



**Verified Carbon
Standard**

BIO-LITE AFRICA IMPROVED STOVE PROGRAM



Document Prepared by



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1 PROJECT DETAILS

1.1 Summary Description of the Project

The goal of the proposed project is to distribute improved cookstoves (“ICS”) in the households/small and medium-sized enterprises (SMEs) in Sub-Saharan Africa, with the initial host countries being Rwanda, Malawi, Nigeria, Mali, Madagascar, *Senegal*, *Côte d’Ivoire*, Democratic Republic of the Congo, Zambia and Uganda (with a possibility of expansion to other countries e.g., Mozambique, Cameroon, Somalia/Somaliland, Tanzania, Ethiopia, Kenya, Sierra Leone, Liberia, Togo, Burundi, Ghana, Benin, Burkina, Guinea, Guinea-Bissau, Zimbabwe and Namibia in Sub-Saharan Africa in future).

BioLite, the coordinating/managing entity (CME) will coordinate the proposed grouped project. CME will establish a framework for distribution of efficient cook stoves through on-ground networks and will provide guidance documents to project implementers for successful implementation of project activity (ies).

Local partners will be trained to manufacture the stove as per specifications communicated by CME/PI. Project Implementer will be responsible for ensuring that end user information is captured at the point of installation, to facilitate the monitoring of stoves over the project crediting period. The CME will provide guidance document for stakeholder engagement for positive influence on the user behaviour to discontinue usage of traditional biomass stoves in favour of Improved cook stoves.

The project ICS combusts biomass fuels (wood/ charcoal) efficiently, reducing the greenhouse gas (GHG) emissions and particulate emissions (PM), thus improving the indoor air quality in project households/SMEs. Due to the higher thermal efficiency of the ICS relative to the traditional/baseline stoves, the ICS reduces the amount of non-renewable biomass fuel required for meeting similar thermal energy needs in the baseline.

Traditional cooking methods prevalent across Africa today, result in greenhouse gas (GHG) emissions due to inefficient combustion of fuel. The use of unsustainably sourced, non-renewable biomass (NRB) in host countries is a major driver of deforestation. Widespread usage of NRB for cooking reduces the ability of forests in the host country to sequester carbon, thereby increasing net GHG emissions. Furthermore, the use of solid biomass fuels (e.g., wood & charcoal) in inefficient traditional stoves and on open fires – whilst meeting domestic household and community level needs - releases large amounts of particulate matter (PM) into the local environment, creating toxic levels of indoor air pollution (IAP). IAP – generated largely by inefficient and poorly ventilated stoves burning biomass fuels such as wood, crop waste, and dung, or coal – is responsible for the deaths of an estimated 1.6 million people annually. More than half of these deaths occur among children under five years of age. In developing countries with high mortality rates overall, indoor air pollution ranks fourth in terms of the risk factors that contribute to disease and death (World Health Organization)¹.

The project location is the geographical boundaries of the countries in the Sub-Saharan Africa with the initial project activity (ies) Rwanda, Malawi, Nigeria, Mali, Madagascar, *Senegal*, *Côte d’Ivoire*, Democratic Republic of the Congo, Zambia and Uganda mentioned in section 1.12.

¹ <https://www.who.int/heli/risks/indoorair/indoorair/en/>

The ICS will substitute the currently common cooking on open fire. The ICS burns wood more efficiently thereby improving thermal transfer to pots, hence saving fuel and lowering greenhouse gas emissions.

The baseline scenario is the continued use of non-renewable wood fuel by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity. In the absence of this project activity, households would cook primarily using traditional inefficient stoves, perpetuating environmental and health degradation.

The project intends to access carbon finance to mitigate one of the main barriers (price) for end users towards adopting clean cookstoves.

Project Activity #	Host Country	Duration of Crediting Period	Estimated Average Annual Emissions (tCO ₂ e)	Total Estimated Emissions over the Crediting Period (tCO ₂ e)
PA-1	Rwanda	01/06/2022 - 31/04/2029	4,00,624	2,804,370
PA-2	Malawi		1,47,280	1,030,958
PA-3	Nigeria		92,867	650,066
PA-4	Mali		88,807	621,652
PA-5	Madagascar		68,883	482,181
PA-6	Senegal		46,476	325,334
PA-7	Ivory Coast		87,884	615,186
PA-8	DRC		74,766	523,359
PA-9	Zambia		47,245	330,715
PA-10	Uganda		47,239	330,674

1.2 Sectoral Scope and Project Type

Mandatory Sectoral Scope: 03 – Energy Demand

Conditional Sectoral Scope: Not Applicable

Project Type: Energy Efficiency Project

The project is a grouped project. All project activity (ies) under the grouped project shall have the aforesaid scope and project type.

1.3 Project Eligibility

Grouped Project and Project Activity (ies)

- The Six Kyoto Protocol greenhouse gases:** The grouped project is applicable to this scope, as project involves emission reduction comes from Kyoto greenhouse gases such as CO₂, CH₄ and N₂O in the baseline.
- Ozone-depleting substances:** NA. This grouped project does not involve ODSs.
- Project activities supported by a methodology approved under the VCS program through the methodology approval process:** This grouped project uses a methodology VMR006 ver. 1.1 which is approved under the VCS program through the methodology approval process.
- Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded:** NA. This grouped project does not use a methodology approved under an approved GHG program.

- 5. Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements:** NA. This grouped project does not involve REDD+.

Additionally, the grouped project is not listed in table 1, section 2.1.1 of the VCS standard version 4.3, given it involves installation of improved cooking stoves (ICS) in *Rwanda, Uganda, Malawi, Côte d'Ivoire, Senegal, Mali, Madagascar, Nigeria, Democratic Republic of the Congo, and Zambia*

Compliance with other general requirements is as described below:

Reference to VCS Standard version 4.3	Requirement	Justification
3.1.1	Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.1.	The grouped project meets all applicable rules and requirements as set out under the VCS Program and is guided by the ISO 14064-2:2006 clause 3.
3.1.2	Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.13.1.	The grouped project applies VCS approved methodology VMR0006, version 1.1 which is an approved VCS methodology along with tools or modules as applicable. Refer section 3 of the PD below for more details. This has been made an eligibility criterion for inclusion of project activity into the grouped project.
3.1.3	Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.	The grouped project shall remain in compliance with the applicable local laws. This has been made an eligibility criterion for inclusion of project activity into the grouped project.
3.1.4	Where projects apply methodologies that permit the project proponent its own choice of model, such model shall meet with the requirements set out in the VCS Program document VCS Methodology Requirements and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or removals).	Not applicable. The applied methodology VMR0006 version 1.1. does not provide any such option.
3.1.5	Where projects apply methodologies that permit the project proponent its own choice of third-party default factor or standard to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality, such default factor or standard shall meet with the requirements set out in the VCS	Not applicable. The applied methodology VMR0006 version 1.1. does not provide any such choice.

	Program document VCS Methodology Requirements.	
3.1.6	Projects shall preferentially apply methodologies that use performance methods where a methodology is applicable to the project that uses a performance method for determining both additionality and the crediting baseline (i.e., a project shall not apply a methodology that uses a project method where such a performance method is applicable to the project). Methodologies approved under the VCS Program that use performance methods provide a list of similar methodologies that use project methods (that were approved under the VCS Program or an approved GHG program at the time the performance method was developed). Such lists are not necessarily exhaustive but can serve as the starting point for determining whether a performance method is applicable to the project. Following the approval of a methodology that uses a performance method, projects may use any applicable pre-existing methodology that uses a project method for a six-month grace period.	Not applicable. The applied methodology VMR0006 version 1.1. does not provide the performance method for determining baseline or additionality.
3.1.7	Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.	Not applicable, the methodology does not conflict with any VCS program requirements.
3.1.8	Where projects apply methodologies from approved GHG programs, they shall comply with any specified capacity limits (see the VCS Program document Program Definitions for definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools referenced by the methodology under those programs).	VMR0006 version 1.1. is equally applicable on projects and large projects.
3.1.9	Where Verra issues new requirements relating to projects, registered projects do not need to adhere to the new requirements for the remainder of their project crediting periods (i.e., such projects remain eligible to issue VCUs through to the end of their project crediting period without revalidation against the new requirements). The new requirements shall be adhered to at project crediting period renewal, as set out in Section 3.8.9.	The grouped project will adhere to the new guidelines on renewal of crediting period as per section 3.8.9 of the VCS standard version 4.3.

