owned SEWA stoves were not included.

To attain fuel savings for each stove model, the lower bound of the 90% confidence interval is taken for each fuel and stove size. Daily charcoal savings parameters are adjusted based on the

ratio of fuel saved to stove cooking capacity calculated for the KPT stoves and extended that to other sized stoves and then subtracting 15% from this total. This approach proved to be both quantitatively and technically rigorous as well as conservative. 45% of SEWA stove users in the BS use fuelwood as secondary fuel. To be conservative, typical wood savings is estimated for MF, GF and SGF stoves based on the KPT field measurements for the MF and GF stoves and the prevalence of wood use as a secondary fuel.

The lower bound of the 90% confidence interval of daily charcoal and fuelwood savings for each stove type is outlined below:

Stove Type	Daily Fuel Savings (kg/HH-day)	
	Charcoal	Fuelwood
SGF	1.32	0.25
GF	0.94	0.25
MF	0.62	0.25
PF	0.26	0
TF	0.16	0

B.5. Demonstration of additionality

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The project will reduce the amount of GHGs emitted through reduced use of charcoal and fuelwood as cooking fuels, by introducing the use of efficient charcoal stoves that will replace existing inefficient stoves.

According to the GS methodology, the most recent version of the UNFCCC "Tool for the Demonstration and Assessment of Additionality", or of an approved Gold Standard VER additionality tool must be applied prior to registration. Here for the project, the "Tool for the demonstration and assessment of additionality" (Version 07.0.0) is applied. The tool requires that 5 steps are taken to investigate whether or not the emission reduction would be achieved in the absence of the project activity.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first-of-its-kind. So here proceeds to Step 1.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity

Four credible alternatives to the project activity exist. 1) First, the project activity could proceed without being registered as a Voluntary Gold Standard project. 2) Alternatively the target population could continue to cook using the same inefficient cooking technology and consume greater amounts of fuel. 3) The target population could also cook with another fuel, such as liquefied petroleum gas (LPG). 4) Finally, the target population might also cook using a solar cooker. Although solar cookers can only be used when the sun is shining and LPG produces a different taste in the food that introduce some cultural barriers, broadly speaking, these alternatives would provide a similar level of service, at least in the near term. Over the long term, continuing the business-as-usual scenario could lead to fuel shortages, thereby decreasing service levels.

Sub-step 1b: Consistency with mandatory laws and regulations

These alternatives are consistent with Malian law since there is no legislation in Mali that requires the use of efficient stoves. Moreover, none is expected to be introduced during the project period.

(proceed to step 3, "barrier analysis" since an investment analysis will not be applied)

Step 3: Barrier analysis

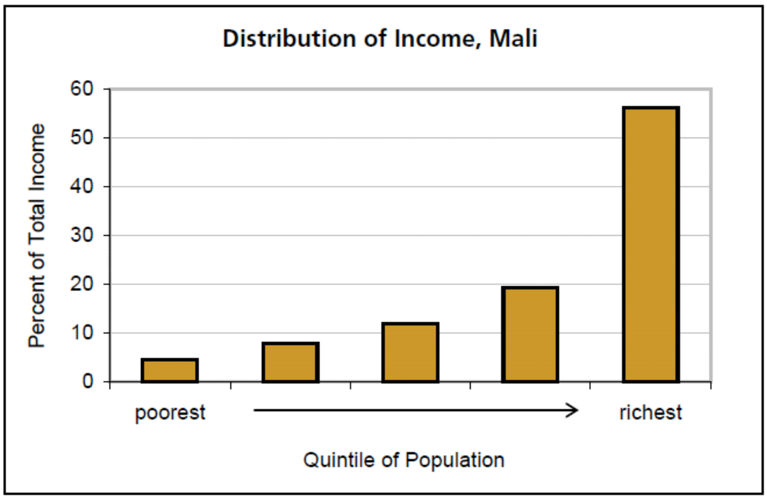
Sub-step 3a: Identify barriers that would prevent the implementation of the proposed project activity:

- Financial barrier

With respect to additionality, the Gold Standard VER methodology being applied states that, "the project proponent must show that the project could not or would not take place without the presence of carbon finance. Possible reasons may be that the initial investment… (is) …not affordable to the target project population in the form of high stove prices."

Evidence gathered from end users, independent artisans, retailers, Katene's staff, government officials and experts suggests that at unsubsidized prices Katene stoves are unaffordable to the majority of Malians whose average GDP per capita (PPP) is $1,000. With the addition of carbon finance, efficient charcoal stoves will be cheap enough for lower income households in Mali to afford them. That is, some carbon revenues will act as a direct subsidy so that efficient stoves are cost competitive with their business-as-usual counterparts. At unsubsidized prices, purchasing a SEWA stove accounts for several percent of annual incomes and the ability for users to save this amount of money to purchase the stove is extremely limited.

