



**Verified Carbon
Standard**

VALIDATION REPORT

KENYA JIKO KISASA IMPROVED COOKSTOVE PROGRAM I



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Summary:**A brief description of the validation and the project**

Validation: ‘Guangzhou Iceberg Environmental Consulting Services Co., Ltd.’ has appointed ‘4K Earth Science Private Limited’ to perform validation of the VCS project activity “Kenya Jiko Kisasa Improved Cookstove Program I”, with regard to the relevant requirements of VCS Standard version 4.4 /4/.

Project: The proposed project activity “Kenya Jiko Kisasa Improved Cookstove Program I” is a project which employs VCS methodology; VMR0006 version 1.1 /5/. The project involves distribution of fuel-efficient stoves in Kenya. The project results in reducing the amount of non-renewable biomass used for cooking. Through reduction in non-renewable biomass consumption, the programme will decrease greenhouse gas emissions.

The purpose and scope of validation

Purpose: The purpose of a validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan and compliance with the relevant VCS and host party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of emission reductions. 4KES's objective is to perform a thorough, independent assessment of the validation of project activity.

Scope: Validation scope is defined as an independent and objective review of the Project Description (PD). The PD is reviewed against the relevant criteria and guidance documents provided by VCS which include the following: VCS Program Guide (v4.3, dated 17/01/2023) /3/, VCS Standard (v4.4, dated 17/01/2023) /4/, Program Definitions (v4.3, dated 21/12/2022) /3/, Registration & Issuance Process (v4.3, dated 17/01/2023) /3/, VCS Validation and Verification Manual (v3.2, dated 19/10/2016) /4/ applicable at the time in order to confirm that the project meets the applicability conditions of the selected baseline and monitoring VCS methodology VMR0006 (version 1.1), also assess the claims and assumptions made in the PD without limitation on the information provided by the project participants.

The method and criteria used for validation

The validation consists of the following four phases:

- I. A desk review of the project description documents
 - A review of data and information;
 - Cross checks between information provided in PD and information from sources with all necessary means without limitations to the information provided by the project proponent;
- II. Site Visit interviews with project stakeholders
 - Interviews with relevant stakeholders in host country with personnel having knowledge with the project development via telephone, email or direct on-site visits;
 - Cross checking between information provided by interviewed personnel with all necessary means without limitations to the information provided by the project proponent;
- III. Reference to available information relating to projects or technologies similar to project under validation and review based on the approved methodology being applied for the appropriateness of formulae and accuracy of calculations.
- IV. The resolution of outstanding issues and the issuance of the final validation report and opinion.

The number of findings raised during validation

During the course of validation, a total of 15 findings were raised, which include:

- 10 Corrective Action Requests (CARs);
- 05 Clarification Requests (CLs);
- 00 Forward Action requests (FARs);

All the raised findings have been successfully closed by the Project Proponent.

Any uncertainties associated with the validation

There are no uncertainties associated with the validation of the project activity. The validation has been done with a reasonable level of assurance.

Summary of the validation conclusion

Certification concludes the validation with a positive opinion that the VCS Project “Kenya Jiko Kisasa Improved Cookstove Program I” as described in the PD (version 04, dated 02/05/2023) /1/, meets all applicable VCS requirements, including those specified in the VCS Standard (v4.4) /4/, relevant methodology, tools and guidelines.

The selected baseline and monitoring methodology (VMR0006 version 1.1) are applicable to the project and correctly applied. ‘4K Earth Science Private Limited’ Certification therefore requests the registration of the project as a VCS project.

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1 INTRODUCTION

1.1 Objective

'Guangzhou Iceberg Environmental Consulting Services Co., Ltd.' has commissioned '4K Earth Science Private Limited' to perform the VCS validation of the project activity: "Kenya Jiko Kisasa Improved Cookstove Program I", with regard to the relevant VCS requirements of VCS Standard version 4.4; to attain real, measurable, additional and permanent emission reductions.

The purpose of validation is to ensure a thorough, independent assessment of the project description (PD), in particular the project's description eligibility, ownership, crediting period and details regarding its compliance with the law statutes and other regulatory frameworks

- The requirements of VCS Program Guide Version 4.3 /3/
- The requirements of VCS Standard Version 4.4 /4/
- To assess the project's compliance with other relevant rules, including the project country (Kenya) legislation and
- Other relevant rules are validated in order to confirm that the project description as documented is sound and reasonable and meet the stated requirements and identified criteria.

The validation is seen as necessary to provide assurance about the quality of the project and its intended generation of emission reductions over the project's crediting period without any double counting.

1.2 Scope and Criteria

The scope of the validation is defined as an independent and objective review of the project description document, where methodological requirements and the project's compliance in section 1 (i.e., project details) are reviewed against the requirements of VCS Standard. 4K Earth Science Private Limited has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of emission reductions.

The items covered in the validation are described below:

- VCS Criteria, VCS standard version 4.4 /4/
- VCS Project Description
- Background investigation and follow up interviews
- Draft validation reporting with CARs, CLs& FARs, if any
- fNRB
- Final validation reporting
 - The validation is based on the information made available to 4K Earth Science Private Limited and on the contract conditions.
 - The validation is not meant to provide any consulting to the project proponent. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project description. The work carried out by 4K Earth Science Private Limited is free from any conflict of interest.

1.3 Reasonableness of Assumptions

The level of assurance of the validation report falls under reasonable assurance engagements as selected by the Client. The validation team verified the assumptions, limitations and methods for all the parameters and confirms that the reported ex-ante emission reductions are free from any type of material errors.

1.4 Summary Description of the Project

The proposed project activity aims to increase access of households and communities to improved cookstoves by disseminating high thermal efficiency and low greenhouse gas emitting cooking stoves known as Improved Cook Stoves (ICS) to the rural households of Kenya. The implementation of the project activity will result in replacement of low efficiency and high greenhouse gas emitting stoves in the households, thereby resulting in reduction of firewood consumption & consequent emissions from combustion. Overall objectives through the implementation of the project are reduction of greenhouse gases, conservation of forests leading to climate change mitigation in a sustainable manner, as well as improved health conditions of ICS users due to improved indoor air quality along with drudgery reduction in everyday cooking.

As confirmed through the site visit/interviews and through the review of documents, the technology deployed under the project activity shall be thermally efficient (in compliance with the methodological requirements) and having an average lifespan of 7 years /17/. The currently eligible types of cookstoves to be distributed include the 'Jiko Kisasa' stoves that meet the requirements of the methodology in future. Jiko Kisasa stove has been tested for thermal efficiency of 27.2% according to WBT protocol (4.2.3) and certified by third party (KIRDI Stove Testing Centre) /17/. The efficiency of ICS has been estimated to be more than the efficiency of old cookstoves. The efficiency test report provided to assessment team was reviewed and it was concluded that the efficiency test was conducted in accordance with the procedure stipulated in the applied methodology VMR0006, version 1.1.

The start date of the project is considered as 21/06/2022 which is the date of distribution of first ICS in the project activity.

The start date was validated by reviewing the project document named "Kenya ICS Donation and Carbon Transfer Agreement for Distribution in the start Date", which shows details of households who received ICS on first day of the project, including location of the household and unique ID of ICS etc. Moreover, this was also validated by the database maintained by the project partner in their local office. Validation team reviewed the database in conjunction with the "ICS Donation and Carbon Transfer Agreement" agreement with the first beneficiary.

Based on the interviews with the PP and manufacturer of ICS, the validation team confirms that the date is reasonably assumed. Accordingly, the duration of fixed crediting period of 10 years starts from 21/06/2022 and ends on 20/06/2032.

The PP will enter into contractual agreement with the beneficiaries (individual households using ICS) by virtue of which, the end user will confirm use of cook stove as well as transfer the VERs right to the project proponent.

The local partner and end users have signed agreements with project proponent stating clearly that the PP has the sole ownership of the VCUs arising from the project. It was validated “13_ICs Donation and Carbon Transfer Agreement”.

VVB reviewed the other GHG registries to ensure that the project is not listed/registered with the other GHG schemes. A declaration/21/ to this effect has been submitted to the validation team that project will not claim any GHG benefits from other GHG mechanisms and project is not claiming any GHG benefits in any other schemes.

The project plans distribute 100,000 fuel-efficient improved cookstoves (ICS) in 2 years to replace the baseline cookstoves in households from 100-400 villages all over the country. 50,000 ICSs are expected to be distributed per year. The local partners oversee the distribution of ICSs. They are local experienced organizations who can ensure that the cookstoves reach the households that need them most. Iceberg maintains close contact with local partners to resolve issues during distributing process in time. A digital database is used to store the information of distribution. The validation team interviewed the top management of the Iceberg to confirm the same.

The estimated average annual GHG emission reduction from the project is 222,137 tCO₂e, and the total GHG emission reduction estimated for the whole crediting period from the project activity is 2,221,373 tCO₂e/2/.

2 VALIDATION PROCESS

2.1 Method and Criteria

Validation was conducted using 4KES procedures in line with the requirements of VCS Standard, version 4.4 and the requirements specified in the CDM M&P, the latest version of the CDM Validation and Verification Standard, VCS validation and verification manual version 3.2 and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

The validation consisted of the following phases:

- Document review;
- On-site assessment/interviews;
- Resolution of outstanding issues
- Issuance of the validation opinion

The following sections outline each step in more detail.

2.2 Document Review

After the submission of the draft PD and supporting background documents related to the project design and baseline from the client, the completeness of information made available is reviewed as per VCS standard version 4.4 requirements. Furthermore, the validation team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data available on public domain. The project has been listed in the VERRA (<https://registry.terra.org/app/projectDetail/VCS/3197>). A desk review is carried out to assess the project activity.

2.3 Interviews

The VVB has conducted the on-site visit for the validation of the project activity. Validation Team Leader was physically present to check/verify on-ground with Local Expert in Kenya. The on-site visit took place on 20/04/2023 to 21/04/2023. The key personnel interviewed are summarized in the table below:

S. No	Name	Role/Organization	Date	Audit Team
1	James Gitau Kimani	Chief, Ngewa County	20/04/2023	Validation Team (Team Leader & Local Expert)

		(Government Officer and attendee of local stakeholder meeting)		
2	Julius G Gathuru	Jumbo Capital, Project Implementer	20/04/2023 & 21/04/2023	Validation Team (Team Leader & Local Expert)
3	Ji Bao	Project Proponent, Guangzhou Iceberg Environmental Consulting Services Co., Ltd.	20/04/2023 & 21/04/2023	Validation Team (Team Leader & Local Expert)
4	Jane Njeri Gathee	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
5	Daniel	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
6	Cecilia Mburu	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
7	John Ndung'u	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
8	Jiang Hao	Guangzhou Iceberg Environmental Consulting Services Co., Ltd.	20/04/2023 & 21/04/2023	Validation Team (Team Leader & Local Expert)
9	Geogrgie Osumba	Guangzhou Iceberg Environmental Consulting Services Co., Ltd.	20/04/2023 & 21/04/2023	Validation Team (Team Leader & Local Expert)

10	John M. Wanyoike	Chief – Kagunduni Location (Government Officer and Attendee of Local Stakeholder meeting)	20/04/2023	Validation Team (Team Leader & Local Expert)
11	Samuel Kamanda	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
12	Fredrick Kimani	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
13	Rachel Muthoni	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
14	Esther Waithira	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
15	Eston Kinuthia	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
16	Albina Asena Agoi	Local Stakeholder	20/04/2023	Validation Team (Team Leader & Local Expert)
17	Jacinta Ruiru	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
18	Jane Mwangi	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
19	Gladys Wanjiru	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
20	Irene Njoki	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
21	Jane Muchiri	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
22	Mercy Kimani	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)

23	Eunice Mwangi	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
24	Jerioth Nyambura	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
25	Tabitha Wairimu	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
26	Mary Kibunja	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)
27	Gladys Kanini	Cookstove User	20/04/2023	Validation Team (Team Leader & Local Expert)

2.4 Site Visits

The VVB has conducted the on-site visit (with the help of Local Expert) for the validation of the project activity. Further the validation Team Leader was also present to check/verify on-ground information collected by Local. The on-site visit interviews took place between 20/04/2023 to 21/04/2023 in Kenya. The following was carried out during the on-site visit interviews:

- An assessment of the project design and technical specifications, project location, implementation status and operation of the project activity as per the VCS-PD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS-PD;
- A cross check between information provided in the VCS-PD and data from other sources such as database, survey records or similar data sources;
- A check of the ICS distribution status and observations of monitoring practices against the requirements of the VCS-PD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and estimated emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Validation team undertaken the acceptance sampling for the determination of baseline scenario, confirmation of local stake holder, project stoves fuel estimation, baseline fuel estimation inter alia. This is to be noted that project had partial distributions at the time of onsite audit, baseline fuel consumption has to be derived through ex-post monitoring of By=1,new,i,survey as per the provisions of VMR0006, version 1.1.