1.4 Project Design

- ☐ The project includes a single location or installation only
- ☐ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☒ *The project is a grouped project*

The proposed grouped project involves distribution of ICS in Rwanda, Malawi, Nigeria, Mali, Madagascar, Senegal, Côte d'Ivoire, Democratic Republic of the Congo, Zambia and Uganda (with a possibility of expansion to other countries e.g., Mozambique, Cameroon, Somalia/Somaliland, Tanzania, Ethiopia, Kenya, Sierra Leone, Liberia, Togo, Burundi, Ghana, Benin, Burkina, Guinea, Guinea-Bissau, Zimbabwe and Namibia in Sub-Saharan Africa in future). All PA shall remain limited to the geographical boundary of Sub-Saharan Africa.

Eligibility Criteria

The project is a grouped project and following are the eligibility criteria for inclusion of new project activity instances into a project activity under the grouped project activity under the grouped project as per para 3.5.15 and 3.5.16 of VCS standard version 4.3:

No.	Eligibility Criterion	Description/ condition	Required	Means of Verification / Supporting evidence for inclusion
1	Applicability Conditions	The project activity shall meet applicability conditions for methodology (VMR 0006 version 1.1) as defined in section 3.2.		PA shall demonstrate compliance with VMR 0006 version 1.1 in the PD or Joint PD MR, as applicable. MoV: PD/ Joint PD MR section 3.2 justifying the applicability criteria of applied methodology.
2	Geographical Area	The project activity instance shall be located within the physical / geographical boundary of the grouped project i.e., Sub-Saharan Africa.		All ICS implemented / distributed in a PAI shall be within the Geographic boundary of Grouped Project. MoV: ICS installation database showing ICS location to be limited in the corresponding host country.
3	Baseline Scenario	The project activity shall have the baseline as usage of non-renewable fuel (wood/charcoal) or fossil fuel (Coal/kerosene) to meet equivalent thermal energy needs.		PA shall capture the baseline fuel of project ICS beneficiaries to show that the baseline fuel is either use of non-renewable biomass or fossil fuel. MoV: ICS installation database / user registration records showing baseline fuel for ICS distributed.
4	Technology type	The project activity shall involve distribution of ICS devices with more than 25% rated efficiency		Only ICS having more than 25% rated thermal efficiency shall be allowed to register in the project activity. MoV: Manufacturer specifications / Manufacturer Certificate / laboratory testing WBT certificates for ICS

5	Additionality	The project activity shall demonstrate additionality as per the following: Step 1: Regulatory Surplus and either of Step 2: Positive list Or Step 3: Project Method	The PA shall be demonstrated as additional via the following: 1. Demonstrate that the PA is not mandated by any law, statute, or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory framework. 2. PA installs or distributes stoves at zero cost to the end-user and/or has no other source of revenue other than the sale of GHG credits as confirmed by the PP. Or 3. Where ICS are not provided at zero cost / free to the end-user or has source of revenues other than the sale of GHG credits, demonstrate that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible using investment analysis.
6	Start Date	The project activity shall start on or after the start date of the Grouped Project.	The start date of grouped project is considered as 01/06/2022 which is also the start date of PA-1. The start date of all other PAs to be included in the grouped project shall be after this date. MoV: ● Distribution record / user agreement showing the date of distribution for the first ICS under PA.
7	Crediting Period	The project activity shall have a renewable crediting period.	Refer PAI PD / Joint PD and MR section 1.9
8	Double Counting	The project activity shall confirm that: 1. It is not registered as a project activity in any other mechanism. 2. The project activity is not leaving any other program to join the Grouped Project.	MoV: Declaration by the Project Owner / Project Developer
9	Project Ownership	The ownership of the PA shall be clearly demonstrated by virtue of the following:	MoV: End user agreement for ICS under the PA Or

		● End user agreements transferring the ownership of credits from the use of project ICS to the CME/PP. Or ● Disclaimer on the product packaging/warranty card assigning the rights of ownership of credits to the PP directly	Product packaging/ warranty card template
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The following table demonstrates how the PA-1 to PA-10 being included in the grouped project activity fulfills the above-mentioned eligibility conditions:

No.	Eligibility Criterion	Means of Verification / Supporting evidence for inclusion	Justification
1	Applicability Conditions	PA shall demonstrate compliance with VMR 0006 version 1.1 in the PD or Joint PD MR, as applicable. MoV: PD/ Joint PD MR section 3.2 justifying the applicability criteria of applied methodology.	The Initial Project activity (ies) PA-1 to PA-10 meet all applicability conditions for methodology (VMR 0006 version 1.1) as defined in section 3.2 below.
2	Geographical Area	All ICS implemented / distributed in a PA shall be within the Geographic boundary of Grouped Project. MoV: ICS installation database showing ICS location to be in corresponding country	All ICS envisaged to be distributed under PA-1 to PA-10 will be in the respective host countries of the project activity and within the Geographic boundary of Grouped project . The ICS installation database shall be checked at the time of verification for all ICS to be within the boundary of the respective country to which the PA belongs.
3	Baseline Scenario	PA shall capture the baseline fuel of project ICS beneficiaries to show that the baseline fuel is either use of non-renewable biomass or fossil fuel. MoV: ICS installation database / user registration records showing baseline fuel for ICS distributed.	The ICS installation database shall be checked at the time of verification for all the baseline fuel of the project ICS.
4	Technology type	Only ICS having more than 25% rated thermal efficiency shall be allowed to register in a PoA.	The Project Activity (ies) involves distribution of ICS (Dura - wood fuel) with rated efficiency of 38.1 % and ICS (Jiko Fresh, Mama Yao and JikoMalkia - Charcoal) with rated

		MoV: Manufacturer specifications / Manufacturer Certificate / laboratory testing WBT certificates for ICS	efficiencies of 45.7%, 55.1% and 50.07% respectively. Manufacturer specifications / Manufacturer Certificate / laboratory testing WBT certificates for ICS distributed under PA-1 to PA-10. In case additional models are included under these PAs in future, they shall be evaluated at the time of verification to ensure that their design rated thermal efficiency is >25%.
5	Additionality	The PA shall be demonstrated as additional via the following: 1. Demonstrate that the PA is not mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. 2. PA installs or distributes stoves at zero cost to the end-user and/or has no other source of revenue other than the sale of GHG credits as confirmed by the PP. Or 3. Where ICS are not provided at zero cost / free to the end-user or has source of revenues other than the sale of GHG credits, demonstrate that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible using investment analysis.	As per section 7 of VMR 0006 version 1.1: 1. There are no laws and regulations governing the use of improved cookstoves in PA countries households. The project is a voluntary effort by the project proponent. 2. Under the proposed grouped project, PA-1 to PA-10 will distribute ICSs at a subsidized price to the end users. Although some revenue will be generated from the distribution of ICS, it is relatively small compared to the total cost to CME for delivering ICS to a beneficiary (including product cost, distribution and logistics cost, data collection cost etc.). Thus, the PA-1 to PA-10 are not financially viable without the support of carbon revenues from sale of VCUs, and are additional.
6	Start Date	The start date of grouped project is considered as 01/06/2022 which is also the start date of (the date of distribution of first ICS). The start date of all other PAs to be included in the grouped project shall be after this date. MoV: ● Distribution record / user agreement showing the date of distribution for the first ICS under the instance.	The PA-1 has started on 01/06/2022 (the date of distribution of first ICS). The Distribution record / user agreement for the first ICS under PA-1 substantiates the same.

7	Crediting Period	Refer PA PD / Joint PD and MR section 1.9	The crediting period for the PA-1 to 10 is renewable (7 years, renewable twice). Refer section 1.9 below
8	Double Counting	MoV: Declaration by the Project Owner / Project Developer	The Declaration by the Project Owner / Project Developer is submitted to the validation team
9	Project Ownership	MoV: End user agreement for ICS under the PA Or Product packaging/ warranty card template	Refer end user agreement template / warranty card template / product packaging for condition/statement that transfers the rights to ownership of credits to Biolite.

1.5 Project Proponent

Organization name	BioLite
Contact person	Erik Wurster
Title	VP, Environmental Markets and Sustainability
Address	65 Jay Street, Floor 4, Brooklyn, NY 11201, USA
Telephone	+1.347.529.5720
Email	erik@bioliteenergy.com

1.6 Other Entities Involved in the Project

Organization name	Climate Secure
Role in the project	Entity Completing the Project Description
Contact person	Rohit Lohia
Title	Director
Address	P.O. Box 515000, Sharjah Media City, Sharjah, UAE
Telephone	+91 9717093552
Email	rohit.lohia@climate-secure.com

1.7 Ownership

For each PAI, the ownership of the instance shall be clearly demonstrated by virtue of the following:

Declaration / agreement with end users transferring the ownership rights of the carbon credits generated from the project ICS to the project proponent.