Yet GDP per capita does not tell the whole story with respect to the target population's ability to afford efficient stoves. This is because income distribution is extremely uneven in Mali. In fact, the 20% wealthiest Malians control 56.2% of the nation's wealth, while the 20% poorest only control 4.6%. 72.8% of Mali's population lives on less than $1/day. Since the target population is among the nation's poorest, these stoves without carbon revenues to subsidize their price represent a significant investment for this population. The graph below shows the distribution of income in Mali by quintile:



The chart below outlines the prices at which Katene's stoves have been sold and were later sold with a discount:

Stove model	Undiscounted Price - CFA (USD)	New Price - CFA (USD) (decreased with hope of carbon revenues, further decrease are planned after revenues are realized)

SGF	5,500 (11.74)	4,000 (8.53)
GF	4,000 (8.53)	3,000 (6.40)
MF	3,500 (7.47)	2,500 (5.33)
PF	3,000 (6.40)	2,250 (4.80)
TF	1,500 (3.20)	1,000 (2.13)

As highlighted in the column heading on the right, the discount offered in the chart is only the current discount, and once carbon revenues are realized, this discount will increase significantly. The discount will be based on studies of price elasticity of demand to determine what price is required to maximize total sales numbers. Project profitability increases as more stoves are sold, regardless of how much is charged for stoves. This is because carbon revenues from the stoves are worth more than the stoves themselves. As such, the goal will be to maximize sales at any price, while avoiding the situation of giving the stoves away for free since this will cause other unintended consequences of misuse and waste.

- Knowledge barrier

The methodology being applied also states that, "…possible reasons (that the project might not take place in the absence of carbon finance) may be that on-going costs for … marketing and distribution … are not affordable…"

Indeed, a key obstacle to the project activity taking place in the absence of carbon revenues is a lack of awareness among potential users regarding the benefits associated with SEWA stove use. As Katene expands into new regions, further sales and promotional activities will be required to foster a vibrant market. Non-traditional marketing techniques using informal village networks and other capacity building methods may be as important as traditional marketing approaches such as branding through radio advertisements. In fact, cooking practices are deeply entrenched in culture, and therefore changing them requires a very specific, culturally appropriate and community-based type of marketing that is resource intensive and involves far more than simply paying for radio advertisements.

- Prevailing practice

Habitual use of traditional stoves imposes a very strong influence on the baseline scenario, resulting in continued use of traditional inefficient charcoal stoves. In Mali, efficient charcoal stoves have not been sold in the absence of support programs such as equipment grants, direct subsidy, marketing and training, making this project the first of its kind since it aims to disseminate stoves using only carbon revenues to fulfil these functions.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

Financial barrier: Financial barriers will not prevent, alternative 2, the business-as-usual alternative of continuing to use inefficient cooking technologies from occurring. Cooking on three-stone stoves and other ad hoc technologies is virtually free, while inefficient stoves are less expensive than their efficient counterparts, offering fewer financial hurdles. In Bamako for instance, the average sized inefficient "Malgache" stove - the stove most widely used in urban areas - cost about $2 compared to $5 for the average sized Sewa stove. Alternatives 3 and 4, cooking with LPG and solar cookers respectively, are eliminated at this stage since they face considerably larger financial barriers than the project activity. Solar cookers can cost from $30 to over $100 depending on their design. LPG burners and cylinder cost on the order of $30, while LPG fuel is significantly more expensive than charcoal and fuelwood. Fuel mixing in Malian households in common, as was revealed in the kitchen surveys performed under this project. Different fuels are used for different cooking tasks depending on the resources and needs of the household. While LPG is reasonably common in urban and peri-urban areas in Mali - the kitchen survey revealed that 53% of Bamako households without efficient charcoal stoves use LPG at least once - LPG is generally used for boiling water in

the morning, for example, a task that does not consume too much fuel. Meeting the thermal requirements needed to cook entire meals with LPG is far more costly. Although solar cookers and LPG are clean and beneficial technological alternatives, they are prohibitively expensive for most Malians.

Knowledge barrier: Knowledge barriers do not plague inefficient cooking technologies in the same way due to their prevalence. The target population is aware of and accustomed to this technology, and do not require special training or targeted marketing prior to purchasing or using this technology. Knowledge of inefficient stoves is deeply entrenched in Malian culture.

Prevailing practice: As explained in previous sections, inefficient stoves are present in most Malian kitchens and are deeply entrenched in Malian culture. They define the prevailing practice and are therefore not deterred by this barrier.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity:

As stated earlier, sales of efficient stoves in the absence of subsidies have not occurred in Mali to date. Since we cannot observe other cases of market-based efficient stove dissemination efforts in Mali, it is instructive to highlight examples in other African nations in similar circumstances. To identify additional examples, we take a nation's per capital gross domestic product (GDP) as a proxy for end users' ability to afford efficient stove technology and a nation's credit rating as a company's ability to gain access to market sources of finance other than carbon finance. We then compare these variables with how efficient stove efforts are being funded in those nations.

Nigeria – With a per capita GDP (PPP) of 2,100, Nigerians should find improved stove technology more affordable than Malians. Moreover, Nigeria's credit rating is 40 out of 100, suggesting slightly fewer barriers to borrow in that nation compared with Mali. Yet an efficient stove project is currently under consideration for CDM funding in Nigeria.

Ghana – With a per capita GDP of $1,400, Ghanaians' purchasing power is similar to that of Malians'. Their credit rating is 37.6 out of 100, and business loans are very difficult to attain, especially for such ventures as efficient stove manufacturing. Two efficient stove projects are currently under consideration for carbon finance in Ghana.

Uganda – Uganda's per capital GDP of $1,000 also suggests that efficient stoves pose a similar burden on household budgets. With a credit rating of 29.9 out of 100, financing for such business is equally unattainable. Uganda is host to at least one efficient stove project funded entirely through carbon finance.

As is clear from these examples, carbon finance is quickly becoming the primary mechanism with which to fund improved stove technologies in countries with similar economic circumstances to Mali. These examples provide an additional credibility check to the additionality rationale outlined in steps 1-3 above.

Sub-step 4b: Discuss any similar options that are occurring:

All similar options discussed necessitate access to carbon finance, and thus do not contradict the claim that the proposed project activity is subject to the barriers outlined in step 3.