Validation team followed the “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities” version 09 (Applicable to the monitoring of this group) esp. for taking samples out of the CME’s sample. Verification team had adopted the acceptance sampling approach to verify the sampling result of the PP for the applied verification period.

For the determination of DOE’s acceptance sample size, verification team assumed the following factors:

1. Acceptable quality level (AQL) - 0.5%
2. Unacceptable Quality Level (UQL) – 20%
3. Producer risk- 10%
4. Consumer risk- 10 %

Validation team has determined acceptance sample size for all the sample survey parameters based on the “Table. Sample size and acceptance number based on AQL, UQL, and producer and consumer risks” of standard “Sampling and surveys for CDM project activities and programme of activities” version 09.0. From the above assumed factors, the verification team determined the minimum sample size (n) as 11 minimum samples for Clean Energy stoves under the project and acceptance number (c) as Zero, chosen with the representative age group. The verification team shared the samples with PP during on-site visit.

During site visit/interviews, verification team visited sample household using the ICS system applying the random selection to cross check the baseline scenario, project fuel consumption etc.

Parameters	DOE Sample size (n)	No of CME’s record beyond unacceptable level (C)	Accepted/Rejected
Baseline scenario, stove cost paid or not, LSC, signed agreement, carbon waiver etc.	11 samples	0	Accepted

The assessment team has verified sufficient appropriate audit evidences, to reduce audit risk to an acceptably low level as requisite to achieve reasonable level of assurance for the current validation.

2.5 Resolution of Findings

The objective of this validation is to resolve any outstanding issues which need to be clarified for 4KES's positive conclusion on the project description. To guarantee transparency a validation protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of validation and the results from verifying the identified criteria. The validation protocol consists of three tables; the different columns in these tables are described below.

A corrective action request (CAR) is raised if one of the following occurs:

- 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 that 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) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

In summary, 05 CLs, 10 CARs, 00 FAR were raised during this validation which were closed successfully and details are given under Appendix 3 of this report.

2.5.1 Forward Action Requests

No FAR is raised during the validation process. Please refer to the Table 3 of Validation report.

3 VALIDATION FINDINGS

3.1 Project Details

Project type, technologies and measures implemented, and eligibility of the project

The project activity will target rural households using low efficiency and higher GHG emitting stoves. Replacement of conventional firewood stoves with higher efficiency ICS models will be carried out in the targeted households. ICSs are more efficient than conventional firewood stoves as they reduce heat loss and improve heat transfer and combustion efficiency. Fuel efficient ICS models with improved heat transfer and combustion efficiency will be deployed, resulting in a decrease in fuel use in comparison to conventional pre-project stoves, while also reducing particulate matter and carbon emissions.

The project is expected to distribute 100,000 improved cook stoves in phased manner (in 2 years) of distribution. It has planned to distribute 100,000 ICS in 2 years. The project results in reducing the amount of non-renewable biomass used for cooking. Through reduction in non-renewable biomass consumption, the programme will decrease greenhouse gas emissions. By reducing the consumption of wood fuel, it can contribute to improving public health problems. Section 1.1. of the VCS PD contains a clear summary description of the project. The completeness and accuracy of the project description was validated through site visit interviews. As confirmed through the site visit interview with the ICS manufacturer and through review of technical specifications of selected model of ICS submitted by the manufacturer, the technology deployed under the project activity is thermally efficient single stove, improved cookstoves (which is in compliance with the methodological requirements) and the ICS has an average lifespan of 7 years. Jiko Kisasa stove has been tested for thermal efficiency of 27.2% according to WBT protocol 4.2.3. and certified by third party (KIRDI Stove Testing Centre) /17/. The efficiency test report provided to assessment team was reviewed and it was concluded that the efficiency test was conducted in accordance with the procedure stipulated in the applied methodology VMR0006, version 1.1.

The project Involves energy efficient cookstove distribution falls under the category of efficiency improvements in thermal applications, therefore it is eligible under the scope of VCS Program. The start date of the project is 21/06/2022, which is based on the date of commissioning of the first ICS. The duration of crediting period is of fixed 10 years i.e., it starts from 21/06/2022 and ends on 20/06/2032.

The PP will enter into contractual agreement with the beneficiaries by virtue of which, the end user will confirm use of cook stove as well as transfer the VERs right to the Project Participant. The sample agreement was validated by the assessment team and found in line with the VCS-PD. A record keeping system and unique identification of the ICS will be done by user's information collected through the Beneficiary Agreement and compiled in distribution records, as set out in the "carbon waiver agreement" between PP and distributor. This will include username, identification number and address/location of the user's house, stove unique serial code and distribution date. The record keeping system will ensure that each ICS can be traced to project to avoid double counting. The estimated total amount of emission

reductions over the chosen 10-year “fixed crediting period” is tCO₂e. The estimated amount of emission reductions per annum are 222,137 tCO₂e. The project activity falls under project category since the annual average GHG emission reductions are less than 300,000 tCO₂e.

The validation team has checked all the above-mentioned details and confirms that all the information provided is accurate.

Project design:

This is a project activity, the technical design along with the efficiency and lifetime validated by the supporting document furnished by the PP to VVB. Lifetime was validated as 7 years based on the manufacturer’s specification and the efficiency was validated as 27.2% and the tests were taken in the independent third part lab as validated in the previous sections.

Project proponent and other entities involved in the project

Guangzhou Iceberg Environmental Consulting Services Co., Ltd. is the Project Proponent (PP), which is as per the submitted declaration. The project activity has been developed by Guangzhou Iceberg Environmental Consulting Services Co., Ltd. Therefore, project proponent has sole right to use the generated Emission reductions. Validation team confirms that the managing director/authorized signatory is the same person (Mr Ji Bao), as mentioned in the section 1.5 of the VCS-PD. The same PP participated in the onsite interviews conducted for the project activity.

The validation team has confirmed that the same has been correctly mentioned in the VCS-PD.

Ownership

The ownership of the emission reductions belongs to project developer/project owner as confirmed through end user agreement copies /13/. The local partners shall also not claim any GHG benefits from the projects under this project and the agreement shall be signed by respective parties. The same was also confirmed during the conducted interviews. The beneficiary agreements validated during the onsite assessment by the validation team and it was also communicated to the users. The users were found aware of the carbon right transfer vide the signing off the beneficiary agreement, validation team undertaken the interviews of the users to confirm this during the onsite assessment.

Project start date

In accordance with section 3.7 of VCS standard, version 4.4, the project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or removals. The starting date of project activity is 21/06/2022 on which the first ICS was installed /commissioned. Based on the interview with the PP and the manufacturer of ICS, the validation team confirms that the start date of the project activity is reasonably determined. The start date is in line with the VCS Standard.

Project crediting period

The VCS Standard version 4.4 section 3.8.1 states that, “For non-AFOLU projects, the project crediting period shall be either seven years, twice renewable for a total of 21 years, or ten years fixed”. A crediting period of 10 years has been chosen for the project activity. The crediting period is from 21/06/2022 until 20/06/2032. The validation team confirms that the project crediting period is reasonably determined.

Project scale and estimated GHG emission reductions or removals

The estimated volume of emission reduction from the project activity is less than 300,000 tons of CO₂e per year. The validation team confirms that the project activity falls under the category 1 ‘Projects’ as per para 3.10 of the VCS standard version 4.4, as it has the potential to reduce GHG emission less than 300,000 tCO₂e/year.

The estimated annual average and the total CO₂e emission reduction by the project activity over the fixed crediting period of 10 years are expected to be 222,137 tCO₂e and 2,221,373 CO₂e respectively. The validation team confirmed that emission reduction forecast is reasonable if the underlying assumptions do not change.

Project location

The project will be implemented across Kenya and will cover the national boundary of the Kenya. The project boundary is defined by the following GPS coordinates and is found to be consistent. Further, project GPS coordinates as provided in the VCS PD and which are presented below, have been verified through the means of google earth software.

Geo-coordinates for Kenya:

<i>Orientation</i>	<i>Latitude</i>	<i>Longitude</i>
Eastmost	3° 48′ 58″ N	41° 53′ 59″ E
Westmost	1° 03′ 35″ S	33° 55′ 46″ E
Southmost	4° 40′ 33″ S	39° 19′ 32″ E
Northmost	4° 15′ 41″ N	35° 23′ 57″ E

Conditions prior to project initiation

As per analyses in the Africa Energy Outlook 2019 /23/ show, the lack of access to clean cooking remains very acute in sub-Saharan Africa with access increasing only slightly from 15% in 2015 to 17% in 2018. Since 2015, only 25 million people have gained access to clean cooking in the region, meaning that the number of people without access increased to over 900 million in 2018 as population growth outpaced

provision efforts. Sub-Saharan Africa is the only region where the number of those without access continues to rise significantly, highlighting the urgent need for action.

The vast majority of population in sub-Saharan Africa thus rely on gathering biomass for cooking, particularly in rural areas, which dramatically damages health and impairs productivity improvements. Almost 490,000 premature deaths per year are related to household air pollution from the lack of access to clean cooking facilities, with women and children being among the worst affected. Forest degradation, sometimes leading to deforestation, is another serious consequence of the unsustainable harvesting of fuelwood. Regarding the way of use of this energy, a large proportion of households depend on traditional cookers named “3 stones or triangle iron or crude clay/mud constructions”, which remains the most common practice. This trend remains true for Kenya as well, which is the condition prior to the project initiation.

Baseline Scenario in Kenya

Over 90% of the rural population and around 75% of all Kenyan households still cook with wood or charcoal¹. The project proponent has conducted a baseline survey from 25/05/2022 to 06/06/2022 among 120 households from 6 villages, which shows that 96.67% of surveyed households used three-stone fire and 3.33% used open fire before the project implemented. All of the households used firewood for cooking. The baseline scenario is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

The baseline survey results were validated by the validation team by reviewing the baseline survey undertaken by the PP before the project implementation. The survey results were further reconfirmed during the onsite assessment wherein the households were interviewed and found the baseline was three stone fire stoves.

PP had undertaken multi-stage sampling was applied in the baseline survey to determine η_{old} , the only parameter requires to be determined by baseline survey for ER calculation according to the applied methodology. According to Equation 16 in *Guideline for sampling and surveys for project activities and programmes of activities (Version 04.0)* as well as the baseline survey, since $\eta_{old} = 0.1$ for all the surveyed households, $SDB=SDW=0$. Therefore, when the number of villages that were sampled is 6, 90/10 confidence/precision was achieved in the baseline survey. (because when $SDB=SDW=0$, the right side of Equation 16 is 0. So when $c=6$, 90/10 confidence/precision was achieved)

Project compliance with applicable laws, statutes and other regulatory frameworks

¹ https://ambitiontoaction.net/wp-content/uploads/2021/07/A2A_Kenya_CleanCookingStudy_July2021.pdf#:~:text=Even%20though%20Kenya%20has%20made%20significant%20progress%20over,petroleum%20gas%20%28LPG%29%20as%20their%20primary%20cooking%20fuel.

There is no mandatory legal requirement for installation of cookstoves in households/institutions of Kenya.

Kenya's national energy policy² mentions as one of the prioritized actions in the energy sector the development and distribution of 4 million improved biomass stoves by 2022. Kenya's National Climate Change Action Plan 2018-2022³, provides some more details related to the development and distribution of those improved biomass cookstoves. As per the National Climate Change Action Plan it becomes clear that the distribution of 4 million improved biomass stoves is an objective and a proposed priority mitigation action, however the distribution and use of improved biomass cookstoves is not enforced by any government law, policy or regulation, hence there is no obligation for households to use improved cookstoves. Hence, though a government objective has been defined, it is not guaranteed whether this objective will be achieved and if so, to what extent. The NDC of Kenya⁴ does not mention any specific objectives regarding improved cookstoves.

Participation under other GHG programs:

The project activity has not been registered or currently seeking registration under any other GHG programs not rejected by other GHG programs. The project has not participated under any other GHG program. The declaration on the same has been provided and found appropriate.