Thus, all VCU's generated from the grouped project instances shall be owned by **BioLite**, unless otherwise stated.

1.8 Project Start Date

Grouped Project and PA-1 to PA-10

01 June 2022 (Date for installation of 1st ICS under the Grouped project as well as the PA-1).

1.9 Project Crediting Period

Grouped Project and PA-1 to PA-10

Grouped Project and Project Activity (ies) Crediting Period start date: 01 June 2022

Crediting Period end date: 31 May 2029

Crediting Period Duration: 21 years (7 Years, Renewable twice)

The date of first ICS distribution under the first project activity (PA-1) shall mark the start date of crediting period for the grouped project.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emission reductions/removals of the project are:

- ☐ <20,000 tCO₂e/year
- ☐ 20,000 – 100,000 tCO₂e/year
- ☐ 100,001 – 1,000,000 tCO₂e/year
- ☒ >1,000,000 tCO₂e/year

Project Scale	
Project	
Large project	X

Project Activity 1 (Rwanda):

The estimated annual GHG emission reductions/removals for the project activity (PA-1) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	18,396
Year 2	1,08,862
Year 3	2,56,472
Year 4	3,99,969
Year 5	5,39,414
Year 6	6,74,867
Year 7	8,06,390
Total estimated ERs	28,04,370
Total number of crediting years	7
Average annual ERs	4,00,624

Project Activity 2 (Malawi):

The estimated annual GHG emission reductions/removals for the project activity (PA-2) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	0
Year 2	30,040
Year 3	88,891
Year 4	1,46,122
Year 5	2,01,756
Year 6	2,55,818
Year 7	3,08,331
Total estimated ERs	10,30,958
Total number of crediting years	7
Average annual ERs	1,47,280

Project Activity 3 (Nigeria):

The estimated annual GHG emission reductions/removals for the project activity (PA-3) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	10,486
Year 2	31,042
Year 3	57,857
Year 4	90,666
Year 5	1,22,585
Year 6	1,53,626

Year 7	1,83,804
Total estimated ERs	6,50,066
Total number of crediting years	7
Average annual ERs	92,867

Project Activity 4 (Mali):

The estimated annual GHG emission reductions/removals for the project activity (PA-4) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	10,048
Year 2	29,733
Year 3	55,390
Year 4	86,758
Year 5	1,17,244
Year 6	1,46,860
Year 7	1,75,619
Total estimated ERs	6,21,652
Total number of crediting years	7
Average annual ERs	88,807

Project Activity 5 (Madagascar):

The estimated annual GHG emission reductions/removals for the project activity (PA-5) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	7,809
Year 2	23,096
Year 3	43,007
Year 4	67,333
Year 5	90,952
Year 6	1,13,874
Year 7	1,36,110
Total estimated ERs	4,82,181
Total number of crediting years	7
Average annual ERs	68,883

Project Activity 6 (Senegal):

The estimated annual GHG emission reductions/removals for the project activity (PAI-6) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	5,363
Year 2	15,800
Year 3	29,302
Year 4	45,684
Year 5	61,446
Year 6	76,596
Year 7	91,143
Total estimated ERs	3,25,334
Total number of crediting years	7
Average annual ERs	46,476

Project Activity 7 (Ivory Coast):

The estimated annual GHG emission reductions/removals for the project activity (PA-7) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	9,942
Year 2	29,420
Year 3	54,810
Year 4	85,853
Year 5	1,16,023
Year 6	1,45,336
Year 7	1,73,802
Total estimated ERs	6,15,186
Total number of crediting years	7
Average annual ERs	87,884

Project Activity 8 (DRC)

The estimated annual GHG emission reductions/removals for the project activity (PA-8) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	8,489
Year 2	25,100
Year 3	46,722
Year 4	73,121

Year 5	98,731
Year 6	1,23,564
Year 7	1,47,632
Total estimated ERs	5,23,359
Total number of crediting years	7
Average annual ERs	74,766

Project Activity 9 (Zambia):

The estimated annual GHG emission reductions/removals for the project activity (PA-9) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	0
Year 2	9,683
Year 3	28,615
Year 4	46,972
Year 5	64,764
Year 6	81,998
Year 7	98,683
Total estimated ERs	3,30,715
Total number of crediting years	7
Average annual ERs	47,245

Project Activity 10 (Uganda):

The estimated annual GHG emission reductions/removals for the project activity (PA-10) are summarized in the following table:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	0
Year 2	10,367
Year 3	25,558
Year 4	45,365
Year 5	64,613
Year 6	83,309
Year 7	1,01,462
Total estimated ERs	3,30,674
Total number of crediting years	7
Average annual ERs	47,239

1.11 Description of the Project Activity

The purpose of this Grouped project is to disseminate energy-efficient improved cookstoves (ICS) to replace existing traditional Cookstoves in domestic households and communities in Rwanda, Malawi, Nigeria, Mali, Madagascar, *Senegal*, *Côte d'Ivoire*, Democratic Republic of the Congo, Zambia and Uganda with a possibility of expansion to other Sub-Saharan African countries in future.

At present, following project activity (ies) are in the grouped project as follows:

Project Activity 1: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Rwanda.

Project Activity 2: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Malawi.

Project Activity 3: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Nigeria.

Project Activity 4: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Mali.

Project Activity 5: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Madagascar.

Project Activity 6: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Senegal.

Project Activity 7: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Côte d'Ivoire.

Project Activity 8: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Democratic Republic of the Congo.

Project Activity 9: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Democratic Republic of the Zambia.

Project Activity 10: Dissemination of energy-efficient improved cookstoves (ICS) in domestic households and communities of Uganda.

Despite efforts to increase global access to clean cooking, the Tracking SDG 7: Energy Progress Report 2022, Chapter-2² points to 2.4 billion people still without access to clean cooking as of 2020. Further, as per the same report, marginal increase in access to clean cooking has been observed **in Sub-Saharan Africa**, with an annualized increase of 0.48 percent, it remains the **only region** in which the number of people without access to clean fuels and technologies is **rising**.

More than 93% of the rural population lacks access to clean cooking fuels and technologies, compared with 71% of the population living in urban areas. The number of people without access to clean cooking in Sub-Saharan Africa is set to increase by almost 20 million every year this decade, rising from 923 million in 2020 to over 1.1 billion in 2030, as **small gains in the percentage of people with clean cooking fail to keep pace with population growth**. *The access deficit has nearly doubled since 1990, rising more than 50 percent since 2000, to reach 923 million (898–946) people in 2020.*

Further, as per the same report, the top 20 countries with the largest populations lacking access to clean cooking fuel and technologies accounted for 82% of the global population

² <https://trackingsdg7.esmap.org/downloads>

without access between 2016 and 2020. The Democratic Republic of Congo, Madagascar, Uganda is listed among those twenty countries in which 5 percent or less of the population had the access to clean cooking. **Uganda, Rwanda, Malawi, Mali, Madagascar, Democratic Republic of Congo** are among the twenty countries that have recorded the lowest *annualized increase in access to clean cooking*.

Thus, traditional cooking methods are prevalent across the host countries. The use of the traditional inefficient biomass stoves is a significant driver of deforestation. Widespread usage of unsustainably sourced, non-renewable biomass (NRB) for cooking results in equivalent GHG emissions attributed to use of non-renewable biomass.

Additionally, the use of solid biomass fuels (e.g., wood) in inefficient traditional stoves and/or open three stone fires release large amounts of particulate matter (PM), creating hazardous levels of indoor air pollution (IAP). IAP generated by inefficient and poorly ventilated stoves burning biomass fuels is responsible for the deaths of an estimated 3.2 million people annually. Almost half of these deaths occur among children under five years of age. Exposure is high among women and children, who spend the most time near the domestic hearth. Reliance on polluting fuels and technologies also requires significant time for cooking on an inefficient device and gathering and preparing fuel. In developing countries with high mortality rates overall, indoor air pollution ranks fourth in terms of the risk factors that contribute to disease and death (World Health Organization)³.

The ICS disseminated under the project are designed to improve fuel combustion and heat transfer. It results in the reduction of fuel consumption and improvement in levels of Indoor air pollution for project users (reducing smoke, black soot and particulate matter (PM)). The reduction in consumption of cooking fuel also reduces greenhouse gas (GHG) emissions attributed to the use of non-renewable biomass.