Conclusion: the proposed project activity is additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The adopted methodology is the Gold Standard methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 2.0 – 24/04/2015”. It is applicable since the project activity is to introduce a technology that reduce or displace greenhouse gas (GHG) emissions from the thermal energy consumption of households. The efficient charcoal stoves will be disseminated and emission reductions from displacing inefficient stoves will be calculated according to this methodology. Below is an outline of the methodological choices selected from the baseline and monitoring methodologies:

(i) Project Boundary

The project boundary is defined in Section B.3, but all project activities will be within the geographical boundaries outlined in Section A.2. The project boundary is the physical, geographical sites of the project stoves sold and used, including the baseline and project fuel collection and production areas.

The emission sources from combustion of charcoal and wood for cooking and production and transport of charcoal.

(ii) Selection of Baseline Scenarios and Project Scenarios

Baseline Scenario

As per the methodology, the baseline scenario for the project activity is the existing practice of cooking by using inefficient high emission stoves combusting fuels including charcoal and fuelwood before using the project Sewa charcoal stove.
Only end users that boil water or are currently using unsafe water are eligible for crediting.

Project Scenario

The project scenario is defined by the fuel consumption of end users within a target population that adopt a project technology. Emission reductions are credited by comparing fuel consumption in a project scenario to the applicable baseline scenario. For this project activity, the project scenario is the introduction of efficient charcoal stoves to reduce the quantity need of using charcoal and fuelwood for cooking.

(iii) Additionality

Additionality is demonstrated in accordance with the Methodological too of “Tool for the demonstration and assessment of additionality”, Version 07.0.0 (see section B.5).

(iv) Baseline Studies and Project Studies

Non-Renewable Biomass Assessment

For calculating the fraction of non-renewable biomass (f_{NRB}), the approach of CDM methodology AMS-II.G is adopted. The calculating result is 94% here for the project, which is fixed during the first crediting period.

Baseline and Project survey (BS and PS) of target population characteristics

Initially about 95% of Katene’s Sewa charcoal stoves are sold in Bamako, therefore baseline and project surveys were conducted on stoves end users in this area.

Following the guidelines below regarding minimum sample size:

Group size < 300: Minimum sample size 30 or population size, whichever is smaller
Group size 300 to 1000: Minimum sample size 10% of group size
Group size >1000: Minimum sample size 100

At least 100 end users were sampled using clustered random sampling from Katene Kadji's sales records. The surveys included questions about basic household characteristics including the number of people living in the household, the number of meals cooked per day, education, source of income, stove and fuel use before and after purchase of the Sewa stove, and season variations of stove and fuel use patterns. Other critical information on target population characteristics, such as the addresses or locations, mobile telephone numbers and so on, was also collected.

Kitchen performance test (KPT) of fuel consumption

The baseline and project kitchen performance tests measure real, observed stove performance in the field. Fuel consumption must be measured with a representative sample of end users under each defined baseline scenario (in the absence of the project technology) and project scenario.

As the project activity is to deploy improved efficient cook stove for the reduction of charcoal and fuelwood use, the baseline fuel and project fuel are the same, and the statistical analysis can be conducted with respect to charcoal and fuelwood savings per stove. Paired sampling for KPT – sampling the same users before and after beginning use of a new cook stove – was performed. The baseline survey and baseline KPT can be conducted concurrently with the same end users.

There are two valid options for the statistical analysis. In all cases, sample sizes must be greater than 20:

a. 90/30 rule. When the sample sizes are large enough to satisfy the "90/30 rule", i.e. the endpoints of the 90% confidence interval lie within +/- 30% of the estimated mean, overall emission reductions can be calculated on the basis of the estimated MEAN annual emission reduction per unit or MEAN fuel annual savings per unit.
b. 90% confidence rule. When the sample sizes are such that the "90/30 rule" is not complied with, the emission or fuel saving result is not the mean (or average) test result, but a lower value, i.e. the LOWER BOUND of the one-sided 90% confidence interval.

The KPT was performed in more than 30 households (HHs) in Bamako, which were selected using screening criteria based on the over 100 end users in the baseline survey. The KPT was performed on households with similar socioeconomic and demographic characteristics as Katene customers (as defined by the results from the BS), but who did not have stoves prior to the test. They were then provided with a stove for purposes of the test. Any households that already owned SEWA stoves were not included.

To attain fuel savings for each stove model, the lower bound of the 90% confidence interval is taken for each fuel and stove size. Daily charcoal savings parameters are adjusted based on the ratio of fuel saved to stove cooking capacity calculated for the KPT stoves and extended that to other sized stoves and then subtracting 15% from this total. This approach proved to be both quantitatively and technically rigorous as well as conservative. 45% of SEWA stove users in the BS use fuelwood as secondary fuel. To be conservative, typical wood savings is estimated for MF, GF and SGF stoves based on the KPT field measurements for the MF and GF stoves and the prevalence of wood use as a secondary fuel.

The lower bound of the 90% confidence interval of daily charcoal and fuelwood savings for each stove type is outlined below:

Stove Type	**Daily Fuel Savings (kg/HH-day)**	
	Charcoal	**Fuelwood**
SGF	1.32	0.25

GF	0.94	0.25
MF	0.62	0.25
PF	0.26	0
TF	0.16	0

(v) Leakage

As per the GS methodology, the potential sources of leakage should be investigated:

a) The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.
b) Non-project users who previously used lower emitting energy sources use the non-renewable biomass or fossil fuels saved under the project activity.
c) The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.
d) The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.
e) By virtue of promotion and marketing of new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.