Sustainable development contributions

The project contributes to the following Sustainable Development benefits:

As the project leads to emission reductions and hence contributes to SDG13. Further It contributes to the SDG 7, since it distributes 100,000 high-efficiency, clean burning 'Jiko Kisasa' Cookstoves in Kenya. As the air pollution is reduced, so it addresses the SDG 3. As it also reduces the proportion of time rural women spend on unpaid domestic work related to collection of firewood, and cooking meals on inefficient traditional cookstoves, so it contributes to SDG 5.

Goal 1: No poverty

² Ministry of Energy of the Republic of Kenya, National Energy Policy, October 2018

(https://kplc.co.ke/img/full/BL4PdOgKtxFT_National%20Energy%20Policy%20October%20%202018.pdf)

³ Ministry of environment and Forestry, National Climate Change Action Plan 2018-2022, Volume 3 : Mitigation Technical Analysis Report, 2018

https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/8737_vol3.pdf

⁴ https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kenya%20First/Kenya_NDC_20150723.pdf

Indicator 1.1.1: Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)

Improved cookstove is a basic service necessary to lead a healthy and productive life, including saving time and money for wood fuel at the household level. The project proponent will distribute 100,000 ICSs, and the ICSs are produced in local factories. Hence the implementation of the project results in more job opportunities and higher income for local residents.

Goal 2: Zero hunger**Indicator 2.1.1: Prevalence of undernourishment.**

The project improves food security and nutrition status, particularly for children and women by reducing inadequate cooking, the burden of firewood collection, the time to prepare food, the need to buy firewood.

Goal 3: Good health and well-being**Indicator 3.9.1: Mortality rate attributed to household and ambient air pollution.**

Most of non-renewable biomass local people used for cooking is firewood, which generates high PM2.5 and high CO biomass smoke when incompletely burnt. By using ICS, it reduces people's exposure to high PM2.5 and high CO due to higher efficiency of combustion leading to faster cooking and more complete combustion. It also reduces the burn risk, significant to children and toddlers due to enclosure of the fire in the combustion chamber.

Goal 4: Quality education**Indicator 4.3.1: Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex.**

The project reduces the time spend on firewood collection for children, especially for girls, which increases their time for education. The implementation of project needs plenty of local people to participate in production, distribution or use steps. They get relevant skills and sustainable development and global citizenship education through training by project proponent.

Goal 5: Gender equality**Indicator 5.4.1: Proportion of time spent on unpaid domestic and care work, by sex, age, and location.**

The project reduces women and children's drudgery through time savings in reducing time spent cutting, collecting, and carrying firewood from trees far removed from households and reduce time spent cooking over toxic smoky open fires. These tasks, if being undertaken without relief, are a major cause of gender inequality.

Goal 6: Clean water and sanitation**Indicator 6.6.1: Change in the extent of water-related ecosystems over time**

Clean cooking technology provides an essential tool to addressing energy poverty and ensuring sustainable energy security in approximately 100,000 Kenya households during the project lifecycle. It also reduces the smoke and GHG emissions during water boiling.

Goal 7: Affordable and clean energy**Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology**

The ICS distributed to Household is a clean cooking technology. The project will increase the proportion of population with primary reliance on clean cooking technology in project area.

Goal 8: Decent work and economic growth**Indicator 8.3.1: Proportion of informal employment in total employment, by sector and sex.**

The factories which produce ICS are local enterprises. They hire more workers to produce ICSs for the project. During the project crediting period, the project proponent and its local partners are in charge of maintenance and monitoring plan, which creates working opportunities for local people.

Goal 9: Industry, Innovation, and Infrastructure**Indicator 9.3.1: Proportion of small-scale industries in total industry value added**

The local factories which produce ICS for project are small-scale industries. They expand production capacity to satisfy the needs. Thus, the upstream and downstream supply chain benefit from the project. Many of the workers hired by the factories for the project were peasants before. So the project increases manufacturing employment.

Goal 13: Climate action**Indicator 13.2.2: Total greenhouse gas emissions per year**

The average annual GHG emission reduction from the project is expected to be 222,137 tCO₂e due to less non-renewable firewood combustion for cooking and heating in the households.

Goal 15: Life on land**Indicator 15.1.1: Forest area as a proportion of total land area**

The project helps local people consume less firewood as the ICS has higher thermal efficiency and it results in a reduction of GHG emissions compared to the baseline scenario. It also helps reduce deforestation and protect biodiversity and natural habitats in Kenya.

Additional information relevant to the project, including: Leakage management for AFOLU projects and commercially sensitive information

The project adopts a net gross adjustment factor of 95% to account for leakage and there is no commercially sensitive information has been excluded from the public version of the project description.

3.2 Safeguards

3.2.1 No Net Harm

The project activity involves energy savings with efficient cooking stoves (ICS). There is no negative environmental and socio-economic impact from the project activity. The project activity promotes environmental and socio-economic well-being as it results in less GHG emissions due to installation and operation of clean technology. This is as per the requirements of the VCS Standard (version 4.4) and deemed acceptable to the audit team.

3.2.2 Local Stakeholder Consultation

The Local stakeholder consultations were conducted by the PP in accordance with the requirements of VCS. The local stakeholder consultation meetings were held with participants representing rural Kenya with an objective of gathering comments and concerns of the stakeholders on the proposed VCS project titled “Kenya Jiko Kisasa Improved Cookstove Program I” implemented by ‘Guangzhou Iceberg Environmental Consulting Services Co., Ltd/22/. The project will be implemented in different counties of Kenya. The dates and attendance list of the various meetings that have been conducted are as follows:

The physical consultation was conducted on 16/05/2022 in Kiambu County and on 19/05/2022 in Murang’a County. Various inviting methods were applied for the stakeholder consultation meeting. For the convenience of stakeholders, the invitations were in both English and Swahili. The invitation was sent to villagers through broadcast in villages to make sure everyone can understand. Some local people were invited by phone call. For local officers and entrepreneurs, invitation letters were sent to them as formal invitation. National government officials, local and international NGOs were invited by email. Validation team met with the government authorities who were part of the local stakeholder consultation process along with the other attendees. It was informed by the government authorities that the LSC was undertaken at the office of the Chief (government officer) and the adequate information was provided to the attendees.

The audit team has checked the stakeholder related documentation-invitations, summary provided to participants and feedback by the local community. The VVB has also conducted interviews with some of the stakeholders during the on-site visit and confirmed on the local stakeholder consultation meeting. No negative comment was received.

PP has maintained a register as a part of on-going communication with local stakeholders and end users are informed about grievance register. PP shall encourage the stakeholders to provide feedback/grievance as part of continuous ongoing stakeholder communication. The stakeholders shall be communicated through the house visits. The project proponent/local partners have the responsibility to take grievances regarding the project activity and same will be considered during operation of project activity. Thus, ongoing communication of stakeholders is followed through grievance mechanism. The VVB confirms that the local stakeholder consultations have been done in accordance with VCS Standard, v4.4 requirements.

3.2.3 Environmental Impact

The project does not have any negative environmental impact and does not require any specific license/approval from host country. The project has positive environmental impacts as discussed below:

- The project being the implementation of improved cooking stoves saves energy which leads to overall emission reductions. The energy supply is not hampered compared to baseline but improved.
- The project involves use of improved cook stoves which does not need any water for its operation. Therefore, the project does not have any impact on water.
- The project involves use of improved cook stoves which does not involve any landscape modification or leads to vulnerable natural disasters. It also does not involve any manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials. It leads to less pollution (air pollution due to firing of firewood) compared to baseline scenario as the project technology itself is saving firewood consumption compared to baseline scenario.

No potential negative environmental or socio-economic impacts have been identified for the project activity.

3.2.4 Public Comments

This project was open for public comment from 21/09/2022 to 21/10/2022. No comment found raised during public commenting period.

3.2.5 AFOLU-Specific Safeguards

The project is a non-AFOLU project. Hence, this section is not required.

3.3 Application of Methodology

3.3.1 Title and Reference

Methodology Title: VMR0006- Methodology for Installation of High Efficiency Firewood Cookstoves, Version: 1.1 /5/

Sectoral Scope: 03

Type: Type II – Energy Efficiency Improved Projects

Methodological tool: “TOOL30: Calculation of the fraction of non-renewable biomass”; Version-03 /8/

The methodology is valid at the time of validation of the project activity have been checked and confirmed by the assessment team.

3.3.2 Applicability

The project activity applies VCS methodology; VMR0006, Version 1.1. The validity of methodology is from 22/07/2021. The applicability criteria for the methodology are assessed by the audit team by means of document review and interviews. The audit team confirms that the project activity meets the criteria of the applied methodology.

S. No	VCS Methodology requirement	Project justification	Means of Validation
1	Project activities shall be implemented in domestic premises, or in community-based kitchens.	The project activity replaces traditional wood-based stove (mainly three stone) in individual households only.	As confirmed from the site visit interviews, replacement of conventional firewood stoves with higher efficiency ICS models will be carried out in the individual households in rural/semi urban areas.
2	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	The Jiko Kisasa improved cookstove has a specified high-power thermal efficiency of 27.2% as per the manufacturer's specifications. It uses non-renewable biomass only.	Based on the interviews and through the review of efficiency test report, VVB confirms that the Jiko Kisasa stove has been tested for thermal efficiency of 27.2% according to WBT protocol and certified by third party (KIRDI Stove Testing Centre). Therefore, all the distributed cookstove types shall have specified high-power thermal efficiency of at least 25% as

			per the manufacturer's specifications, in line with methodological requirements.
3	Both 'Projects' and 'Large Projects' can use this methodology.	Since the average annual GHG emission reduction from the project is expected to be 222,137 tCO ₂ e, it is a project as per Paragraph 3.10.1 of VCS Standard (Version 4.4).	The project falls under the category of project as the ERs are below the threshold of project VVB verified the calculations of ERs demonstrated in the ER spreadsheet and found it correct.
4	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	A literature published in 1989 showed that firewood was the principal cooking and heating fuels in rural area of Kenya, which caused dramatically increasing environmental damage like deforestation, soil erosion ⁵ . Biomass Energy Use in Kenya ⁶ , IEA (International Energy Agency) report in 2019 ⁷ , and baseline survey conducted by project proponent before the implementation of the project, all demonstrate that non-renewable biomass has been used since 31 December 1989 till date in Kenya.	PP demonstrated that firewood is non renewable biomass is in use in Kenya through 1989. VVB also validated it by the other publicly available information: Non-renewable biomass has been used since 31/12/1989 within the boundary of the activity: According to FAO Forest Resource Assessment, 2010, the forested area in Kenya reduced by 0.35 % between 1990 and 2000, by 0.34% between 2000 and 2005 and by 0.31% between 2005 and 2010. Therefore, between 1990 and 2010, Kenya lost its forests at an average rate of 0.32% per year. In total, between 1990 and 2010, Kenya lost 6.5% of its forest cover ⁸ .
5	For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood	<i>According to baseline survey, all of the sampled households used firewood</i>	Through the site visit interviews, it is confirmed that the project activity shall

⁵ <https://journals.sagepub.com/doi/abs/10.1177/014459878900700205>

⁶ <https://iied.org/sites/default/files/pdfs/migrate/G02985.pdf>

⁷ <https://www.iea.org/articles/kenya-energy-outlook>

⁸ <http://www.fao.org/docrep/013/i1757e/i1757e.pdf> , Table 3

	chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded.	<i>for cooking while no biomass residues such as briquettes and woods were used. The consumption of the fuel used in the project activity will be monitored.</i> If the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips) are used in project stoves, it will be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded. Otherwise, the emission reduction of the project stoves using biomass residues will be excluded from the ER calculation.	disseminate energy efficient biomass based cookstoves to replace the baseline stoves and these stoves shall not be fired with any other type of fuel. However, if any other type of fuel is used, then project emissions shall be calculated accordingly.
6	The project description shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	Each ICS distributed in this project has a unique identification ID, and the user's basic information (e.g. name, location, unique identification ID) are recorded. The ICS is also labelled with programme logo. Hence, the above methods can make sure that it avoids double counting of emission reductions.	The validation team by means of site visit interviews confirms that the proposed method for distribution of project devices includes the method to avoid double counting of emission reductions such as unique identifications of product and end-user details (name, address etc). Therefore, the validation team confirms that the record keeping system will eliminate double counting.

7	The project description shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The local partner and end users have signed agreements with project proponent stating clearly that the PP has the sole ownership of the VCUs arising from the project.	During the site visit interview and the review of sample beneficiary agreement, it has been confirmed that an agreement will be signed between the users and the PP, which shall give the ownership of VERs to the PP /13/.
8	<i>Tool30 may be used by:</i> (a) DNAs to submit region- or country-specific default fNRB values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants to calculate project- or PoA-specific fNRB values.	The project proponent has used tool 30 to calculate project-specific fNRB value.	The project has used the T001 30 for the calculation of fnr and has been validated in the subsequent section by the validation team.