In the absence of this project activity project households would cook primarily using traditional inefficient stoves, perpetuating environmental and health degradation.

The project intends to access carbon finance to mitigate one of the main barriers (price) for end users towards adopting clean cookstoves.

Technology/Measure

The ICS disseminated under the project is designed to improve fuel combustion and heat transfer. It results in the reduction of fuel consumption and improvement in levels of Indoor air pollution for project users (reducing smoke, black soot, and particulate matter (PM)). The reduction in consumption of cooking fuel also reduces greenhouse gas (GHG) emissions attributed to the use of non-renewable biomass.

The PA-1 to PA-10 includes dissemination of Dura, Jiko Fresh, Mama Yao, JikoMalkia ICS⁴. Specification of these example ICS ⁵ is given below:

³ <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>

⁴ Stoves are sold based on potential customer demands and preferences. Other models may be included in the PA subsequently, provided they meet the methodological / eligibility requirement for inclusion in the grouped project.

⁵ These ICS may be distributed with or without pot-skirt depending upon PP discretion in future.

Stove Model	Dura (Firewood ICS)	Jiko Fresh (Charcoal ICS)	Mama Yao (Charcoal ICS)	JikoMalkia (Charcoal ICS)
Photo				
Thermal Efficiency	38.1%	45.7%	55.1%	50.07%
Estimated Life ⁶	7 Years	7 Years	7 Years	7 Years
Weight	6.5 kg	6 kg	5.8 kg	5.3 kg
Dimensions	27.5x27.5x30cm	27.5x27.5x22.5 cm	29x29x26.5cm	40x21x8.8cm
Fixed/Portable	Portable	Portable	Portable	Portable
Grate/Chimney	Grate	Grate	Grate	Grate

In the absence of this project activity, households would cook primarily using traditional inefficient stoves, perpetuating environmental and health degradation.

The project intends to access carbon finance to mitigate one of the main barriers (price) for end users towards adopting clean cookstoves.

1.12 Project Location

The proposed group project is going to be implemented in Rwanda, Malawi, Nigeria, Mali, Madagascar, Senegal, Côte d'Ivoire, Democratic Republic of the Congo, Zambia and Uganda (with a possibility of expansion to other countries e.g., Mozambique, Cameroon, Somalia/Somaliland, Tanzania, Ethiopia, Kenya, Sierra Leone, Liberia, Togo, Burundi, Ghana, Benin, Burkina, Guinea, Guinea-Bissau, Zimbabwe and Namibia in Sub-Saharan Africa in future).

All PA shall remain limited to the geographical boundary of Sub-Saharan Africa.

⁶ In case of estimated life of project devices is less than the crediting period (7 years renewable twice), then either these devices will be replaced after the end of their expected lifetime span or otherwise, emission reductions will be claimed only till the end-of-life span of the project devices.

PA-1:
Host Country: Rwanda

Region/State/Province etc.: All regions of Rwanda

City/Town/Community etc.: All cities and towns in Rwanda

Physical/Geographical location:

Project Location ⁷	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Rwanda	01°03' S	02°51' S	30°53' E	28°52' E

The map of Rwanda, for reference purpose, is as follows:



Figure 1: Map of Rwanda

PA-2:
Host Country: Malawi

Region/State/Province etc.: All regions of Malawi

City/Town/Community etc.: All cities and towns in Malawi

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Malawi	09°22' S	17°07' S	35°55' E	32°40' E

The map of Malawi, for reference purpose, is as follows:

⁷ <https://worldpopulationreview.com/>

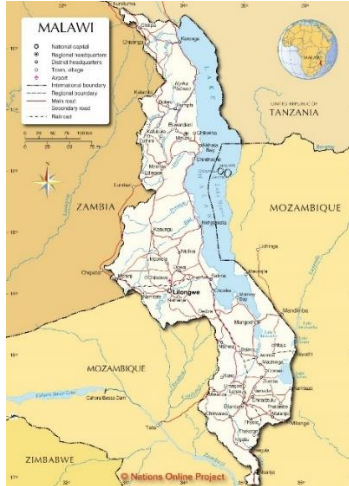


Figure 2: Map of Malawi

PA-3:

Host Country: Nigeria

Region/State/Province etc.: All regions of Nigeria

City/Town/Community etc.: All cities and towns in Nigeria

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Nigeria	13°53' N	4°16' N	14°40' E	2°42' E

The map of Nigeria, for reference purpose, is as follows:



Figure 3: Map of Nigeria

PA-4:
Host Country: Mali

Region/State/Province etc.: All regions of Mali

City/Town/Community etc.: All cities and towns in Mali

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Mali	25°00' N	10°09' N	4°00' E	12°00' W

The map of Mali, for reference purpose, is as follows:



Figure 4: Map of Mali

PA-5:
Host Country: Madagascar

Region/State/Province etc.: All regions of Madagascar

City/Town/Community etc.: All cities and towns in Madagascar

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Madagascar	11°57' S	25°37' S	50°40' E	43°30' E

The map of Madagascar, for reference purpose, is as follows:



Figure 5: Map of Madagascar

PA-6:

Host Country: Senegal

Region/State/Province etc.: All regions of Senegal

City/Town/Community etc.: All cities and towns in Senegal

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Senegal	16°41' N	12°18' N	11°22' W	17°27' W

The map of Senegal, for reference purpose, is as follows:



Figure 6: Map of Senegal

PA-7:
Host Country: Côte d'Ivoire

Region/State/Province etc.: All regions of Côte d'Ivoire

City/Town/Community etc.: All cities and towns in Côte d'Ivoire

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Côte d'Ivoire	10°44' N	4°21' N	2°29' W	8°36' W

The map of Côte d'Ivoire, for reference purpose, is as follows:



Figure 7: Map of Côte d'Ivoire

PA-8:
Host Country: Democratic Republic of Congo

Region/State/Province etc.: All regions of Democratic Republic of Congo

City/Town/Community etc.: All cities and towns in Democratic Republic of Congo

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Democratic Republic of Congo	5°23' N	13°27' S	30°56' E	12°12' E

The map of Democratic Republic of Congo, for reference purpose, is as follows:

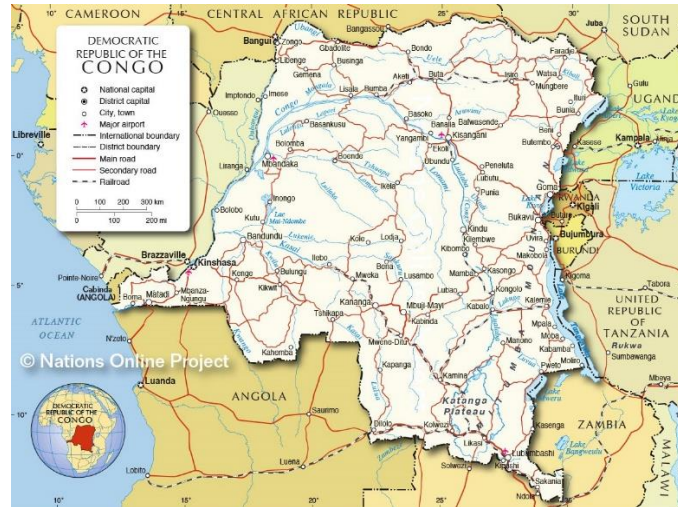


Figure 8: Map of Democratic Republic of Congo

PA-9:

Host Country: Zambia

Region/State/Province etc.: All regions of Zambia

City/Town/Community etc.: All cities and towns in Zambia

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Zambia	08°14' S	18°05' S	32°50' E	22°00' E

The map of Zambia, for reference purpose, is as follows:



Figure 9: Map of Zambia

PA-10:

Host Country: Uganda

Region/State/Province etc.: All regions of Uganda

City/Town/Community etc.: All cities and towns in Uganda

Physical/Geographical location:

Project Location	Geodetic Coordinates (Northernmost Point)	Geodetic Coordinates (Southernmost Point)	Geodetic Coordinates (Easternmost Point)	Geodetic Coordinates (Westernmost Point)
Uganda	04° 14' N	01° 29' S	35° 02' E	29° 34' E

The map of Uganda, for reference purpose, is as follows:



Figure 10: Map of Uganda

1.13 Conditions Prior to Project Initiation

The conditions prior to project initiation are the continued use of non-renewable biomass in traditional/inefficient baseline stoves by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Grouped Project-

There are no laws and regulations governing the use of improved cookstoves in the households of host countries involved under Grouped project.