In accordance with the methodology, leakage risks deemed very low can be ignored. No significant sources of leakage were identified at this point in the project but future offset calculations will be adjusted accordingly if significant sources are later identified.

Leakage will be investigated every two years as part of the monitoring.

(vi) Calculation of Emission Reductions

As per the GS methodology, the project calculates emissions reduction by applying the emission factor of charcoal and fuelwood to the fuel savings per stove (equation 1) rather than deducting project emissions from baseline emissions, for projects where the baseline fuel and the project fuel are the same. The overall GHG reductions achieved by the project activity in year y are calculated as follows:

$$ER_y = \sum_{b,p} (N_{p,y} * U_{p,y} * P_{p,b,y} * NCV_{b,fuel} * (f_{NRB,b,y} * EF_{fuel,CO2} + EF_{fuel,nonCO2})) - \sum LE_{p,y} \quad (1)$$

Where:

$\Sigma_{b,p}$	Sum over all relevant (baseline b/project p) couples
$N_{p,y}$	Cumulative number of project technology-days included in the project database for project scenario p against baseline scenario b in year y
$U_{p,y}$	Cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by usage surveys (fraction)
$P_{p,b,y}$	Specific fuel savings for an individual technology of project p against an individual technology of baseline b in year y, in tons/day, as derived from the statistical analysis of the data collected from the field tests
$f_{NRB,b,y}$	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass (drop this term from the equation when using a fossil fuel baseline scenario)
$NCV_{b,fuel}$	Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.015 TJ/ton)
$EF_{b,fuel,CO2}$	CO2 emission factor of the fuel that is substituted o reduced. 112 tCO2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{b,fuel,non\text{-}CO2}$	Non‐CO2 emission factor of the wood that is reduced
$LE_{p,y}$	Leakage for project scenario p in year y (tCO2e/yr)

The modification is necessary to take into account both charcoal and wood and to include emission factors for the production and use of charcoal.

$$ER_y = \sum_{b,p} (N_{p,y} * U_{p,y} * (P_{p,b,y\text{-}charcoal} * (NCV_{charcoal} * (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}cooking} + EF_{charcoal,nonCO2\text{-}cooking}) + (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}production} + EF_{charcoal,nonCO2\text{-}production})) + P_{p,b,y\text{-}wood} * (NCV_{wood} * (f_{NRB,b,y} * EF_{wood,CO2} + EF_{wood,nonCO2})))) - \sum LE_{p,y} \quad (2)$$

Where:

$P_{p,b,y\text{ -charcoal}}$	Specific charcoal savings for an individual technology of project p against an individual technology of baseline b in year y, in tons/day, as derived from the statistical analysis of the data collected from the field tests
$P_{p,b,y\text{ -wood}}$	Specific wood savings for an individual technology of project p against an individual technology of baseline b in year y, in tons/day, as derived from the statistical analysis of the data collected from the field tests
$NCV_{charcoal}$	Net calorific value of charcoal that is substituted or reduced
NCV_{wood}	Net calorific value of wood that is substituted or reduced (IPCC default for wood fuel, 0.015 TJ/ton)
$EF_{charcoal,CO2\text{-}cooking}$	CO2 emission factor for cooking of the charcoal that is reduced
$EF_{charcoal,non\text{-}CO2\text{-}cooking}$	Non - CO2 emission factor for cooking of the charcoal that is reduced
$EF_{charcoal,CO2\text{-}production}$	CO2 emission factor for production of the charcoal that is substituted or reduced
$EF_{charcoal,non\text{-}CO2\text{-}production}$	Non - CO2 emission factor for production of the charcoal that is reduced
$EF_{wood,CO2}$	CO2 emission factor of the wood that is reduced
$EF_{wood,non\text{-}CO2}$	Non - CO2 emission factor of the wood that is reduced

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{wood,CO2}$
Unit	tCO2/t_wood
Description	CO2 emission factor arising form use of wood in baseline and project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Tables 1.2/1.4
Value(s) applied	1.747
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

Data / Parameter	$EF_{wood,non\text{-}CO2}$
Unit	tCO2/t_wood
Description	Non-CO2 emission factor arising from use of wood in baseline and project scenario
Source of data	CH4 and N2O: IPCC 2006 Guidelines for emission factors and NCVs, IPCC SAR 1996 for GWPs.

Value(s) applied	0.455
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

Data / Parameter	$EF_{charcoal,CO2\text{-}production}$
Unit	tCO2/t_charcoal
Description	CO2 emission factor arising from production of charcoal
Source of data	Emissions of greenhouse gases and other airborne pollutants from charcoal making in Kenya and Brazil, David M. Pennise, Kirk R. Smith, Environmental Health Sciences, University of California, Berkeley, California. Journal of Geophysical Research Vol 106 October 27 2001.
Value(s) applied	1.802
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

Data / Parameter	$EF_{charcoal,non\text{-}CO2\text{-}production}$
Unit	tCO2/t_charcoal
Description	Non-CO2 emission factor arising from production of charcoal
Source of data	CO2, CH4, N2O GWPs from (IPCC SAR 1996).
Value(s) applied	0.983
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

Data / Parameter	$EF_{charcoal,CO2\text{-}cooking}$
Unit	tCO2/t_charcoal
Description	CO2 emission factor arising from consumption of charcoal
Source of data	Product of NCVch (IPCC 2006 Guidelines default 29.5 MJ/kg) and Emission factor (energy basis) for charcoal (IPCC 2006 Guidelines default 112 tCO2/TJ) x 10^-3
Value(s) applied	3.304
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