3.3.3 Project Boundary

As per applied methodology, the project boundary is the physical, geographical site of the efficient devices that utilize biomass. Therefore, the project boundary covers each project ICS location. The PP has stated that the project activity distributes ICS in entire geographical location of Kenya and hence the project boundary covers all the districts of Kenya. The validation team was able to confirm that all the identified emission sources which are impacted by the project activity are addressed by the approved methodology and can be seen in the Table below. The validation team concludes that the project boundary is correctly identified in accordance with the methodology. All greenhouse gas emissions (CO₂) occurring within the proposed project activity boundary as a result of the implementation of the proposed project activity have been appropriately addressed in the VCS PD.

Source		Gas	Included?	Justification/Explanation
B	Emission from use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	No other source identified
		CO ₂	No	Baseline and project fuels are same thus no transportation and

	Production & Transport of Fuel			production triggering from project activity.
		CH ₄	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
		N ₂ O	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
		Other	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
Project	Emission from use of non-renewable biomass	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO ₂	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
		CH ₄	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
		N ₂ O	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.
		Other	No	Baseline and project fuels are same thus no transportation and production triggering from project activity.

3.3.4 Baseline Scenario

There is no mandatory legal requirement for installation of cookstoves in households/institutions of Kenya.

Over 90% of the rural population and around 75% of all Kenyan households still cook with wood or charcoal⁹. The project proponent has conducted a baseline survey from 25/05/2022 to 06/06/2022 among 120 households from 6 villages, which shows that 96.67% of surveyed households used three-stone fire and 3.33% used open fire before the project implemented. All of the households used firewood for cooking. The baseline scenario is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

The baseline survey results were validated by the validation team by reviewing the baseline survey undertaken by the PP before the project implementation. The survey results were further reconfirmed during the onsite assessment wherein the households were interviewed and found the baseline was three stone fire stoves.

PP had undertaken multi-stage sampling was applied in the baseline survey to determine η_{old} , the only parameter requires to be determined by baseline survey for ER calculation according to the applied methodology.

According to Equation 16 in Guideline for sampling and surveys for project activities and programmes of activities (Version 04.0) as well as the baseline survey, since $\eta_{old} = 0.1$ for all the surveyed households, $SDB=SDW = 0$. Therefore, when the number of villages that were sampled is 6, 90/10 confidence/precision was achieved in the baseline survey.

(Because when $SDB=SDW = 0$, the right side of Equation 16 is 0. So when $c=6$, 90/10 confidence/precision was achieved)

⁹ https://ambitiontoaction.net/wp-content/uploads/2021/07/A2A_Kenya_CleanCookingStudy_July2021.pdf#:~:text=Even%20though%20Kenya%20has%20made%20significant%20progress%20over,petroleum%20gas%20%28LPG%29%20as%20their%20primary%20cooking%20fuel.

$$c \geq \frac{\frac{SD_B^2}{p^2} \times \frac{M}{M-1} + \frac{1}{u} \times \frac{SD_w^2}{p^2} \times \frac{(\bar{N} - \bar{u})}{(\bar{N} - 1)}}{\frac{0.1^2}{1.645^2} + \frac{1}{M-1} \times \frac{SD_B^2}{p^2}} \quad \text{Equation (16)}$$

Where:

C	=	Number of groups that should be sampled
M	=	Total number of groups in the population (120 villages)
$\bar{u}$	=	Number of units to be sampled within each group (pre-specified as 10 households)
$\bar{N}$	=	Average units per group (50 households per village)
SD_B^2	=	Unit variance (variance between villages)
SD_w^2	=	Average of the group variances (average within village variation)
p	=	Overall proportion
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

Since the result of baseline survey is 100% using open fire and three-stone fire, which means the η_{old} of all the surveyed households belongs to option(a) of parameter table η_{old} in Section 5.1. Therefore, the default value $\eta_{old} = 0.1$ is used for all the surveyed households. Thus, SD_B^2 =the variance between villages=0, SD_w^2 =average within village variation =0. Therefore, when the number of villages that were sampled is 6, 90/10 confidence/precision was achieved in the baseline survey (because when $SD_B^2=SD_w^2=0$, the calculation result of the right side of Equation 16 is 0, which means C =number of groups (it means villages for the project) that should be sampled ≥ 0 . So when $C=6$, 90/10 confidence/precision was achieved).

Therefore, validation team based on review of the VCS PD confirms that the above baseline scenario is relevant, and correctly quoted and interpreted in the project description. The baseline scenarios were also confirmed through site visit interviews with the end users of technologies and representatives of PP. Validation team confirms that the baseline scenario opted by the project activity is in accordance with the requirements of the applied methodology and is justified.

3.3.5 Additionality

PP has demonstrated additionality based on the activity method of applied methodology VMR0006 version 1.1, as per which the following steps have been followed:

Step 1: Regulatory Surplus

Kenya's national energy policy¹⁰ mentions as one of the prioritized actions in the energy sector the development and distribution of 4 million improved biomass stoves by 2022. Kenya's National Climate

¹⁰ Ministry of Energy of the Republic of Kenya, National Energy Policy, October 2018

(https://kplc.co.ke/img/full/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20%202018.pdf)

Change Action Plan 2018-2022¹¹, provides some more details related to the development and distribution of those improved biomass cookstoves. As per the National Climate Change Action Plan it becomes clear that the distribution of 4 million improved biomass stoves is an objective and a proposed priority mitigation action, however the distribution and use of improved biomass cookstoves is not enforced by any government law, policy or regulation, hence there is no obligation for households to use improved cookstoves. Hence, though a government objective has been defined, it is not guaranteed whether this objective will be achieved in reality and if so, to what extent. The NDC of Kenya¹² does not mention any specific objectives in regard to improved cookstoves.

Through the review of related policies and validation team's sectoral expertise, it is confirmed that there is no mandated government programme or policy in host country (Kenya) ensuring the distribution of domestic fuel-efficient cookstoves. The government promotes the use of improved ICS, however it's not mandatory. Also, PP has declared voluntary participation in the VCS project, and all actions taken as part of it, are voluntary and coordinated project as it is not mandated by any law, statute or other regulatory framework.

Step 2: Positive List

The applicability conditions of methodology represent the positive list. The project must demonstrate that it meets all of the applicability conditions of the methodology as well as the below condition. In so doing, the project is deemed as complying with the positive list.

1. Where the project activity installs or distributes stoves at zero cost to the end-user and has no other source of revenue other than the sale of GHG credits, the project activity shall be deemed additional.

- ✓ *The project is distributing ICS to the HHs at the zero cost, validation team validated the same by confirming the users during the onsite assessment*
- ✓ *Validation team would like to state that during the interview with the beneficiaries as part of acceptance sampling, this was asked whether they pay any cost while the stoves they got from the technology supplier/implementer. This was confirmed by the HHs that they didn't pay any charges. Moreover, while validating the local stakeholder consultation*

¹¹ Ministry of environment and Forestry, National Climate Change Action Plan 2018-2022, Volume 3 : Mitigation Technical Analysis Report, 2018

https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/8737_vol3.pdf

¹² https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kenya%20First/Kenya_NDC_20150723.pdf

process, the validation team had an opportunity to meet with the government officials and during the interview the officials also confirmed that the project distribution/implementation has their approval and it is implemented at the provisions of zero cost to the end users.

2. Project activities that are implemented as part of government schemes or are supported by multilateral funds cannot be considered additional even if the stoves are distributed free of cost or at a highly subsidized rate and hence are not eligible to use this methodology.

- ✓ The project is a voluntary activity and not supported by any government subsidy scheme. *This was also confirmed by the government officials who were on board by the PP during the local stakeholder consultation.*

Step 3: Project Method

N/A

3.3.6 Quantification of GHG Emission Reductions and Removals

The equation and choices provided in the methodology and all other methodological tools are correctly quoted in the PD. The emission reductions of the project would be calculated using the formulae mentioned in the applied methodology; VMR0006 (version 1.1).

Validation team based on the review of the PD, confirms that the formulae are correctly presented for the determination of emissions reductions at project level. The parameters and equations presented in the PD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology respectively. An equation comparison has also been made to ensure consistency between all the formulae presented in the PD and ER spreadsheet and methodology: VMR0006 (version 1.1).

According to applied methodology VMR0006 (version 1.1) the emissions are calculated as below:

Baseline Emissions

The improved cookstove is introduced as energy efficiency measure in the project, therefore equations 1 and 2 of the methodology is applied to calculate the net GHG emission reductions.

$$ER_y = \sum_i \sum_j ER_{y,i,j} \quad \text{Equation (1)}$$

Where;

<i>i</i>	Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire
<i>j</i>	Indices for the situation where there is more than one batch of improved cookstove of type <i>i</i>
<i>ER_y</i>	Emission reductions during year <i>y</i> in t CO _{2e}

$ER_{y,i,j}$	Emission reductions by improved cookstove of type i and batch j during year y in t CO ₂ e
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$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95 \quad \text{Equation (2)}$$

Where;

$f_{NRB,y}$	Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
$NCV_{wood\ fuel}$	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne) /5/
EF_{wf,CO_2}	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ) /5/
$EF_{wf,non\ CO_2}$	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ) /5/
$N_{y,i,j}$	Number of improved cookstoves of type i and batch j operating during year y
0.95	Discount factor to account for leakage

To calculate $B_{y,savings}$, Option set out in Equation 4 of the applied methodology is used.

$$B_{y,savings,i,j} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,y,i,j}}{\eta_{old}} - 1 \right) \quad \text{Equation (4)}$$

Where:

$B_{y=1,new,i,survey}$	Annual quantity of woody biomass used by improved cook stoves in tonnes per device of type i and batch j, determined in the first year of the implementation of the project through a sample survey. The value is assumed to be 3.19 kg/device/day or equal to 1.16 tonnes/device/year. The assumption for the ex-ante calculation was validated reasonable by the VVB based on it's sectoral expertise. VVB would like to clarify that the ex-ante estimation of the $B_{y=1,new,i,survey}$ was based on the pilot fuel tests undertaken by the PP. The ex-ante value is only for the determination of ex-ante VERs and this will be monitored as per the methodology during the ex-post scenario. The document "Fuel Consumption Test Report" has been submitted to the project validation team and validation team found it adequate for the ex-ante calculations based on it's sector expertise. Since the actual value will be decided during verification and therefore section 5.3 has methodology for the monitoring of cited parameter applies in the ex-post scenario. Validation team would like to state that Section 5.3 has the provisions for the ex-post monitoring of the parameter $B_{y=1,new,i,survey}$ as ex-ante values can not be applied for the ex-post scenario. $B_{y=1,new,i,survey}$ is a monitored parameter and methodology has the following provisions for this parameter . Option b Section 8.4 of applied methodology VMR0006, version 1.1 lays down for the following provisions for the ex-post monitoring of $B_{y=1,new,i,survey}$. "Project proponent shall carry out a survey of usage prior to implementation of the project activity following the sampling approach described in the latest version of CDM document Sampling and surveys for CDM project activities and programme of activities. Alternatively, the project participant may follow the simple random sampling approach and the minimum sample size should be determined as per the following guidelines: • Project target population < 300: Minimum sample size 30 • Project target population 300 – 1000: Minimum sample size 10% of group size • Project target population > 1000: Minimum sample size 100". PP has chosen the former one i.e. following the sampling approach
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	described in the latest version of CDM document Sampling and surveys for CDM project activities and programme of activities, thus we used multi-stage sampling method in Section 5.3 of PD according to “Standard sampling and surveys for CDM project activities and POAs (Ver9.0)” and “Guideline for sampling and surveys for CDM project and POA_(Ver 4.0)”.
η_{old}	A default value of 0.10 is used based on the baseline survey undertaken. Through interview with the stakeholders of the project, the validation team confirmed that the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e., without a grate or a chimney. Hence use of default value confirms to the requirements of the applied methodology /5/
$\eta_{new,i,j}$	Efficiency of the system being deployed as part of the project activity (fraction).

For ex-ante estimates:

Determination of annual quantity of woody biomass that would have been used in the household in the absence of the project activity has been opted as per the below method.

$$B_{y=1,new,i,j,survey}$$

PP has considered 1.16435 Metric Tonnes of project fuel consumption based on the professional judgement of 3.19 Kg of firewood consumption daily.

Validation team assessed it reasonable in context of ex-ante estimations of ERs, since this value will be monitored ex-post therefore validation team accepts it based on it's local and sectoral expertise.