PA-1 to PA-10:

There are no laws and regulations governing the use of improved cookstoves in the host countries of each Project Activity.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

Grouped Project

Every additional project activity to be added to this Grouped Project is required to demonstrate whether the project has been registered, or is seeking registration, under any other greenhouse gas programme. Where the project activity instance has been registered under any other greenhouse gas programme, the registration number and details will be provided.

PA-1 to PA-10:

The project activity 1 to 10 have not been registered, nor seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The grouped project and project activity have not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

Does the project reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading?

☐ Yes☒ No

1.16.2 Other Forms of Environmental Credit

Has the project sought or received another form of GHG-related credit, including renewable energy certificates?

☐ Yes☒ No

Supply Chain (Scope 3) Emissions

This is not applicable, as scope 3 emissions are already accounted in leakage emissions.

Have the owner(s) or retailer(s) of the impacted goods and services⁸ posted a public statement saying, “VCUs may be issued for the greenhouse gas emission reductions and removals associated with [organization name(s)] [name of good or service]” since the project’s start date?

☒ Yes ☐ No

Has the project proponent posted a public statement saying, “VCUs may be issued for the greenhouse gas emission reductions and removals associated with [name of good or service][describe the region or location, including organization name(s), where practicable].”

☒ Yes ☐ No

Have the producer(s) or retailer(s) of the impacted good or service been notified of the project and the potential risk of Scope 3 emissions double claiming via email?

☒ Yes ☐ No

Yes, this has been already informed to all the stakeholders involved (including end-users, distributors, retailers etc.) by end-user agreement and signed declaration between PP and distributor.

1.17 Sustainable Development Contributions

Each country under grouped project is one of the United Nations member states that have committed to achieve Sustainable Development Goals. The project contributes to social, environmental, and economic benefits which contribute to sustainable development of the local environment and the country.

The project contributions to the relevant SDGs are discussed below:

SDG	Project Contributions - Justification	Relevant SDG Target	SDG Impact Indicator
1 - No Poverty	Economic Sustainability: Household expenditures on purchased cooking fuel will be reduced with the use of the ICS as it shall reduce the fuel consumption by virtue of its increased efficiency. Thus, project ICS shall result in money savings in	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and	1.4.1 Proportion of population living in households with access to basic services. Indicator: Average household savings due to decrease in expenditure on basic services such as purchased fuel after shifting to project technology.

⁸ Impacted goods and services are all goods and services directly impacted by the technologies and measures specified as project activities in the project description. Please see the VCS Program document *VCS Program Definitions* for additional information.

	beneficiary households.	financial services, including microfinance	
3 - Good Health and Well Being	Social Sustainability: The emission of indoor pollutants from inefficient burning of solid biomass fuels in the beneficiary households will be reduced. The project ICS shall aid improved combustion of fuel thereby reducing smoke and Particulate matter (PM) emissions.	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	3.9.1 - Mortality rate attributed to household and ambient air pollution. Indicator: % users reporting reduction in smoke/PM after shifting to ICS in project.
5 - Gender Equality	Social Sustainability: The project ICS shall save time in cooking activities (by faster cooking) as well as save time in fuel procurement (reduced collection time or reduced purchase trips to market) due to reduced fuel consumption. This shall free the women involved in these activities (unpaid work) and utilize the same in more productive and income generating tasks.	5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.	5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location. Indicator: The average time saving associated with cooking and fuel collection time due to adoption of project technology / measures.
7 - Affordable and Clean Energy	Social, Economic Sustainability: The project involves installation and dissemination of clean, modern technology for cooking. The project ICS shall be made available free of cost to beneficiary households.	7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services.	7.1.2 Proportion of population with primary reliance on clean fuels and technology. Indicator: Number of Beneficiaries under the project i.e., Number of ICS distributed under the project.
7 - Affordable and Clean Energy	Social, Economic Sustainability: The project involves installation and dissemination of clean, modern technology for cooking. The project ICS shall be made available free of cost to beneficiary households.	7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services.	7.1.2 Proportion of population with primary reliance on clean fuels and technology. Indicator: % Users reporting operational project stove.

8 - Decent Work and Economic Growth	Economic Sustainability: The project will create local employment opportunities in operational and management roles, as well as in manufacturing, distribution and logistics.	8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.	8.5.1 Average hourly earnings of employees, by sex, age, occupation, and persons with disabilities Indicator: Number of male / female numbers of employment created by project.
13 - Climate Action	Environmental Sustainability: The project will help significantly reduce greenhouse gas emissions over its lifetime.	13.2 Integrate climate change measures into national policies, strategies, and planning.	13.2.2 Total greenhouse gas emissions per year Indicator: Amount of CO ₂ e emissions avoided or sequestered.
15 - Life on Land	Environmental Sustainability: The project will help reduce the use of non-renewable biomass from forests, thus assist in conserving existing forest stock and the protection of natural forest ecosystems and wildlife habitats.	15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.	15.2.1 Progress towards sustainable forest management. Indicator: Total non-renewable wood fuel saved after shifting to project device.

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable, as the project adopts a net gross adjustment factor of 95% to account for leakage.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

Not applicable

2 SAFEGUARDS

2.1 No Net Harm

No potential negative socio-economic impacts are generated by the grouped projects. Some of the Mitigation measures for social and environmental impacts are listed in the table below:

Requirement Description	Relevance (Yes/Potentially/No)	How the Project will Achieve Requirements	Mitigation Measures (if required)
1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights	Yes	The Grouped Project/PA and PP both respect human rights and are not complicit in violence or human rights abuses.	Not Applicable
2. The Project shall not discriminate with regards to participation and inclusion	Yes	The Grouped Project/PA does not discriminate with regards to participation and inclusion	Not Applicable
2. Gender Equity			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women a. Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking. b. Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls. c. Restriction of women's rights or access to resources (natural or economic). d. Recognise women's ownership rights regardless of marital	Yes	1. The primary beneficiaries of the Grouped project/PA, include domestic households, where women usually serve as primary cook. Thus, ICSs shall contribute towards Gender equality by freeing the women from the drudgery of fuel collection and cooking. The time saved in these activities would also help them to conduct other more productive /income generation activities. This would further contribute towards Gender Equality.	Not Applicable

status – adopt project measures where possible to support to women’s access to inherit and own land, homes, and other assets or natural resources. 2. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work a. Where appropriate for the implementation of the grouped project/PA, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities. b. Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. c. Ensure that these conditions do not limit the access of women or men, as the case may be, to Grouped Project/PA participation and benefits. 3. The Project shall refer to the country’s national gender strategy or equivalent national commitment to aid in assessing gender risks		2. PP does not discriminate on the basis on gender and promotes equal work for equal pay. PP (BioLite) further confirms that the average wages / remunerations paid to the employees working with BioLite is at / above par with the industry standards and in compliance with the minimum wage rate prescribed by the state / local government regulations. 3. The project complies with National Women Development & Gender Policy and does not limit women access to or control of resources, entitlements, and benefits. On the contrary, the PA ameliorates the living condition of women by freeing them from the burden of biomass fuel collection, decreasing smoke levels and incidence of respiratory illness relative to cooking on traditional biomass stoves using solid biomass fuel. 4. Not Required	
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4. (Where required) Summary of opinions and recommendations of an Expert Stakeholder(s)			
3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	Yes	The Grouped Project/PA reduces exposure to indoor air pollutants and smoke levels, further reducing incidence of respiratory illness compared to cooking on traditional biomass stoves using solid biomass fuel.	
4.1 Sites of Cultural and Historical Heritage			
1. Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional, or religious values or intangible forms of culture?	No, the ICSs are installed in the kitchen of beneficiary households. The ICSs do not interfere with any sites, structures, or objects with historical, cultural, artistic, traditional, or religious values or intangible forms of culture	Requirements do not apply	Not Applicable
4.2 Forced Eviction and Displacement			
1. Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No, the project ICS are installed in the kitchens of the household and hence any possibilities of forced eviction/physical relocation of people due to the project is not applicable. The PP collaborates with the local entrepreneurs for fabrication as well as installation of project ICS thereby empowering them economically rather than relocation / threat.	Requirements do not apply	Not Applicable
4.3 Land Tenure and Other Rights			
1. Does the Project require any change, or have any uncertainties related to	No, refer justification for 4.1,4.2 above.	Requirements do not apply	Not Applicable