Data / Parameter	$EF_{charcoal,non-CO2-cooking}$
Unit	tCO2/t_charcoal
Description	Non-CO2 emission factor arising from consumption of charcoal
Source of data	CH4 and N2O: IPCC 2006 Guidelines for emission factors and NCVs, IPCC SAR 1996 for GWPs
Value(s) applied	0.255
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of emission reductions
Additional comment	

B.6.3. Ex ante calculation of emission reductions

>>

Step 1: Calculation of ERs per stove per year

Take the Sewa Grand Format (GF) stove for example:

Substituting for values for one Sewa GF stove in use for one year; during the stove's first year of operation we get the calculation below. Because the project saves both charcoal and wood and emissions factor must be considered for charcoal consumption and charcoal production, the emissions factors (CO2 and non-CO2) of both fuels are calculated before solving the equation.

Table B.6.3-1 Parameters

Parameter	Value	Reference
$\Sigma_{b,p}$	1	
$N_{p,y}$	365 (days)	
$U_{p,y}$	100%	
$P_{p,b,y\ -charcoal}$	0.00094 tonnes/day	Baseline Report
$P_{p,b,y\ -wood}$	0.00025 tonnes/day	Baseline Report
$f_{NRB,b,y}$	94%	NRB Assessment
$NCV_{charcoal}$	0.0295 TJ/tonne	2006 IPCC Guidelines for National GHG inventories
NCV_{wood}	0.0156 TJ/tonne	2006 IPCC Guidelines for National GHG inventories
$EF_{charcoal,CO2-cooking}$	112 tCO2e/TJ	2006 IPCC Guidelines for National GHG inventories
$EF_{charcoal,non-CO2-cooking}$	4.510 tCO2e/TJ	Calculated based on values for N2O and CH4 from the 2006 IPCC Guidelines for National GHG inventories
$EF_{charcoal,CO2-production}$	1.8020 tCO2e/t_fuel	Calculated based on values for N2O and CH4 from “Emissions of Greenhouse Gases and other Air Pollutants from Charcoal Making in Kenya and Brazil” (Pennise and Smith)
$EF_{charcoal,non-CO2-production}$	0.9831 tCO2e/t_fuel	Calculated based on values for N2O and CH4 from “Emissions of Greenhouse Gases and other Air Pollutants from Charcoal Making in Kenya and Brazil” (Pennise and Smith)
$EF_{wood,CO2}$	112 tCO2e/TJ	2006 IPCC Guidelines for National GHG inventories
$EF_{wood,non-CO2}$	7.540 tCO2e/TJ	Calculated based on values for N2O and CH4 from the 2006 IPCC Guidelines for National GHG inventories
$LE_{p,y}$	0	

$ER_y = \sum_{b,p} (N_{p,y} * U_{p,y} * (P_{p,b,y\text{-}charcoal} * (NCV_{charcoal} * (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}cooking} + EF_{charcoal,nonCO2\text{-}cooking}) + (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}production} + EF_{charcoal,nonCO2\text{-}production})) + P_{p,b,y\text{-}wood} * (NCV_{wood} * (f_{NRB,b,y} * EF_{wood,CO2} + EF_{wood,nonCO2})))) - \sum LE_{p,y}$

Solving for combined emission factor of charcoal:

$(NCV_{charcoal} * (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}cooking} + EF_{charcoal,nonCO2\text{-}cooking}) + (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}production} + EF_{charcoal,nonCO2\text{-}production}))$

(0.0295 * (94% * 112 + 4.510) + (94% * 1.8020 + 0.9831)) = 5.9158 tCO2e/t_charcoal

Solving for combined emission factor of wood

$(NCV_{wood} * (f_{NRB,b,y} * EF_{wood,CO2} + EF_{wood,nonCO2}))$

(0.0156 * (94% * 112 + 7.540)) = 1.7600 tCO2e/t_wood

Therefore, $(P_{p,b,y\text{-}charcoal} * (NCV_{charcoal} * (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}cooking} + EF_{charcoal,nonCO2\text{-}cooking}) + (f_{NRB,b,y} * EF_{charcoal,CO2\text{-}production} + EF_{charcoal,nonCO2\text{-}production})) + P_{p,b,y\text{-}wood} * (NCV_{wood} * (f_{NRB,b,y} * EF_{wood,CO2} + EF_{wood,nonCO2})))$

((0.00094 * 5.9158) + (0.00025 * 1.7600)) = 0.0056 + 0.0004 = 0.0060 tCO2e/stove-day

Solving for ER_y

ER_y = 1 * (365 * 100% * 0.0060) – 0

ER_y = 2.19 tCO_2e/stove-year

According to the daily charcoal and fuelwood savings for each stove type:

Table B.6.3-2 Fuel savings for each stove type

Stove Type	Daily Fuel Savings (kg/HH-day)	
	Charcoal	Fuelwood
SGF	1.32	0.25
GF	0.94	0.25
MF	0.62	0.25
PF	0.26	0
TF	0.16	0

The ERs per stove per year for each stove type are listed in the table below:

Table B.6.3-3 ERs per stove per year for each stove type

Stove Type	Emission Reductions (tCO2 per stove-year)
SGF	3.01
GF	2.19
MF	1.50
PF	0.56
TF	0.35

Step 2: Estimation and Assumption for stoves sales and drop-off rate

Katene made plans to secure carbon finance with a view to a major expansion effort that would allow the SEWA stove to be sold at affordable prices to poor customers, and that would dramatically increase sales (see Table B.6.3-4). Table B.6.3-4 projects the expected volume of sales of SEWA improved charcoal stoves, assuming stoves are installed at a consistent rate through the year with the year to year increasing rate of 10%, 20,000 stoves are sold in the first project year, and 20% of the stoves sold cease to be used each year.