Determination of the fraction of fuel type (non-renewable biomass):

According to methodological tool "Calculation of the fraction of non-renewable biomass" version 03.0, equation 1, shall be used to calculate f_{NRB} :

$$f_{NRB} = \frac{NRB}{NRB + RB}$$

Where:

$f_{NRB,y}$: Fraction of non-renewable biomass in the applicable area in the relevant period (fraction or %)

NRB : Quantity of non-renewable biomass consumed in the applicable area in the relevant period (tonnes)

RB : Quantity of renewable biomass that is available on a sustainable basis in the applicable area in the relevant period (tonnes)

$$NRB = H - RB$$

where:

H = Total annual consumption of wood in the absence of the project activity in the country/region or project area (t/yr)

H is calculated, accounting for all consumption within the country/region (not only wood fuel but also timber and industrial consumption).

$$H = HW \times N + CE + NE$$

Where:

HW	=	Average consumption of wood fuel per household, including fuelwood and charcoal, in the applicable area in the relevant period (tonnes//household)
CE	=	Commercial woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of woody biomass in ovens, boilers etc.) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)
NE	=	Commercial woody biomass consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)
N	=	Number of households consuming wood fuel within the applicable area in the relevant period (number)

Renewable biomass (RB) in the country/region/area is estimated using the equation below.

$$RB = \sum(MAI_{forest,i} \times (F_{forest,i} - P_{forest})) + \sum(MAI_{other,i} \times (F_{other,i} - P_{other}))$$

Where:

$MAI_{forest,i}$ = Mean Annual Increment of woody biomass growth per hectare in sub- category i of forest areas (t/ha/yr)

$MAI_{other,i}$ = Mean Annual Increment of woody biomass growth per hectare in sub- category i of other wooded land areas (t/ha/yr)

$F_{forest,i}$ = Extent of forest in sub-category i (ha)

$F_{other,i}$ = Extent of other wooded land in sub-category i (ha)

P_{forest} = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (ha)

P_{other} = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other wooded land areas (ha)

i = Sub-category i of forest areas and other wooded land areas

Hence the total annual consumption of wood (H) been arrived as:

= 27,734,283 Metric Tonnes

The value is sourced from the FAO report 2020

Further the extent of forest, other wooded land and other land have been calculated based on the “Global Forest Resources Assessment 2020, Country Report Kenya”.

MAI (forest)

Percentage	Global Ecological Zone	Total forest extent	Primary Forest	12 yr forest gain	Extrapolated 20 yr forest gain	Total forest extent <20 yr	Total forest extent >20 yr	Total primary forest extent	Growth rate <20 yr forest	Growth rate >20 yr forest	Growth rate primary Forest	Age-weighted growth rate
		ha	ha	ha	ha	%	%	%	t/ha/yr	t/ha/yr	t/ha/yr	t/ha/yr
1.64%	Tropical dry forest	49,299.0	135.0	800.0	1,333.3	2.70%	97.02%	0.27%	3.9	1.6	-	1.7
20.70%	Tropical moist forest	6,23,476.0	28,985.0	990.0	1,650.0	0.26%	95.09%	4.65%	2.9	0.9	0.4	0.9
70.26%	Tropical mountain system	21,15,850.0	5,59,240.0	94,780.0	1,57,966.7	7.47%	66.10%	26.43%	5.5	1.8	0.5	1.7
3.24%	Tropical rainforest	97,453.0	424.0	1,856.0	3,093.3	3.17%	96.39%	0.44%	7.6	3.5	1.3	3.6
4.16%	Tropical shrubland	1,25,391.0	6,400.0	2,143.0	3,571.7	2.85%	92.05%	5.10%	0.5	0.9	0.9	0.9

Data source: Global Forest Resources Assessment (FRA) 2020 Kenya - Report (fao.org)

The data source was validated from the FAO site and the report link provide above.

Forest Data

The Forest related data was primarily sourced from the FAO report 2020 and the details provided below:

FAO Global Ecological Zone	Total forest cover	Protected area cover	Remote area cover	Accessible area cover	MAI	Annual growth
	(ha)	(ha)	(ha)	(ha)	(t/ha/yr)	(t/yr)
Tropical dry forest	49,299.0	4,706.0	1,870.0	42,723.0	1.7	70,827.2
Tropical moist forest	6,23,476.0	1,409.0	4,59,002.0	1,63,065.0	0.9	1,43,831.2
Tropical mountain system	21,15,850.0	3,09,620.0	3,79,228.0	14,27,002.0	1.7	24,72,472.9
Tropical rainforest	97,453.0	15,705.0	997.0	80,751.0	3.6	2,92,364.6
Tropical shrubland	1,25,391.0	5,120.0	39,830.0	80,441.0	0.9	71,480.4
Total	30,11,469	3,36,560	8,80,927	17,93,982	-	30,50,976

Variable	Unit	Value2
Total woody biomass consumption (H)	t/yr	2,77,34,283
Renewable biomass (RB)	t/yr	30,50,976
Non-renewable biomass (NRB)	t/yr	2,46,83,307
fNRB	-	0.89

Based on the calculated total annual consumption of wood and calculated renewable biomass, the fNRB has been calculated as follows:

= 89%

As the value is calculated on the national level, The compliance of para 13 of the tool 30 has now been demonstrated in the fnrb spreadsheet under tab '1-fNRB Calculation' (Refer row 19-26). Screenshot is presented below. The para 13 lays down:

If the fNRB value is estimated at the national level, as a cross check, project proponent shall compare the value of estimated NRB with the product of: i) total average above ground biomass tonnage of the area of forest areas deforested in recent past (tonnes/ha), and ii) most recent available observed annual rate of deforestation (ha/yr). If the estimated NRB value is more than 10% above the value calculated as per the product of biomass and deforestation rate, justification shall be provided for the higher value for NRB.

It is noted that the threshold is within the range.

Cross Check	Forest loss (ha/yr)	1,03,368
	AGB (t/ha)	200.38
	Product (NRB, t/yr)	2,07,12,880
	Estimated NRB (t/yr) whole country	2,29,72,365
	Estimated NRB (t/yr) accessible area	2,46,83,307
	% Difference	10

Based on the literature review of the sources of data used in the calculations, the assessment team found that most recent available data have been used in the calculations, which is also the most appropriate/specific in the Kenyan context. All the values used in the fNRB calculations have been validated and found correct.

The fNRB calculations is in line with the paragraph 23 of AMS-II.G, version 04.0, /28/ and Methodological tool: Calculation of the fraction of non-renewable biomass', version 02.0 /30/ and found correct. Also the assessment team checked the below registered PoAs of Kenya with comparable values of fNRB, hence the fNRB value for this PoA is found appropriate.

UNFCCC Ref. No.	fNRB Value (fraction)
PoA 9265 (Various CPAs, Fnrb was established at CPA level)	0.914
PoA 10476 (Various CPAs)	0.915

All the cited PoAs have established the fnrb on the past data of FAO, PP has used the recent data of FAO 2020 therefore a reasonable variation is observed due to the updated forest data and fuelwood/charcoal consumption.

Project Emissions

The applied methodology does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. This quantification is carried out. This complies the requirements established in section 8.2 of the applied methodology.

Leakage

Leakage is already accounted in calculation of emission reduction by adjusting with default value of 0.95. This is as per section 8.4 of the applied methodology.

Emission Reduction

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
21/06/2022-31/12/2022	N.A.	N.A.	0	23,340
01/01/2023-31/12/2023	N.A.	N.A.	0	160,369
01/01/2024-31/12/2024	N.A.	N.A.	0	273,525
01/01/2025-31/12/2025	N.A.	N.A.	0	254,886
01/01/2026-31/12/2026	N.A.	N.A.	0	219,224
01/01/2027-31/12/2027	N.A.	N.A.	0	197,267
01/01/2028-31/12/2028	N.A.	N.A.	0	241,799
01/01/2029-31/12/2029	N.A.	N.A.	0	281,862
01/01/2030-31/12/2030	N.A.	N.A.	0	254,886
01/01/2031-31/12/2031	N.A.	N.A.	0	219,224
01/01/2032-20/06/2032	N.A.	N.A.	0	94,991
Total	N.A.	N.A.	0	2,221,373

The total emission reduction is 2,221,373 tCO₂e over 10 years fixed crediting period.

Through the validation process, 4KES has confirmed that:

- All the assumptions and data used by the project participants are listed in the PD including their references and sources;
- All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD;

- All values used in the PD are considered reasonable in the context of the VCS project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;
- All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PD.

3.3.7 Methodology Deviations

The project activity has used the VMR0006 version 1.1 and the PP has completely followed the methodology for the development of the VCS PD. The validation team has confirmed that the PP does not make any deviations from the applied methodology.

3.3.8 Monitoring Plan

The monitoring plan is in line with the applied methodology VMR0006, version 1.1. The monitoring plan will give opportunity for real measurement of achieved emission reductions. Since the project is distribution of ICS, the methodology does not account for baseline emissions separately but instead quantifies net emission reductions achieved by the project. The leakage is accounted in calculation of emission reduction by adjusting with the default value of 0.95. The action plan for monitoring has been included in section 5.3 of the VCS PD.

Data and parameters available at validation

Following parameters are fixed for the entire crediting period and are mentioned in section 5.1 of the VCS PD.

Parameter	Unit	Value	Source/Justification
NCV_{woodfuel} Net calorific value of the non-renewable woody biomass that is substituted or reduced	TJ/tonne	0.0156	The IPCC default value for wood fuel, is sourced from applied approved methodology VMR0006, v1.1.
EF_{wf,CO2} CO ₂ emission factor for the use of wood fuel in baseline scenario	tCO ₂ /TJ	112	The IPCC default value for wood fuel is sourced from applied approved methodology VMR0006, v1.1.
EF_{wf,non CO2} The non-CO ₂ emission factor for the use of wood fuel in baseline scenario	tCO ₂ /TJ	26.23	The IPCC default value for wood fuel is sourced from applied approved methodology VMR0006, v1.1.
f_{NRB,y}	Fraction	0.89	The value is calculated following

Fraction of non-renewable biomass saved by the project activity			procedures outlined in the tool to calculate fraction of NRB, "Tool 30: Calculation of the fraction of non-renewable biomass version 03", referred in the CDM methodology AMS-II. G. The calculation was undertaken by using the version 03 of Tool 30 in a separate Excel sheet, which is found correct. The parameters were found reasonable and correct, the fnrb sources were validated correct.
η_p Efficiency of project stove at the start of project activity	Fraction	0.272	It is confirmed during interview that the project will distribute Jiko Kisasa model and for this model, the efficiency is defined ex-ante. The value is sourced from efficiency tested in laboratory and validated in previous section.

Data and parameters monitored

Following parameters are monitored during the crediting period and are mentioned in section 5.2 of the VCS PD:

Parameter	Unit	Source/Justification
$B_{y=1,new,i,j,survey}$	tonnes	Validation team would like to state that Section 5.3 has the provisions for the ex-post monitoring of the parameter $B_{y=1,new,i,j,survey}$ as ex-ante values can not be applied for the ex-post scenario. $B_{y=1,new,i,j,survey}$ is a monitored parameter and methodology has the following provisions for this parameter . Option b Section 8.4 of applied methodology VMR0006, version 1.1 lays down for the following provisions for the ex-post monitoring of $B_{y=1,new,i,j,survey}$. "Project proponent shall carry out a survey of usage prior to implementation of the project activity following the sampling approach described in the latest version of

		CDM document Sampling and surveys for CDM project activities and programme of activities. Alternatively, the project participant may follow the simple random sampling approach and the minimum sample size should be determined as per the following guidelines: • Project target population < 300: Minimum sample size 30 • Project target population 300 – 1000: Minimum sample size 10% of group size • Project target population > 1000: Minimum sample size 100”. PP has chosen the former one i.e. following the sampling approach described in the latest version of CDM document Sampling and surveys for CDM project activities and programme of activities, thus we used multi-stage sampling method in Section 5.3 of PD according to “Standard sampling and surveys for CDM project activities and POAs (Ver9.0)” and “Guideline for sampling and surveys for CDM project and POA_(Ver 4.0)”. Determined in the first year of the introduction of the devices (e.g., during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied: (a) Baseline cookstoves have been completely decommissioned and only improved cookstoves are exclusively used in the project households; (b) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of firewood being used by each device. In other words, if more than one device, or another device that consumes firewood, are in use in project households, then the
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		sample survey needs to distinguish the quantity of firewood used by the project device and the other devices that use firewood.
$N_{y,i,j}$ Number of project devices of type I and batch j operating during year y	Number	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of “Standard for sampling and surveys for CDM project activities and programme of activities”. The project implementer shall maintain a distribution record to calculate this parameter. For ex-ante emission reduction calculation, it is assumed that the project will distribute up to 100,000 ICS in phases i.e. 100,000 distributions in 2 year.
$\eta_{new,i,j}$ Efficiency of the device of each type i and batch j implemented as part of the project activity	Fraction	The value validated and checked from the Manufacturer’s Specification or/and Certification by a national standards body or an appropriate certifying agent recognized by that body. For ex-ante calculation, the value of 0.272 /17/ has been used based on the test report, which is checked by the validation team and found correct.
η_{old} Efficiency of baseline cookstove	Fraction	0.1 The default value is sourced from applied approved methodology VMR0006, v1.1 based on the baseline devices. During site visit interview, the validation team noted that the baseline device is a three-stone fire using firewood or a conventional device with no improved combustion air supply. Hence the choice of default value is deemed appropriate.