land tenure arrangements and/or access rights, usage rights or land ownership?			
2. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership?			
4.4 Native People			
1. Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	No, the project does not involve any land/territory claim. The ICS are installed in the project beneficiary households at their discretion.	Requirements do not apply	Not Applicable
5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	Yes	The PP does not promote / or is complicit in direct or indirect corruption.	Not Applicable
6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions 2. Workers shall be able to establish and join labour organisations 3. Working agreements with all individual workers shall be documented and implemented and include: a. Working hours (must not exceed 48 hours per week on a regular basis), AND b. Duties and tasks, AND c. Remuneration (must include provision for payment of overtime), AND		1. The Grouped Project/PA does not involve any forced labour and the PP ensures that all employment is in compliance with local labour regulations and laws. 2. The PP puts no constraints / limitations on employees to form a union. 3. The CME/PI's policies and employment contracts are compliant with the requirement 4. The PP does not promote / or is complicit in child labour	

d. Modalities on health insurance, AND e. Modalities on termination of the contract with provision for voluntary resignation by employee, AND f. Provision for annual leave of not less than 10 days per year, not including sick and casual leave.		5. No, Major occupational hazards are envisaged during the operation of the project activity.	
4. No child labour is allowed (Exceptions for children working on their families' property requires an <u>Expert Stakeholder</u> opinion)			
5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures			
6.2 Negative Economic Outcomes			
1. Does the project cause negative economic consequences during and after project implementation?	No, the project will rather contribute to money and time saving because of the reduced fuel consumption. Therefore, the economic outcomes are expected to be positive.	Requirements do not apply	Not Applicable
7.1 Emissions			
1. Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No, the project shall reduce GHG emission by virtue of the increased efficiency of the ICS.	Requirements do not apply	Not Applicable
7.2 Energy Resource			
1. Will the Project use energy from a local grid or power supply (i.e., not connected to a national	No, the project does not use or intervene with the fuel type used in baseline	Requirements do not apply	Not Applicable

or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	scenario. In fact, the project minimizes the consumption and thereby reduces the emission by virtue of the increased efficiency of the ICS.		
8.1 Impact on Natural Water Patterns/Flows			
1. Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No, the by-products (ash and smoke) of the project cookstoves operation are same as baseline scenario since there is no fuel change. This rule out any additional potential impact on natural or pre-existing pattern of watercourses, groundwater and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	Requirements do not apply	Not Applicable
8.2 Erosion and/or Water Body Instability			
1. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? 2. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	No, The Grouped Project/PA shall result in reduction in demand of biomass fuel in the region putting less pressure on forests for deforestation and will hence indirectly avoid erosion associated with tree cutting/felling.	Requirements do not apply	Not Applicable
9.1 Landscape Modification and Soil			
1. Does the Project involve the use of land and soil for production of crops or other products?	No, project ICSs shall be installed in the kitchen/cooking area of the beneficiary.	Requirements do not apply	Not Applicable
9.2 Vulnerability to Natural Disaster			
1. Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides,	No such consequences are envisaged.	Requirements do not apply	Not Applicable

erosion, flooding, drought, or other extreme climatic conditions?			
9.3 Genetic Resources			
1. Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	No, the project intervenes only with design of the baseline stoves. It does not carry out any change in baseline fuel or that may add additional pollutant to in the air.	Requirements do not apply	Not Applicable
9.4 Release of pollutants			
1. Could the Project potentially result in the release of pollutants to the environment?	No, the project intervenes only with design of the baseline stoves. It does not carry out any change in baseline fuel or that may add additional pollutant to in the air.	Requirements do not apply	Not Applicable
9.5 Hazardous and Non-hazardous Waste			
1. Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	No, the Project does not involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	Requirements do not apply	Not Applicable
9.6 Pesticides & Fertilisers			
1. Will the Project involve the application of pesticides and/or fertilisers?	No, the Project does not involve the application of pesticides and/or fertilisers	Requirements do not apply	Not Applicable
9.7 Harvesting of Forests			
1. Will the Project involve the harvesting of forests?	No, The Grouped Project/PA does not involve harvesting of forests. The Project shall result in reduction in demand of biomass fuel in the region putting less pressure on forests for deforestation and	Requirements do not apply	Not Applicable

	will hence indirectly avoid erosion associated with tree cutting/ felling.		
9.8 Food			
1. Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No, the project does not intervene with the baseline food or other edible items.	Requirements do not apply	Not Applicable
9.9 Animal Raising			
1. Will the Project involve animal husbandry?	No, the project will not involve animal husbandry	Requirements do not apply	Not Applicable
9.10 High Conservation Value Areas and Critical Habitation			
1. Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No, the ICS are going to decrease the baseline emission level solely due to improvements done on the key design element of the baseline stove. It does not involve change in baseline fuel or any other major interventions that may add additional pollutant to in the air. Thus, the project does not affect or alter the largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.	Requirements do not apply	Not Applicable
Requirement 9.11 Threatened Species			
Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? and/or Does the Project potentially impact other areas where	No, the ICS are going to decrease the baseline emission level solely due to improvements done on the key design element of the baseline stove. It does not involve change in baseline fuel or does any other major	Requirements do not apply	Not Applicable

endangered species may be present through transboundary effects?	interventions that may add additional pollutant to in the air. Therefore, the project implementation does not pose any threat to the endangered species prevalent in that area.		
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2.2 Local Stakeholder Consultation

The local stakeholder consultation (LSC) for PA-1 to PA-10 were conducted batchwise from 22/08/2022 to 10/11/2022 as follows:

S. No.	E mail Invitations sent Date	Date on which LSC was concluded	Batch	Country (ies)
1	08/08/2022	22/08/2022	Batch 1	Uganda, Rwanda, Malawi, and Zambia
2	24/08/2022	05/09/2022	Batch 2	Nigeria
3	25/08/2022	06/09/2022	Batch 3	Democratic Republic of Congo
4	09/10/2022	21/10/2022	Batch 4	Madagascar
5	09/10/2022	10/11/2022	Batch 5	Senegal, Mali, Côte d'Ivoire

The meeting had the presence of all categories of stakeholders targeted, with the sessions being quite productive and engaging. The representatives of BioLite and Climate Secure were also present to address any questions/queries from the participating stakeholders.

During the meeting, important aspects of the proposed project activity(ies) were discussed including technology/measure, baseline, grievance mechanism, SDG benefits, transfer of ownership of credits etc. Stakeholder feedback were collected via question and answer session during the consultation as well as a feedback form designed specifically to collect stakeholder opinion and rating on various aspects of the grouped project and respective PA. In general, the participating stakeholders were appreciative of the initiative taken by BioLite and welcomed the project.

2.3 Environmental Impact

No negative environmental impacts have been identified from the project and environmental impact assessment (EIA) is not required for the project.

2.4 Public Comments

This shall be updated after closure of the public consultation period .

2.5 AFOLU-Specific Safeguards

This section is not applicable as the project is a non-AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Grouped Project and Project Activity (ies)

VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1 dated 22 July 2021,

<https://verra.org/wp-content/uploads/2021/07/VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf>

Project Activity 1 to 10-

For calculation of fraction of non-renewable biomass, the below tool is used “TOOL30: Calculation of the fraction of non-renewable biomass” Version 3.0- and third-party reports on assessment of fraction of non-renewable biomass has been used.

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v3.0.pdf>

3.2 Applicability of Methodology

The applicability of VMR006 methodology is justified as below:

Applicability criterion	Project Activity Applicability
Project activities shall be implemented in domestic premises, or in community-based kitchens	The proposed grouped project involves deployment of ICS in domestic households and communities of Sub-Saharan Africa, with the initial host countries being Rwanda, Malawi, Nigeria, Mali, Madagascar, Senegal, Côte d'Ivoire, Democratic Republic of the Congo, Zambia and Uganda (with a possibility of expansion to other countries e.g., Mozambique, Cameroon, Somalia/Somaliland, Tanzania, Ethiopia, Kenya, Sierra Leone, Liberia, Togo, Burundi, Ghana, Benin, Burkina, Guinea, Guinea-Bissau, Zimbabwe and Namibia in Sub-Saharan Africa in future). The PA-1 to PA-10 comprises distribution of ICS in domestic households and communities of the respective host countries of the project activity and within the <i>Geographic boundary of Grouped project</i>.