Table B.6.3-4 Stoves sales in the first crediting period

Stove sales and Usage Parameters									
Initial Sales (1st Year)	20000								
Annual Sales Growth (%)	10%								
Average Annual Leakage	0%								
Average Annual Sales	27106								
		Annual Usage and Sales Rates							
		Project Year		1	2	3	4	5	6	7
		Stove Usage Rate (% in use at end of year)		90%	70%	50%	30%	10%	0%	0%
		Annual Sales		20000	22000	24200	26620	29282	32210	35431

The operational lifetime of each improved stove is an important factor, since greenhouse gas (GHG) emission reductions are dependent not on the sale of an improved stove for use in a kitchen operating an inefficient stove, but rather they are dependent on the number of months or years the improved stove is in daily use. The actual drop-off in customer numbers is expected to be less than 20% per year, due to quality assurance measures, and should be monitored carefully by the project. Actual drop-off rates will be substituted for this conservative estimate of 20%; equally the potential drop-off in performance of aging stoves will be measured and the results applied to GHG emission reduction calculations.

Step 3: Calculation ERs for the first crediting period

Based on the actual sales records in 2015, the percentages for each stove type sold are calculated and listed as below:

Table B.6.3-5 Percentages of sales for each stove type

Stove Type	Percentage
SGF	28.95%
GF	45.02%
MF	20.40%
PF	0.02%
TF	5.61%

Therefore, the ERs for the first crediting period can be calculated and the results are presented as below:

Table B.6.3-6 Conservative Emission Reductions for the first crediting period

Conservative Emission Reductions (tCO2e)								
	Project Year	1	2	3	4	5	6	7
Project Year	Stoves disseminated							
1	20000	39,292	30,560	21,829	13,097	4,365	0	0
2	22000		43,221	33,616	24,012	14,407	4,802	0
3	24200			47,543	36,978	26,413	15,847	5,282
4	26620				52,298	40,676	29,054	17,432
5	29282					57,528	44,744	31,960
6	32210						63,280	49,218
7	35431							69,608
Total Annual ER		39,292	73,781	102,988	126,385	143,389	157,727	173,500
							7 years total	817,062
							Average	116,723

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	N/A	N/A	0	39,292
Year 2	N/A	N/A	0	73,781
Year 3	N/A	N/A	0	102,988
Year 4	N/A	N/A	0	126,385
Year 5	N/A	N/A	0	143,389
Year 6	N/A	N/A	0	157,727
Year 7	N/A	N/A	0	173,500
Total	N/A	N/A	0	817,062
Total number of crediting years	7			
Annual average over the crediting period	N/A	N/A	0	116,723

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$f_{NRB,i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data	Applicable NRB assessment
Value(s) applied	94%
Measurement methods and procedures	Calculation using the approach of CDM methodology AMS-II.G f_{NRB}=NRB/(NRB+DRB)
Monitoring frequency	Fixed by baseline study for the first crediting period, updated if necessary as specified in section III.1 of the GS methodology

QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	As applicable, NRB assessment may be used for multiple scenarios

<table>
<tr><td>Data / Parameter</td><td>$P_{b,y}$</td></tr>
<tr><td>Unit</td><td>Kg/household-day</td></tr>
<tr><td>Description</td><td>Quantity of fuel that is consumed in baseline scenario b during year y</td></tr>
<tr><td>Source of data</td><td>Baseline FT</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><td>Stove size</td><td>Charcoal</td><td>Wood</td><td>Method</td></tr>
<tr><td>SGF</td><td>4.67</td><td>3.2</td><td>Calculated</td></tr>
<tr><td>GF</td><td>3.2</td><td>3.2</td><td>Measured</td></tr>
<tr><td>MF</td><td>2.4</td><td>3.2</td><td>Measured</td></tr>
<tr><td>PF</td><td>0.93</td><td>0</td><td>Calculated</td></tr>
<tr><td>TF</td><td>0.56</td><td>0</td><td>Calculated</td></tr>
</table>
</td></tr>
<tr><td>Measurement methods and procedures</td><td>
Using Digital Hanging Scales
Kitchen Performance Test (KPT) to determine baseline consumption for sizes GF and MF. For other size, the average consumption per person of the GF and MF is multiplied by the capacity (maximum people cooked for) of the other sizes then reduced by 15%. This is the same approach used to calculate savings of un-tested stove sizes.
<table>
<tr><td>Stove size</td><td>Charcoal consumption</td><td>Capacity (max. #people cooked for)</td><td>Consumption per person</td><td>Average consumption per person</td></tr>
<tr><td>GF</td><td>3.2</td><td>15</td><td>0.21</td><td rowspan="2">0.22</td></tr>
<tr><td>MF</td><td>2.4</td><td>10</td><td>0.24</td></tr>
</table>
<table>
<tr><td>Stove size</td><td>Capacity</td><td>Charcoal consumption</td><td>15% adjustment</td></tr>
<tr><td>SGF</td><td>25</td><td>0.22*25 = 5.5</td><td>4.67</td></tr>
<tr><td>PF</td><td>5</td><td>0.22*5 = 1.1</td><td>0.93</td></tr>
<tr><td>TF</td><td>3</td><td>0.22*3 = 0.66</td><td>0.56</td></tr>
</table>
In the KPT results, wood savings for SGF stove is the same as with the measured GF and MF. There was no adjustment for size. It is also assumed in the report that the smaller sizes PF and TF do not save wood. The same approach is used here to determine wood consumption for the SGF, PF and TF.
</td></tr>
<tr><td>Monitoring frequency</td><td>Updated every two years</td></tr>
<tr><td>QA/QC procedures</td><td>Transparent data analysis and reporting</td></tr>
<tr><td>Purpose of data</td><td>Calculation of emission reductions</td></tr>
<tr><td>Additional comment</td><td>This parameter is fixed unless kitchen surveys reveal that clusters have changed.
Values are available for stove size GF and MF as KPT was performed on these two sizes only. The savings resulting from the KPT were adjusted for other size.</td></tr>
</table>