Life span The operating lifetime of the project device. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency	Years	The operating lifetime of the project device is considered based on the manufacturer's specifications, which is found correct. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency. For the ex-ante calculation, the lifetime of 7 years /17/ have been considered based on the declaration from the technical specifications from the manufacturer.
Date of commissioning of batch j To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch	Date	To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch. The date of first distribution of the ICS is 21/06/2022 and validation in the previous sections.

Sample Plan:

The objective is determining the value of parameter $N_{y,i,j}$ and $B_{y=1,new,i,survey}$ during the crediting period, and with a 90/10 confidence/precision compliance with the applied methodology.

The following parameters may be determined by sampling:

Parameter	Description	Frequency
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y	Biennial
$B_{y=1,new,i,survey}$	Quantity of woody biomass used by project devices in tonnes per device of type i and batch j	Determined in the first year of project implementation

(2) Target population

The target population will be the complete set of appliances (ICS) deployed under the project.

(3) Sampling method and size

The sampling requirements of methodology are:

Parameter	Measurement procedures
-----------	------------------------

$N_{y,i,j}$	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch
$B_{y=1,new,i,survey}$	Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, $y=1$) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied: Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass. Only the quantity of biomass used by the project device will be accounted in project caused emission reductions.

According to “Standard sampling and surveys for CDM project activities and POAs (Ver9.0)” and “Guideline for sampling and surveys for CDM project and POA_(Ver 4.0)”, multi-stage sampling will be used. The sample size will be decided by the actual distribution quantity of ICSs then. The equations are shown below:

$$c \geq \frac{\frac{SD_B^2}{\bar{p}^2} \times \frac{M}{M-1} + \frac{1}{u} \times \frac{SD_w^2}{\bar{p}^2} \times \frac{(\bar{N}-u)}{(\bar{N}-1)}}{\frac{0.1^2}{1.645^2} + \frac{1}{M-1} \times \frac{SD_B^2}{\bar{p}^2}}$$

Where:

C	=	Number of groups that should be sampled
M	=	Total number of groups in the population
u	=	Number of units to be sampled within each group
N	=	Average units per group
SD_B^2	=	Unit variance (variance between villages)
SD_w^2	=	Average of the group variances (average within village variation)

p	=	Overall proportion
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

And

$$c \geq \frac{\left(\frac{SD_B}{Clustermean} \right)^2 \times \left(\frac{M}{M-1} \right) + \left(\frac{1}{u} \right) \times \left(\frac{SD_W}{Overallmean} \right)^2 \left(\frac{\bar{N} - u}{\bar{N} - 1} \right)}{\left(\frac{0.1}{1.645} \right)^2 + \frac{1}{M-1} \left(\frac{SD_B}{Clustermean} \right)^2}$$

Where:

C	=	Number of groups that should be sampled
M	=	Total number of groups in the population
u	=	Number of units to be sampled within each group
N	=	Average units per group
SD _B ²	=	Unit variance (variance between villages)
SD _W ²	=	Average of the group variances (average within village variation)
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

(b) Data to be collected

Besides the above parameters, the following data need to be collected as per the applied methodology:

- Date of distribution
- Geographic area of distribution
- Model/type of project technology distributed
- Quantity of project technologies distributed

- Name and telephone number (if available), and address of recipient
- unique identification alpha/numeric ID for each device that is sold/distributed

The information collected will be stored in the electronic database for 2 years after the end of crediting period.

The PP has informed that 90/10 is the chosen confidence/precision for the parameters. This confidence/precision is the same confidence/precision prescribed in the applied methodology (90/10). The same is described in section 5.3 of the VCS PD. The validation team confirms that the sampling method is clearly described in line with the description of the population and that the sampling plan transparently describes how the samples are selected.

Validation team confirms that the overall monitoring plan complies with the requirements of the methodology VMR0006; the monitoring arrangements described in the monitoring plan are feasible within the project design and the project proponents will be able to implement the described monitoring plan.

3.4 Non-Permanence Risk Analysis

Non-permanence risk analysis is not applicable as the Project is not an AFOLU (Agriculture, Forestry and Other Land Use) project.

4 VALIDATION OPINION

‘Guangzhou Iceberg Environmental Consulting Services Co., Ltd.’ has commissioned 4KES Pvt. Ltd. to do VCS validation of the project activity: “Kenya Jiko Kisasa Improved Cookstove Program I” having VCS ID 3197, with regard to the relevant requirements of VCS Standard version 4.4; to attain real, measurable, additional and permanent emission reductions.

The proposed project activity seeks to increase access of households and communities to improved cookstoves by disseminating high thermal efficiency and low greenhouse gas emitting cooking stoves known as Improved Cook Stoves (ICS) to the rural households of Kenya. The improved cook stoves through replacement of inefficient traditional cook stove will contribute towards reduction of greenhouse gas emission resulting in the reduction of firewood consumption leading to climate change mitigation in a sustainable manner.

A risk-based approach has been followed to perform this validation. In the course of the validation 10 Corrective Action Request (CAR) and 05 Clarification Request (CL) were raised and successfully closed. No FARs raised during the validation.

The validation is based on the VCS PD, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

As a result of the validation, the validation team confirms that:

- The project fulfils criteria of VCS Standard Version 4.4.
- The project is in line with all relevant VCS requirements.
- The project baseline is sufficiently justified in the PD.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of is 2,221,373 tCO_{2e} is most likely to be achieved within the 10 years of fixed crediting period.
- No restrictions or uncertainties were identified related to the validation.

Validated GHG emission reductions and removals in the above period:

Year	Estimated GHG emission reductions or removals (tCO _{2e})
Year 2022	23,340
Year 2023	160,369
Year 2024	273,525

Year 2025	254,886
Year 2026	219,224
Year 2027	197,267
Year 2028	241,799
Year 2029	281,862
Year 2030	254,886
Year 2031	219,224
Year 2032	94,991
Total estimated ERs	2,221,373
Total number of crediting years	10
Average annual ERs	222,137 (Rounded down)

APPENDIX 1: DOCUMENT REFERENCES

The following table lists the documentation that were reviewed during this validation of the project activity:

1.	- VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 1.0 dated 15/05/2022 (Listed) - VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 2.0 dated 31/03/2023 (Intermediate) - VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 3.0 dated 26/04/2023 (Intermediate) - VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 4.0 dated 02/05/2023 - VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 5.0 dated 18/08/2023 - VCS PD for “Kenya Jiko Kisasa Improved Cookstove Program I”, version 6.0 dated 04/10/2023 (Final)
2	Emission Reduction Calculation Excel sheet (ex-ante) corresponding to final VCS PD Fnrb spreadsheet corresponding to final version of final VCS PD
3	VCS: VCS Program Guide, version 4.3 dated 17/01/2023 VCS Program Definitions (v4.3, dated 21/12/2022) VCS Registration & Issuance Process (v4.3, dated 17/01/2023)
4	VCS: VCS Standard, version 4.4 dated 17/01/2023 VCS Validation and Verification Manual version 3.2 dated 19/10/2016
5	VCS approved methodology: VMR0006: “Methodology for Installation of High Efficiency Firewood Cookstoves”, Version 1.1 CDM approved methodology: Baseline and Monitoring Methodology “AMS-II.G”, “Energy efficiency measures in thermal applications of non-renewable biomass”, version 11 & version 13
6	UNFCCC: Guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities, Ver. 4.0 (EB86, Annex 4)
7	UNFCCC: Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 09.0

8	TOOL30: Calculation of the fraction of non-renewable biomass"; Version-03, EB 108, Annex 11 https://cdm.unfccc.int/Reference/tools/index.html
9	VERRA: Project search: https://registry.verra.org/app/search/VCS/All%20Projects CDM project standard for project activities, version 03.0 CDM validation and verification standard, version 03.0
10	VERRA: https://registry.verra.org/app/projectDetail/VCS/3197
11	VERRA Rules and Requirements: https://verra.org/programs/verified-carbon-standard/vcs-program-details/#rules-and-requirements
12	VCS: VCS Project Description template, VCS Version 4.2 of 21/12/2022
13	Carbon Waiver End-user Agreement to transfer the carbon emission reduction ownership rights from end-user to project implementer (sample)
14	Evidence of start date (Beneficiary Agreement with the first household)
15	Distribution agreement with the implementation partner
16	Baseline survey Report
17	Technical specifications (including thermal efficiency, lifetime) of the ICS stoves distributed in the project activity Test Report from KIRDI Stove Testing Centre dated 28th Jan 2022
18	Baseline Survey Forms
19	Fraction of Non-renewable Biomass Excel sheet, version 03
20	Project Installation Database/Sale Database
21	Declaration to comply with various requirements under VERRA Declaration form on avoidance of double counting of the project activity dated 10/03/2023
22	Supporting documents for the local stakeholder consultation (individual Invitations, photographs, attendance sheets etc.) Local Stakeholder Consultation report
23	Africa Energy Outlook 2019 https://www.iea.org/reports/africa-energy-outlook-2019
24	Ministry of Energy of the Republic of Kenya, National Energy Policy, October 2018

	https://kplc.co.ke/img/full/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20%202018.pdf
25	Ministry of environment and Forestry, National Climate Change Action Plan 2018-2022, Volume 3 : Mitigation Technical Analysis Report, 2018 https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/8737_vol3.pdf
26	Weblink for Kenya NDC https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kenya%20First/Kenya_NDC_20150723.pdf
27	Energy Use in Kenya https://journals.sagepub.com/doi/abs/10.1177/014459878900700205
28	IEA (International Energy Agency) report in 2019 https://www.iea.org/articles/kenya-energy-outlook
29	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion
30	Biomass Energy Use in Kenya https://iied.org/sites/default/files/pdfs/migrate/G02985.pdf
31	FAO Forest Resource Assessment, 2010 http://www.fao.org/docrep/013/i1757e/i1757e.pdf
32	Kenyan households wood or charcoal Consumption https://ambitiontoaction.net/wp-content/uploads/2021/07/A2A_Kenya_CleanCookingStudy_July2021.pdf#:~:text=Even%20th ough%20Kenya%20has%20made%20significant%20progress%20over,petroleum%20gas%20%28LPG%29%20as%20their%20primary%20cooking%20fuel.
33	IPCC. <i>Guidelines for national greenhouse gas inventories</i> . (IGES, 2006)
35	Global Forest Resources Assessment 2010 (FAO) <i>Global Forest Resources Assessment 2015</i> (FAO)

APPENDIX 2: ABBREVIATIONS

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
EB	Executive Board
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases
HH	House Holds
ICS	Improved Cookstoves
IPCC	Intergovernmental Panel for Climate Change
ISO	International Organization for Standardization
LE	Local Expert
LSC	Local Stakeholder Consultation
MP	Monitoring Period
MR	Monitoring Report
NDC	National Determined Contribution
PD	Project Description
PP	Project proponent
QA/QC	Quality Assurance/Quality Control
tCO ₂	Tonnes of Carbon Dioxide
TE	Technical Expert
TL	Team Leader
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVB	Validation & Verification Body
WBT	Water Boiling Test

APPENDIX 3: VALIDATION FINDINGS

CL from this validation

CL ID	01	Section no.	1.1	Date: 25/04/2023
Description of CL				
1. The header is missing in the submitted VCS PD, kindly check. The template shall be the recent one or not, it is not verifiable whether recent template is used by the PP or not. 2. The table used under section 1.1 is applicable only for the case of registration in other programme and/or the transfer. Since this is a greenfield project, the rationale of using the table is not sufficiently clear to VVB?				
Project participant response				Date: 26/04/2023
1. There was a format error before. The header has been added of Page one. The PD is consistent with the latest version (4.2) of template. 2. The table used under section 1.1 has been deleted.				
Documentation provided by project participant				
Revised VCS PD				
VVB assessment				Date: 28/04/2023
1. The formatting has been updated by the PP and validation team confirmed that the corrections are aligned with the latest template v 4.2 available on the VERRA website. Finding is closed now. 2. The table has been removed as the project is green field and explicitly seeking registration in VCS. Finding is closed now.				