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;	The rated efficiencies of ICS planned to be distributed under the grouped project are more than 25%. The same has been developed as an eligibility criterion (#4) for inclusion of project activity instances in the grouped project.
Both 'Projects' and 'Large Projects' can use this methodology	The proposed grouped project is a large-scale project as the annual emission reduction is more than 300,000 tonnes of CO ₂ e per year which is in line with the section 3.9.1 of VCS standard ver 4.3.
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	Non-renewable biomass has been used since 31-December 1989 in the targeted countries. Same is demonstrated below on 43-46.
For the specific case of biomass residues processed as a fuel (e.g., briquettes, wood chips), it shall be demonstrated that: 1. It is produced using exclusively renewable biomass (more than one type of biomass may be used). 2. The consumption of the fuel should be monitored during the crediting period and 3. 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	In case, processed biomass residues are used in the grouped project, the following will be ensured: 1. It is renewable biomass 2. Its consumption will be monitored 3. If renewable biomass processing (e.g., shredding and compacting in the case of briquetting) occurs in project case, the energy consumption for manufacturing and transportation of renewable biomass fuel (briquettes) will be monitored to calculate project emissions.
The VCS PD 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).	The ICS installation database will have the following provisions to confirm complete avoidance of double counting: 1. Unique serial number of ICS distributed 2. End users' details (End username, address, and/or telephone number (if available))
The VCS PD 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.	At the time of ICS distribution, each ICS beneficiary transfers the rights of credit ownership to PP via an agreement or disclaimed via clear statement on the product packing or warranty card thereby avoiding any subsequent double claim on ownership of credits by other entities

Evidence that the non-renewable biomass has been in use since 1989- Non-renewable biomass has been in use since 31 December 1989 as evidenced by various FAO statistical data given below:

PA-1: Rwanda

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA 2020 categories ⁹	Area (1000 hectares)			
	1990	2000	2010	2020
Forest	317.00	287.00	265.00	276.00
Other wooded land	261.00	261.00	261.00	261.00
Other land	1,889.00	1,919.00	1,941.00	1,930.00
Total Land	2,467.00	2,467.00	2,467.00	2,467.00

Rwanda lost an average of 1,366 hectares of forest per year with average annual deforestation rate of 0.43% between 1990 and 2020. In total, Rwanda lost 12.93% of its forest or 41,000 hectares

PA-2: Malawi

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁰ 2020	Area (1000 hectares)			
	1990	2000	2010	2020
Forest	3,501.70	3,081.70	2,661.70	2,241.70
Other wooded land	0.00	0.00	0.00	0.00
Other land	5,926.30	6,346.30	6,766.30	7,186.30
Total Land	9,428.00	9,428.00	9,428.00	9,428.00

According to latest data, the forest annual forest loss in Malawi is estimated at 1.20%, which correspond to approximately 42,000 hectares.

PA-3: Nigeria

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹¹ 2020	Area (1000 hectares)			
	1990	2000	2010	2020
Forest	26,526.09	24,893.04	23,259.98	21,626.95
Other wooded land	0.00	0.00	0.00	0.00
Other land	64,550.91	66,183.96	67,817.02	69,450.05
Total Land	91,077.00	91,077.00	91,077.00	91,077.00

Nigeria lost an average of 163,304 hectares of forest per year with average annual deforestation rate of 0.61% between 1990 and 2020. In total, Nigeria lost 18.46% of its forest or 4,899,120 hectares.

PA-4: Mali

As per Global Forest Watch (database by World Resources Institute), From 2001 to 2021, Mali lost 3.79kha of relative tree cover, equivalent to a 15% decrease since 2000 and < 0.1% of the global total¹².

PA-5: Madagascar

⁹ <https://www.fao.org/3/ca9878fr/ca9878fr.pdf>

¹⁰ <https://www.fao.org/3/cb0032en/cb0032en.pdf>

¹¹ <https://www.fao.org/3/cb0037en/cb0037en.pdf>

¹² [Global Forest Watch - Mali](#)

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹³	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		13,693.45	13,030.67	12,561.98	12,429.81
Other wooded land		21,148.00	18,453.00	15,688.00	13,244.00
Other land		23,338.55	26,696.33	23,930.02	32,506.19
Total Land		58,180.00	58,180.00	58,180.00	58,180.00

Madagascar lost an average of 42,122 hectares of forest per year with average annual deforestation rate of 0.30% between 1990 and 2020. In total, Madagascar lost 9.22% of its forest or 1,263,640 hectares.

PA-6: Senegal

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁴	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		9,303.16	8,853.16	8,468.16	8,068.16
Other wooded land		5,531.83	5,531.83	5,232.06	5,072.06
Other land		4,418.01	5,048.01	5,552.78	6,112.78
Total Land		19,253.00	19,253.00	19,253.00	19,253.00

From 1990 to 2020, Senegal lost 40,000 ha of forests annually, which corresponds to annual loss of 0.43% in the forest area.

PA-7: Côte d'Ivoire

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁵	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		7,850.86	5,094.45	3,955.58	2,836.71
Other wooded land		2,675.00	2,662.00	2,590.00	2,518.00
Other land		21,274.14	2,4043.55	2,5244.42	2,6445.29
Total Land		31,800.00	31,800.00	31,800.00	31,800.00

From 1990 to 2020, Côte d'Ivoire lost 167.13 kha of forests annually, which corresponds to annual loss of 2.12% in the forest area.

PA-8: Democratic Republic of the Congo

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁶	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		150,629.00	143,899.00	137,169.00	126,155.24

¹³ <https://www.fao.org/3/cb0139fr/cb0139fr.pdf>

¹⁴ <https://www.fao.org/3/cb0152fr/cb0152fr.pdf>

¹⁵ <https://www.fao.org/3/cb0126fr/cb0126fr.pdf>

¹⁶ <https://www.fao.org/3/cb0125fr/cb0125fr.pdf>

Other wooded land	11,512.00	11,512.00	11,512.00	11,512.00
Other land	64,564.00	71,294.00	78,024.00	89,037.76
Total Land	226,705.00	226,705.00	226,705.00	226,705.00

Democratic Republic of the Congo lost an average of 815,792 hectares of forest per year with average annual deforestation rate of 0.54% between 1990 and 2020. In total, Democratic Republic of the Congo lost 16.24% of its forest or 24,473,760 hectares.

PA-9: Zambia

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁷	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		47,412.00	47,054.00	46,696.00	44,814.03
Other wooded land		13,219.00	13,219.00	13,219.00	13,219.00
Other land		13,708.00	14,066.00	14,424.00	16,305.97
Total Land		74,339.00	74,339.00	74,339.00	74,339.00

Zambia lost an average of 86,599 hectares of forest per year with average annual deforestation rate of 0.18% between 1990 and 2020. In total, Zambia lost 5.48% of its forest or 2,597,970 hectares.

PA-10: Uganda

The Global Forest Resources Assessment 2020 (FRA) indicates that forest areas declined yearly between 1990 to 2020.

FRA categories ¹⁸	2020	Area (1000 hectares)			
		1990	2000	2010	2020
Forest		3,575.47	3,162.95	2,750.42	2,337.90
Other wooded land		3,393.88	3,400.82	3,719.91	3,234.32
Other land		13,082.65	13,488.23	13,581.67	14,479.78
Total Land		20,052.00	20,052.00	20,052.00	20,052.00

Uganda lost an average of 41,252 hectares of forest per year with average annual deforestation rate of 1.154% between 1990 and 2020. In total, Uganda lost 34.61% of its forest or 1,237,470 hectares

This substantiates that non- renewable biomass has been in use in **targeted countries since 1989.**

The applicability of tool 30 is justified as below:

Applicability criterion	Project Activity Applicability
This tool may be used by: a) DNAs to submit region/country-specific default fNRB values, following the procedures for development, revision, clarification, and update of standardized baselines (SB procedures); or	This tool is used by the project participants to calculate a project specific value for fNRB under option (b) of applicability condition 1.

¹⁷ <https://www.fao.org/3/cb0092en/cb0092en.pdf>

¹⁸ <https://www.fao.org/3/cb0084en/cb0084en.pdf>

b) project participants to calculate project or PoA-specific fNRB values.	
For project or PoA specific fNRB values, project participants shall assess the area where biomass is sourced for end-users included in the project activity and justify the selection of the area in project design documents.	The area for the calculated value is selected within the geographical boundary of Grouped Project.