Data / Parameter	$P_{p,y}$
Unit	Kg/household-day
Description	Quantity of fuel that is consumed in project scenario p during year y
Source of data	Project FT
Value(s) applied	<table><tr><td>Stove size</td><td>Charcoal Consumption</td><td>Wood Consumption</td><td>Method</td></tr><tr><td>SGF</td><td>3.35</td><td>2.95</td><td>Calculated</td></tr><tr><td>GF</td><td>2.26</td><td>2.95</td><td>Measured</td></tr><tr><td>MF</td><td>1.78</td><td>2.95</td><td>Measured</td></tr><tr><td>PF</td><td>0.67</td><td>0</td><td>Calculated</td></tr><tr><td>TF</td><td>0.4</td><td>0</td><td>Calculated</td></tr></table>
Measurement methods and procedures	Using Digital Hanging Scales Kitchen Performance Test (KPT) on the GF and MF stoves. The values for all the other sizes are expressed in “savings” rather than “consumption” in the survey report. Subsequent reports also provide savings values. Project consumption is therefore calculated as “baseline consumption – savings (per stove size and age group) = project consumption”
Monitoring frequency	Updated every tow years
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	-

Data / Parameter	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p during year y
Source of data	Annual usage survey
Value(s) applied	0-1 year – 90% 1-2 year – 70% 2-3 year – 50% 3-4 year – 30% 4-5 year – 10% 5-6 year – 0% 6-7 year – 0% Here assumes that 20% of the stoves sold cease to be used each year. The actual drop-off in customer numbers is expected to be less than 20% per year, due to quality assurance measures, and should be monitored carefully by the project. Actual drop-off rates will be substituted for this conservative estimate of 20%; equally the potential drop-off in performance of aging stoves will be measured and the results applied to GHG emission reduction calculations.
Measurement methods and procedures	Usage Survey (US)
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting

Purpose of data	Calculation of emission reductions
Additional comment	-

Data / Parameter	$N_{p,y}$
Unit	Project technologies credited (units)
Description	Technologies in the project database for project scenario p through year y
Source of data	Total sales record
Value(s) applied	20,000 stoves for the 1st project year, assuming 10% year to year increasing sales rate
Measurement methods and procedures	Collect sales records from project owner
Monitoring frequency	Continuous
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	The total sales record is divided based on project scenario to create the project database

Data / Parameter	$LE_{p,y}$
Unit	t_CO_2e per year
Description	Leakage in project scenario p during year y
Source of data	Baseline and monitoring surveys
Value(s) applied	0
Measurement methods and procedures	Leakage assessment
Monitoring frequency	Every two years
QA/QC procedures	Transparent data analysis and reporting
Purpose of data	Calculation of emission reductions
Additional comment	-

Sustainable Development Indicators:

Data / Parameter	Air Quality
Unit	NA
Description	Reduced indoor air pollution (IAP)
Source of data	Baseline study
Value(s) applied	Improved IAP
Measurement methods and procedures	Interviews with end users
Monitoring frequency	Every two years
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators

Additional comment	

Data / Parameter	Livelihood of the Poor
Unit	$ saved/year per household
Description	Monetary savings by stove users
Source of data	Baseline study
Value(s) applied	2015: 105 $
Measurement methods and procedures	Literature study and interviews with end users
Monitoring frequency	Every two years
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators
Additional comment	

Data / Parameter	Employment
Unit	Jobs/year
Description	Creation of new employment
Source of data	Employment records
Value(s) applied	3
Measurement methods and procedures	Check employee contract and interviews with new employees
Monitoring frequency	Annually
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators
Additional comment	

Data / Parameter	Employment quality
Unit	NA
Description	Working condition of employees
Source of data	Employment records and baseline study
Value(s) applied	Katene’s employees are provided with personal protection equipment. Their salaries and benefits are higher than what is prescribed by law. All employees report having better and more stable position than what they were holding before.
Measurement methods and procedures	Interviews with employees
Monitoring frequency	Annually
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators
Additional comment	

Data / Parameter	Access to energy services

Unit	People/year
Description	Number of people reached by the project activity
Source of data	Sales database and Baseline study
Value(s) applied	192,000
Measurement methods and procedures	Number of stoves sold per year X number of people per household 20,000 X 9.6 = 192,000
Monitoring frequency	Annually
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators
Additional comment	

Data / Parameter	Other Pollutants
Unit	NA
Description	Proper disposal of other pollutants generated by project activity
Source of data	Baseline study
Value(s) applied	Katene Kadji sells metal pieces to scrap dealers and recycles ceramic remnants for manufacturing new Sewa stoves. The company uses paint for the stoves and burns any leftover unused paint, although there is typically little remaining after manufacturing. There are no additional sources of waste reported from Sewa stove production.
Measurement methods and procedures	Onsite observation and interviews
Monitoring frequency	Every two years
QA/QC procedures	Performed by independent third party
Purpose of data	Assessment of Gold Standard sustainability indicators
Additional comment	

B.7.2. Sampling plan

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For Kitchen Surveys, households are randomly selected from the end-user database as required by the methodology. For aging KPT (KPT) and Usage rate survey (US), in order to ensure that a representative and sufficiently sized cross-sectional sample of Sewa stoves is sampled, a list of hierarchical criteria for household selection is developed. Preference will be put on households with the oldest stoves since the goal is to measure the performance and the drop-off rate of stoves as they age. These criteria range from the most accurate, yet the most difficult to locate (Criterion #1) to the least accurate and the most simple to locate (Criterion #n). Attempts will be made to obtain as many as households as possible that adhered to Criterion #1, before proceeding to Criterion #2, and so forth.