CL ID	02	Section no.	1.8	Date: 25/04/2023
Description of CL				
The basis of start date is not mentioned in the section 1.8 of VCS PD, in other words why the date mentioned is selected as start date as per the VCS standard, version 4. Rationale shall be also part of VCS PD.				
Project participant response				Date: 26/04/2023
The start date is 21/06/2022, which is the date of distribution of the first improve cookstove. The basis has been added in the section 1.8 of VCS PD.				
Documentation provided by project participant				
Revised VCS PD				
VVB assessment				Date: 28/04/2023
The start date is 21/06/2022, which is the date of distribution of the first improve cookstove. The basis has been added in the section 1.8 of VCS PD and the evidence of the same has been furnished to validation team. Based on the review of the submitted database, beneficiary agreements, onsite assessment it has been concluded that the date constitutes the start date of the project as defined in the VCS programme.				
Finding is closed now.				

CL ID	03	Section no.	1.11	Date: 25/04/2023
Description of CL				
1. Section 1.11 indicates that “The type of ICS distributed in the project is Jiko Kisasa improved cookstove. According to independent stove efficiency tests performed by KIRDI Stove Testing Centre in Kenya on the Jiko Kisasa improved cookstove, the thermal efficiency is 27.2%. The report shall be submitted to VVB for the validation. 2. Other key technical specification of the ICS shall also be reported apart from the efficiency. 3. Also please note that the efficiency as per the WBT protocols and AMSIIG, is the average of hold and cold power efficiency, kindly clarify whether the efficiency indicates meets the requirements.				
Project participant response				Date: 26/04/2023

1. The report has been submitted as document “11_Technical Specification and Efficiency Test Report”, which is from page 2 to 9. Please refer to it.
2. Other key technical specification has been added.
3. The efficiency test used WBT 4.2.3 protocol, and the efficiency is the average of hot and cold power efficiency, please refer to the “Thermal Efficiency Test Report” mentioned above.

Documentation provided by project participant

WBT Test Report

Revised VCS PD

Technical Specifications

VVB assessment

Date: 28/04/2023

1. Jiko Kisasa stove has been tested for thermal efficiency of 27.2% according to WBT protocol 4.2.3. and certified by third party (KIRDI Stove Testing Centre). The efficiency test report provided to assessment team was reviewed and it was concluded that the efficiency test was conducted in accordance with the procedure stipulated in the applied methodology VMR0006, version 1.1. Finding is closed.

2. Key technical specifications are also part of the WBT testing report, the details has been incorporated in the updated VCS PD. Finding is closed.

3. The efficiency test used WBT 4.2.3 protocol, and the efficiency is the average of hot and cold power efficiency, has been considered and validated from the “Thermal Efficiency Test Report”.

Finding is closed now.

CL ID	04	Section no.	1.7	Date: 25/04/2023
Description of CL				
Evidence to establish the ownership rights as per the VCS standard 4 is mentioned as the carbon waiver agreements with the households. PP shall submit the sample evidence to VVB to verify the same for the distributed cook stoves.				
Project participant response				Date: 26/04/2023
The evidence has been submitted as document "13_ICs Donation and Carbon Transfer Agreement", please refer to it.				
Documentation provided by project participant				
ICS Donation and Carbon Transfer Agreement				
VVB assessment				Date: 28/04/2023
The beneficiary agreement has been furnished to the validation team and validated during the onsite assessment. The beneficiary agreement has clause for the carbon waiver, therefore fulfils the requirements of ownership as stipulated in VCS standard, version 4.				
Finding is closed now.				

CL ID	05	Section no.	5.1	Date: 25/04/2023
Description of CL				
η_p has been used a notation for the project ICS, the notation is not in accordance with the applied methodology. PP shall use the consistent notation/labelling of parameters as per the applied methodology. - The source of the value 27.2% has been mentioned as manufacturer specification, however in the other sections this value is based on the third part efficiency test. PP shall clarify the inconsistency. - PP has chosen a dropdown method as per the methodology for the project efficiency, therefore the description mentioned for the parameter is contradicting in table. The periodic WBT is not part of the monitoring therefore the description shall be consistent with the actual option. $B_{y=1,new,i,j,survey}$ has been assumed as 3.19 kg/device/day, equal to 1.16 tonnes/device/year,, the rationale of assumption shall be clarified.				
Project participant response				Date: 26/04/2023
η_p means efficiency of project stove at the start of project activity, which is in Page 15 of applied methodology VMR0006, the notation are the same. - The value 27.2% from Manufacturer's specification is sourced from Test Report by KIRDI Stove Testing Centre in Kenya using WBT test protocol 4.2.3. Hence the sources of efficiency are manufacturer's specification and Test Report, the PD has been modified. - We have chosen the dropdown method i.e. option v of the methods. The description has been modified, and other methods have been deleted from the table. - We have conducted a pilot test before the implementation of the project, the result is used here. The detail of the test please refer to document "19_Fuel Consumption Test Report".				
Documentation provided by project participant				
Revised VCS PD.				
VVB assessment				Date: 28/04/2023

1. The clarification is acceptable based on the notations provided for the cite parameter in the applied methodology, finding is closed now.
2. The efficiency test used WBT 4.2.3 protocol, and the efficiency is the average of hot and cold power efficiency, has been considered and validated from the “Thermal Efficiency Test Report”. The source has been provided to validation team and review reveals the application of WBT protocol 4.2.3 is adequately undertaken during the testing, all raw data are part of the submitted report to validation team. Finding is closed now.
3. The parameter description has been corrected for the project stoves efficiency in the updated VCS PD, finding is closed now.
4. PP responded that ex-ante estimation of the $By_{=1,new,i,survey}$ was based on the pilot fuel tests undertaken by the PP. The ex-ante value is only for the determination of ex-ante VERs and this will be monitored as per the methodology during the ex-post scenario.

The document “Fuel Consumption Test Report” has been submitted to the project validation team and validation team found it adequate for the ex-ante calculations based on it’s sector expertise. Since the actual value will be decided during verification and therefore section 5.3 has methodology for the monitoring of cited parameter applies in the ex-post scenario. The rationale has been provided and accepted to the validation team based on the pilot fuel consumption patterns. The evidence of the same has been shared with the validation team, based on the sector expertise, validation team concluded that it is reasonable and only used for the ex-ate calculations. In ex-post scenario, the parameter shall be monitored, finding is closed now.

Table 2. CAR from this validation

CAR ID	01	Section no.	1.12	Date: 25/04/2023
Description of CAR				
The section 1.12 of the submitted VCS PD does not include latitude/longitude both. You have indicated one value? Please also include the project specific area in the map, KML file shall also be submitted to VVB.				
Project participant response				Date: 26/04/2023
The latitude and longitude have been added. The project plans to distribute 100,000 ICSs to households in the whole country of Kenya, which is shown within the red line of the new map. The ICSs will be distributed to rural households who use traditional low thermal efficiency cookstoves. When distributing, the latitude and longitude of the village will be recorded. Since the project is neither a AFOLU nor a group project, providing KML map is not compulsory as per the latest version of VCS Standard.				

Documentation provided by project participant	
Revised VCS PD.	
VVB assessment	Date: 28/04/2023
The revised PD indicated the country specific geo coordinates, the finding is closed.	

CAR ID	02	Section no.	1.13	Date: 25/04/2023
Description of CAR				
Section 1.13 has been substantiated with a statement, this section shall be substantiated with the data source/reference etc. Refer the below VCS PD filling guideline to this section if the scenario is same as baseline: <i>Where the baseline scenario is the same as the conditions existing prior to the project initiation, there is no need to repeat the description of the scenarios (rather, just state that this is the case and refer the reader to Section 3.4 (Baseline Scenario)).</i>				
Project participant response				Date: 26/04/2023
The baseline scenario is the same as the conditions existing prior to the project initiation. Please refer to Section 3.4 of the PD for more information. The section 1,13 has been modified.				
Documentation provided by project participant				
Revised VCS PD.				
VVB assessment				Date: 28/04/2023
The PD filling guidelines lays down, “Where the baseline scenario is the same as the conditions existing prior to the project initiation, there is no need to repeat the description of the scenarios (rather, just state that this is the case and refer the reader to Section 3.4 (Baseline Scenario)). The PP has now complied the requirements as both scenarios are common. Finding is closed now.				

CAR ID	03	Section no.	1.14	Date: 25/04/2023
Description of CAR				

Section 1.14 is not supported with host country specific policies which governs the sector and how the project complies or not with that. Refer the below VCS PD filling guideline to this section: <i>Identify and demonstrate compliance of the project with all and any relevant local, regional and national laws, statutes and regulatory frameworks.).</i>	
Project participant response	Date: 26/04/2023
Added some related policies, i.e. Energy Act 2019 ¹³ of Kenya has no mention of cooking.	
Documentation provided by project participant	
Revised VCS PD.	
VVB assessment	Date: 28/04/2023
Energy Act 2019¹⁴ of Kenya has no mention of cooking is added in the revised VCS PD, however validation team has in addition to the policy referred by PP, undertaken detailed research and included in the main section of validation report. Finding is closed.	

CAR ID	04	Section no.	1.15.1	Date: 25/04/2023
Description of CAR				
The project has not been registered, nor is it seeking registration under any other GHG program, no supporting evidence has been furnished to VVB to confirm the statement provided by PP.				
Project participant response				Date: 26/04/2023
Please refer to the document “14_Statement _Kenya” submitted this time. The PP declares that the Project has not been registered, nor is it seeking registration under any other GHG program. And the Project has not been rejected by any other GHG program. The Project is not included in an emissions trading program or any other mechanism that includes GHG allowance trading.				
Documentation provided by project participant				
Revised VCS PD.				

¹³ <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/109334/135598/F1714620448/KEN109334.PDF>

¹⁴ <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/109334/135598/F1714620448/KEN109334.PDF>

VVB assessment	Date: 28/04/2023
The declaration covering with various requirements viz. double counting, ODA inter alia has been furnished to the validation team. The detailed validation of the same has been included in the main section of validation report. Finding is closed now.	

CAR ID	05	Section no.	1.17	Date: 25/04/2023
Description of CAR				
The SDG indicators to be monitored has not been specified in the VCS PD corresponding to the chosen SDGs.				
Project participant response				Date: 26/04/2023
The SDG indicators has been added in the VCS PD.				
Documentation provided by project participant				
Revised VCS PD.				
VVB assessment				Date: 28/04/2023
All chosen SDG goals are not linked with the corresponding SDG indicators, the revisions were assessed adequate by the validation team. Finding is closed now.				

CAR ID	06	Section no.	2.2	Date: 25/04/2023
Description of CAR				
1. What was the methodology for the LSC invitation, when and how the invitations sent is not part of the VCS PD. Whether sufficient time provided to the stakeholders. The information is missing in the section 2.2 of the VCS PD, PP shall adhere the requirements of VCS PD filling. 2. Whether this is part of ongoing feedback mechanism, same shall be part of section 2.2 as per the VCS standard, version 4. Please also provide the photographs, attendance sheet inter alia?				
Project participant response				Date: 26/04/2023
1. Various inviting methods were applied for the stakeholder consultation meeting. For the convenience of stakeholders, the invitations were in both English and Swahili. The invitation was sent to villagers through broadcast in villages to make sure everyone can understand. Some local people were invited by phone call. For local officers and entrepreneurs, invitation letters were				

sent to them as formal invitation. National government officials, local and international NGOs were invited by email. Iceberg and its local partners had already established contact with most of identified stakeholders when started preparing the project. They also communicated with stakeholders in person or by phone before they set the date so that as many as possible stakeholders could participate. The official invitations were sent out a few days before the consultation meeting started. The information has been added in section 2.2 of the VCS PD. 2. It is part of ongoing feedback mechanism, the opinions recorded in books of Way 2 above are delivered by them, so the problems can be solved in time. And they are bridge of communication between end users and JCI. For attendance sheet of LSC please refer to document "8_Attendance Forms of LSC" we submitted last time, and photographs please refer to document "17_Photo of opinion book" and " 18_Photos of LSC" submitted this time.	
Documentation provided by project participant	
Revised VCS PD.	
VVB assessment	Date: 28/04/2023
1. The revised VCS PD includes the detailed methodology of the LSC process undertaken, the revisions were found meeting the reporting requirements of VCS standard and VCS PD filling guidelines. Finding is closed now. 2. Feedbacks are recorded in books of Way 2 provided to users and they are bridge of communication between end users and Jumbo Capital (Project partner). The adequate revisions are made in the revised VCS PD to include the continuous ongoing mechanism. Finding is closed now.	

CAR ID	07	Section no.	2.4	Date: 25/04/2023
Description of CAR				
The link and duration of the comment period for the VCS project is missing in the section 2.4, refer the VCS PD filling guidelines.				
Project participant response				Date: 26/04/2023
The link and duration of the comment period for the VCS project has been added in section 2.4. Changed to "This project was open for public comment from 21/09/2022 to 21/10/2022 ¹⁵ . There are no comments received during the public comment period".				
Documentation provided by project participant				

¹⁵ <https://registry.verra.org/app/projectDetail/VCS/3197>

Revised VCS PD.	
VVB assessment	Date: 28/04/2023
Section 2.4 has been updated and the link of public consultation period has been incorporated, validation team reviewed the link and found that no comments received during the public consultation. Finding is closed now.	

CAR ID	08	Section no.	3.2	Date: 25/04/2023
Description of CAR				
1. For the applicability criteria 4 for the use of non-renewable biomass since 1989 till date is not substantiated with the reference. How the argument provided therein substantiates the use of NRB since 1989 till date. 2. The applicability criteria 5 is pertaining to the use of briquettes, VVB has validated during the onsite assessment that project ICS are using the firewood not the briquettes. 3. Section 3.4 indicates the baseline survey, however the duration of survey, sample size, achieved confidence/precession inter alia is not reported.				
Project participant response				Date: 26/04/2023
1. We replaced the argument with other published literature and official reports to make it clear. Change to "A literature published in 1989 showed that firewood was the principal cooking and heating fuels in rural area of Kenya, which caused dramatically increasing environmental damage like deforestation, soil erosion¹⁶. Biomass Energy Use in Kenya ¹⁷, IEA(International Energy Agency) report in 2019 ¹⁸, and baseline survey conducted by project proponent before the implementation of the project, demonstrate that non-renewable biomass has been used since 31 December 1989 till date in Kenya". 2. According to baseline survey, households use firewood for thermal needs. The use of briquettes, wood chips is an assumption here. The actual fuel used by project stove will be monitored during the crediting period, and if it could not meet the applicability criterion No.5 of the applied methodology, the emission reduction of the stove will be excluded from the project. 3. The duration of survey, sample size, achieved confidence/precession has been added in section 3.4 of VCS PD. The baseline survey was conducted from 25/05/2022 to 06/06/2022 among 120 households from 6 villages. We used multi-stage sampling to select samples for the baseline survey. We randomly selected 6 villages, and the randomly selected 20 households from each village. 90/10 confidence/precession applied in methodology VMR0006 were applied. Since the usage of traditional cookstoves and firewood were found 100%, therefore the desired 90/10 confidence/precision was adequately met. The sampling process please refer to document "16_Randomly select 6 villages".				
Documentation provided by project participant				
Revised VCS PD.				
VVB assessment				Date: 28/04/2023

¹⁶ <https://journals.sagepub.com/doi/abs/10.1177/014459878900700205>

¹⁷ <https://iied.org/sites/default/files/pdfs/migrate/G02985.pdf>

¹⁸ <https://www.iea.org/articles/kenya-energy-outlook>

1. The revisions are made in the updated VCS PD to justify the applicability criteria, the revisions were found adequate by the validation team. Finding is closed now.
2. According to baseline survey report submitted to validation team, households use firewood for thermal needs. PP clarified that the use of briquettes, wood chips is an assumption and actual fuel used by project stove will be monitored during the crediting period, and if it could not meet the applicability criterion No.5 of the applied methodology, the emission reduction of the stove will be excluded from the project. The argument is accepted as no such case of identified during the onsite assessment. Finding is closed now.
3. The duration of survey, sample size, achieved confidence/precision has been added in section 3.4 of VCS PD. The baseline survey was conducted from 25/05/2022 to 06/06/2022 among 120 households from 6 villages. PP used multi-stage sampling to select samples for the baseline survey. We randomly selected 6 villages, and the randomly selected 20 households from each village. 90/10 confidence/precision applied in methodology VMR0006 were applied. Since the usage of traditional cookstoves and firewood were found 100%, therefore the desired 90/10 confidence/precision was adequately met. The sampling process please refer to document "16_Randomly select 6 villages".

The survey methodology is part of the updated VCS PD and validation team confirmed that the samples were correct, and representative.

Finding is closed now.

CAR ID	09	Section no.	4.2 ,4.4 & 5.1	Date: 25/04/2023
Description of CAR				
1. The justification given in section 4.2 for the exclusion of project emission is contradictory to the information provided in applicability criteria that briquette shall also be part of it. The information is inconsistent within the document. 2. Equation 3 & 4 for the computation of baseline saving is being given in the section 4.4 of the VCS PD, the methodology has the only one option. The use of both equations is therefore in accordance with the applied methodology VMR0006. 3. Baseline emission, Project Emission and Leakage shall be separately reported in table under section 4.4, even the value is 0. 4. η_{old} under the ex-ante parameter has the default value 0.1. & 0.2, the rationale of 0.2 shall be explained as this value is applicable for charcoal baseline stove. VVB didn't find any charcoal baseline stove in the submitted baseline survey report. 5. The fnrb sheet doesn't include the requirement of para 6 (b) of tool, which requires a comparison of calculated value with the publicly available information at-least one of the referred literature therein?				
Project participant response				Date: 26/04/2023
1. The use of briquettes, wood chips is an assumption. The actual fuel used by project stove will be monitored during the crediting period, and if it could not meet the applicability criterion No.5 of the applied methodology, the emission reduction of the stove will be excluded from the project. 2. We chose equation 4. The information is indicated above equation 5. 3. As states in Section 8.1 Baseline Emissions and Section 8.2 Project Emissions of VMR0006, "Methodology AMS-II.G does not account for baseline/project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non- renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. This revision follows the same convention". So we could not know the BE and PE separately. 4. It is just listed for different conditions to choose different default value. For this project, it is not applicable. We added the reason of choosing default value after the table of outcome of baseline survey. 5. I made a mistake, the version of tool30 applied should be 3.0 because it is supposed to be submitted before 5th of May.				
Documentation provided by project participant				
Revised VCS PD.				
VVB assessment				Date: 28/04/2023
1. The justification accepted as the fuel consumption will be monitored, finding is closed.				

2. The application of the applied baseline equation has been included in the revised VCS PD, finding is closed.

3. The explanation is accepted as it has no material impact on the outcome of ERs, finding is closed.

4. The revisions for the baseline stove efficiency have been made and the 01. has been chosen with the support of baseline survey results. The same was also validated by the validation team during the onsite assessment. Finding is closed now.

5. The version of Tool 30 has been updated as version 3, validation team confirms that the version 3 is valid till May 05th 2023.

Finding is closed.

CAR ID	10	Section no.	5.3	Date: 25/04/2023						
Description of CAR										
PP has used the sampling provisions of methodology for the baseline fuel consumption rather than the project fuel survey. The sampling reported is therefore not in compliance with the CDM Guidelines/standard. The PP shall adhere the methodological requirements.										
Project participant response				Date: 26/04/2023						
<i>It was a mistake. The sampling method has been modified according to sampling requirements in context of AMSIIG as the VMR006 is extended version of AMSIIG. The section 5.3 of the PD has been modified as follows.</i>										
<i>The sampling requirements of methodology are:</i>										
<table><tr><td><i>Parameter</i></td><td><i>Measurement procedures</i></td></tr><tr><td><i>N_{y,i,j}</i></td><td><i>Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch</i></td></tr><tr><td><i>B_{y=1,new,i,survey}</i></td><td><i>Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied:</i> <i>Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass. Only the quantity of biomass used by the project device will be accounted in project caused emission reductions.</i></td></tr></table>					<i>Parameter</i>	<i>Measurement procedures</i>	<i>N_{y,i,j}</i>	<i>Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch</i>	<i>B_{y=1,new,i,survey}</i>	<i>Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied:</i> <i>Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass. Only the quantity of biomass used by the project device will be accounted in project caused emission reductions.</i>
<i>Parameter</i>	<i>Measurement procedures</i>									
<i>N_{y,i,j}</i>	<i>Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch</i>									
<i>B_{y=1,new,i,survey}</i>	<i>Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied:</i> <i>Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass. Only the quantity of biomass used by the project device will be accounted in project caused emission reductions.</i>									
According to “Standard sampling and surveys for CDM project activities and POAs (Ver9.0)” and “Guideline for sampling and surveys for CDM project and POA_(Ver 4.0)”, multi-stage sampling will be										

used. The sample size will be decided by the actual distribution quantity of ICSs then. The equations are shown below:

$$c \geq \frac{\frac{SD_B^2}{\bar{p}^2} \times \frac{M}{M-1} + \frac{1}{u} \times \frac{SD_w^2}{\bar{p}^2} \times \frac{(\bar{N}-u)}{(\bar{N}-1)}}{\frac{0.1^2}{1.645^2} + \frac{1}{M-1} \frac{SD_B^2}{\bar{p}^2}}$$

Where:

C	=	Number of groups that should be sampled
M	=	Total number of groups in the population
u	=	Number of units to be sampled within each group
N	=	Average units per group
SD_B^2	=	Unit variance (variance between villages)
SD_w^2	=	Average of the group variances (average within village variation)
p	=	Overall proportion
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

And

$$c \geq \frac{\left(\frac{SD_B}{Clustermean} \right)^2 \times \left(\frac{M}{M-1} \right) + \left(\frac{1}{u} \right) \times \left(\frac{SD_w}{Overallmean} \right)^2 \left(\frac{\bar{N}-u}{\bar{N}-1} \right)}{\left(\frac{0.1}{1.645} \right)^2 + \frac{1}{M-1} \left(\frac{SD_B}{Clustermean} \right)^2}$$

Where:

C	=	Number of groups that should be sampled
M	=	Total number of groups in the population
u	=	Number of units to be sampled within each group
N	=	Average units per group
SD_B^2	=	Unit variance (variance between villages)

SD_w^2	=	Average of the group variances (average within village variation)
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision
Documentation provided by project participant		
Revised VCS PD.		
VVB assessment		Date: 28/04/2023
The multi stage sampling has been adequately incorporated in the revised version of VCS PD, the sampling approach is one of the accepted sampling methods in the CDM Guideline for Sampling & Surveys, version 4. PP has incorporated the detailed methodology of sampling for the chosen monitored parameters and the correspondence equations therein. Finding is closed now.		

Table 3.FAR from this validation

No FAR raised during this validation.

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

APPENDIX 4: TEAM COMPETENCE

<u>Certificate of Competence</u>						
Name	☒ Mr. ☐ Ms.	Sanjay Kandari				
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.					
Appointed to work as:						
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert
Appointed	Yes	Yes	Yes	Yes	Yes	No
Appointed Date	25-03-2023					
Authorized to work as Technical Expert for:						
Authorized Technical Area	Sectoral Scope		TA Code	Technical Area within the scope		
	Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation		
	Energy industries (renewable - / non-renewable sources)		1.2	Renewables		
	Energy distribution		2.1	Energy distribution		
	Energy demand		3.1	Energy demand		
	Waste handling and disposal		13.1	Solid waste and wastewater		
	Waste handling and disposal		13.2	Manure		
Authorized to work as Local Expert for:						
Country/Countries	India					
Compliance check by: Anand S. R.						

<u>Certificate of Competence</u>						
Name	☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal				
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.					
Appointed to work as:						
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert
Appointed	Yes	Yes	Yes	Yes	Yes	No
Appointed Date	27-04-2021					
Authorized to work as Technical Expert for:						
Authorized Technical Area	Sectoral Scope		TA Code	Technical Area within the scope		
	Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation		
	Energy industries (renewable - / non-renewable sources)		1.2	Renewables		

	Energy demand	3.1	Energy demand
	Construction	6.1	Construction
	Waste handling and disposal	13.1	Solid waste and wastewater
	Waste handling and disposal	13.2	Manure
	Agriculture	15.1	Agriculture
<i>Authorized to work as Local Expert for:</i>			
<i>Country/Countries</i>	India and Sri Lanka		
<i>Compliance check by:</i> Anand S. R.			