Criterion #1.

Households from the baseline Kitchen Survey list.

- Includes households surveyed in baseline study.

Criterion #2.

Households from the baseline Kitchen Performance Test.

- Includes households surveyed in the baseline KPT conducted on during the baseline study.

Criterion #3.

Households from the first biannual Kitchen Survey list.

- Includes households surveyed in the first biannual KS.

Criterion #4.

Households from the first biannual Kitchen Performance Test.

- Includes households surveyed in the first biannual KPT.

Criterion #5.

Households from the second biannual Kitchen Survey list.

- Includes households surveyed in the second KS.

……

Criterion #n.

“Snowball sampling.”

- Visit the areas and neighborhoods where the baseline study, the first biannual survey … took place and ask the residents, “Where can we find households that purchased a Sewa stove?” While efforts were made to minimize the utilization of the snowball approach, the field team was confident that the households they recruited via snowball sampling owned stoves that were at least four years old. The conservativeness of the sample is further supported by the fact that survey respondents generally have a bias towards remembering things as having occurred more recently than they actually did.
- NOTE: Fieldworkers were instructed NOT to ask, “Who has a Sewa stove?” as this could bias the sample towards households that are still using their Sewa stove and away from those households that are no longer using their Sewa stove.

Data collected include contact information of the person surveyed, household size, cooking frequency, level of education, income, etc. In addition, KPT collects fuel moisture, fuel weight, other fuel used in the households, etc.

The minimum sample size recommended by the methodology is 100 for Kitchen Surveys and Usage Surveys (for population over 1000) and 20 for Kitchen Performance Tests. Confidence/precision level is applicable to KPT only as it is the only parameter that gives a numeric measurement. The 90/10 confidence/precision was applied to fuel use in the baseline KPT. The aging KPT is controlled by sample size requirements proposed by the Gold Standard Technical Team. Usage surveys and kitchen surveys are also controlled by sample size.

B.7.3. Other elements of monitoring plan

>>

NA

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>

14/04/2016

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SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>

01/05/2015 (Sales of first stove)

C.1.2. Expected operational lifetime of project activity

>>

3 x 7 = 21 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Renewable crediting period

C.2.2. Start date of crediting period

>>

01/05/2015 or 2 years prior to the GS registration of the project activity (which ever is later)

C.2.3. Length of crediting period

7 years for the first crediting period

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

The host country does not require an EIS. However, the Designated National Authority in Mali has already granted approval of the project (upon their request). This letter specifically highlights that the project is consistent with Mali's environmental regulations.

D.2. Environmental impact assessment

>>

During manufacturing of the stoves, small amounts of paint are used. Although the painting releases fumes, there is no waste from the paint except for paint cans, which are sold to metal scrappers. Used cans are collected in bags to avoid excess release of fumes. Clay is also harvested as a source of raw materials for the ceramic liners. Clay is harvested from a small quarry far from any residential use, and harvesting of clay is not expected to have any consequences on water supplies or the soil's ability to effectively filter groundwater.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

As the project activity is seeking for retroactive approval, Stakeholder Feedback Round (SFR) will be held later soon and will be inline with the requirements of the Gold Standard.

E.2. Summary of comments received

>>

Comments received from the stakeholders will be summarized after SFR is held.

E.3. Report on consideration of comments received

>>
Comments received from SFR will be properly considered and reported.

SECTION F. Approval and authorization

>>
Not applicable

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	√☐ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Katene Kadji
Street/P.O. Box	Sogoniko Commenrcial, Rue: 199; Porte: 253
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City	Bamako
State/Region	
Postcode	
Country	Mali
Telephone	+ 223 76417700
Fax	
E-mail	sewakadji@yahoo.fr
Website	
Contact person	Ousmane Samassekou
Title	
Salutation	
Last name	Samassekou
Middle name	
First name	Ousmane
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Project participant and/or responsible person/ entity	√☐ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Swiss Carbon Value Ltd.
Street/P.O. Box	Technoparkstrasse 1
Building	
City	Zurich
State/Region	
Postcode	8005
Country	Switzerland
Telephone	+ 41 43 501 35 50
Fax	

E-mail	
Website	www.thesouthpolegroup.com
Contact person	Jane Duan
Title	Project Manager
Salutation	
Last name	Duan
Middle name	
First name	Jane
Department	
Mobile	
Direct fax	
Direct tel.	+10 8454 9953
Personal e-mail	j.duan@southpolecarbon.com

Appendix 2. Affirmation regarding public funding

NA

Appendix 3. Applicability of methodology and standardized baseline

NA

Appendix 4. Further background information on ex ante calculation of emission reductions

NA

Appendix 5. Further background information on monitoring plan

NA

Appendix 6. Summary of post registration changes

NA

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Document information

Version	Date	Description
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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