3.3 Project Boundary

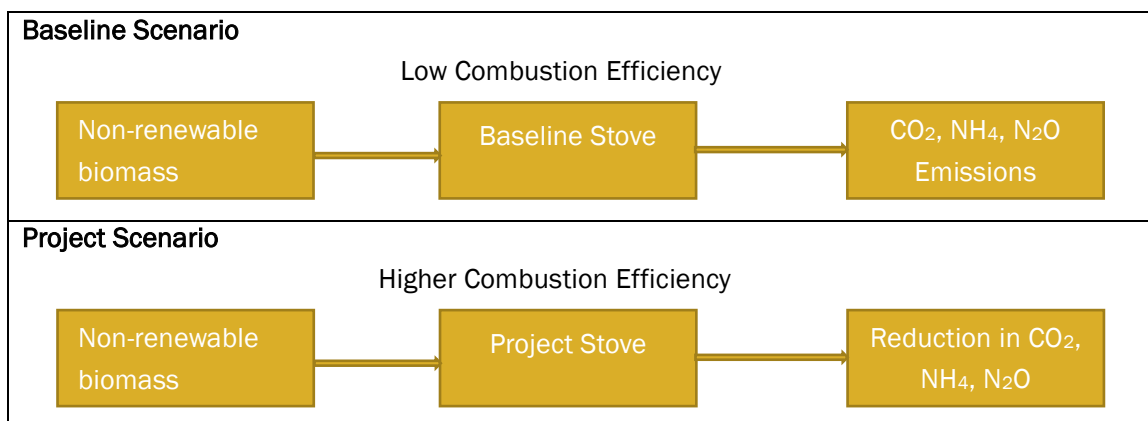
Grouped Project and Project Activity (ies)

As per methodology, the project boundary is the physical, geographical location of all equipment and systems affected by the project activity. As the activity involves distribution of ICS (Improved Cookstove), the project boundary is the physical, geographical location of each household where the ICS (Improved Cookstove) is distributed to replace the traditional stove.

Each Project Activity (ies) will define the boundary of emission sources. The emissions sources for PA-1 to PA-10 are outlined in the following table.

Source		Gas	Included?	Justification/Explanation
Baseline	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
Project	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

A representation of baseline and project boundary are given as below:



3.4 Baseline Scenario

Grouped Project and Project Activity (ies)

As per methodology, “The baseline scenario is the continued use of non-renewable wood fuel (firewood/charcoal) or fossil fuel (coal/kerosene) by the target population to meet similar thermal energy needs as provided by project cook stoves in absence of project activity.”

3.5 Additionality

Grouped Project and Project Activity(ies)

Step 1: Regulatory Surplus

The proposed grouped project is a voluntary coordinated action by BioLite, and there is no mandated government programme or policy in the host countries of this project ensuring the distribution of domestic fuel-efficient cookstoves. The project is not mandated by any law, statute, or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory framework (refer section 1.14 above).

Step 2: Positive List

Under the proposed grouped project, PA-1 to PA-10 will distribute ICSs at a subsidized price to the end users. Although some revenue will be generated from the distribution of ICS, it is relatively small compared to the total cost to CME for delivering ICS to a beneficiary (including product cost, distribution and logistics cost, data collection cost etc.). Thus, the PA-1 to PA-10 are not financially viable without the support of carbon revenues from sale of VCU, and are additional.

3.6 Methodology Deviations

The project does not involve any methodological deviations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The methodology does not account for baseline emissions separately, but instead quantifies net emission reductions achieved by the project. Please refer to Section 4.4.

4.2 Project Emissions

The methodology does not account for project emissions separately, but instead quantifies net emission reductions achieved by the project. Please refer to Section 4.4.

4.3 Leakage

Leakage shall be considered as default 0.95 in accordance with methodology.

4.4 Net GHG Emission Reductions and Removals

As per applicable methodology,

Formula to calculate emission reduction (ERs) is:

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

Where:

- i Indices for the situation where more than one type/model of improved cook stove is introduced to replace three-stone fire
- j Indices for the situation where there is more than one batch of improved cook stove of type i
- ER_y Emission reductions during year y in t CO₂e
- $ER_{y,i,j}$ = Emission reductions by improved cook stove of type i and batch j during year y in t CO₂e

$$ER_{y,i,j} = B_{y,savings,i,j} \times f_{NRB,y} \times NCV_{wood\ fuel} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95 \quad (2)$$

Where:

- $B_{y,savings,i,j}$ Quantity of woody biomass that is saved in tonnes per improved cook stove of type i and batch j during year y
- $f_{NRB,y}$ 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)
- EF_{wf,CO_2} CO₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO₂/TJ)
- $EF_{wf,non\ CO_2}$ Non-CO₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO₂/TJ)
- $N_{y,i,j}$ Number of improved cook stoves of type i and batch j operating during year y
- 0.95 Discount factor to account for leakage

The quantity of woody biomass saved due to implementation of improved cookstoves to be estimated using equation below:

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

Where:

$B_{y=1,new,i,survey}$ Annual quantity of woody biomass used by improved cookstoves 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.

η_{old} Efficiency of baseline cookstove

$\eta_{new,i,y}$ Efficiency of the improved cook stove type i and batch j determined through water boiling test (WBT). efficiency may be determined using Equation 4.

$$\eta_{new,i,y} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad (5)$$

Where:

η_p Efficiency of project stove (fraction) at the start of project activity

$(DF_n)^{y-1}$ Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.

0.94 Adjustment factor to account for uncertainty related to project cookstove efficiency test

Ex-ante calculation of emission reduction

PA-1 Rwanda

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)
Year 1	18,396	0	0	18,396
Year 2	1,08,862	0	0	1,08,862
Year 3	2,56,472	0	0	2,56,472
Year 4	3,99,969	0	0	3,99,969
Year 5	5,39,414	0	0	5,39,414
Year 6	6,74,867	0	0	6,74,867
Year 7	8,06,390	0	0	8,06,390
Total	28,04,370	0	0	28,04,370

PA-2 Malawi

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)
Year 1	0	0	0	0
Year 2	30,040	0	0	30,040
Year 3	88,891	0	0	88,891
Year 4	1,46,122	0	0	1,46,122
Year 5	2,01,756	0	0	2,01,756
Year 6	2,55,818	0	0	2,55,818
Year 7	3,08,331	0	0	3,08,331
Total	10,30,958	0	0	10,30,958

PA-3 Nigeria

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)
Year 1	10,486	0	0	10,486
Year 2	31,042	0	0	31,042
Year 3	57,857	0	0	57,857
Year 4	90,666	0	0	90,666
Year 5	1,22,585	0	0	1,22,585
Year 6	1,53,626	0	0	1,53,626
Year 7	1,83,804	0	0	1,83,804
Total	6,50,066	0	0	6,50,066

PA-4 Mali

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)
Year 1	10,048	0	0	10,048
Year 2	29,733	0	0	29,733
Year 3	55,390	0	0	55,390
Year 4	86,758	0	0	86,758

Year 5	1,17,244	0	0	1,17,244
Year 6	1,46,860	0	0	1,46,860
Year 7	1,75,619	0	0	1,75,619
Total	6,21,652	0	0	6,21,652

PA-5 Madagascar

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)
Year 1	7,809	0	0	7,809
Year 2	23,096	0	0	23,096
Year 3	43,007	0	0	43,007
Year 4	67,333	0	0	67,333
Year 5	90,952	0	0	90,952
Year 6	1,13,874	0	0	1,13,874
Year 7	1,36,110	0	0	1,36,110
Total	4,82,181	0	0	4,82,181

PA-6 Senegal

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)
Year 1	5,363	0	0	5,363
Year 2	15,800	0	0	15,800
Year 3	29,302	0	0	29,302
Year 4	45,684	0	0	45,684
Year 5	61,446	0	0	61,446
Year 6	76,596	0	0	76,596
Year 7	91,143	0	0	91,143
Total	3,25,334	0	0	3,25,334

PA-7 Ivory Coast

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)
Year 1	9,942	0	0	9,942
Year 2	29,420	0	0	29,420
Year 3	54,810	0	0	54,810
Year 4	85,853	0	0	85,853
Year 5	1,16,023	0	0	1,16,023
Year 6	1,45,336	0	0	1,45,336
Year 7	1,73,802	0	0	1,73,802
Total	6,15,186	0	0	6,15,186

PA-8 DRC

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)
Year 1	8,489	0	0	8,489
Year 2	25,100	0	0	25,100
Year 3	46,722	0	0	46,722
Year 4	73,121	0	0	73,121
Year 5	98,731	0	0	98,731
Year 6	1,23,564	0	0	1,23,564
Year 7	1,47,632	0	0	1,47,632
Total	5,23,359	0	0	5,23,359

PA-9 Zambia

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)
Year 1	0	0	0	0
Year 2	9,683	0	0	9,683
Year 3	28,615	0	0	28,615

Year 4	46,972	0	0	46,972
Year 5	64,764	0	0	64,764
Year 6	81,998	0	0	81,998
Year 7	98,683	0	0	98,683
Total	3,30,715	0	0	3,30,715

PA-10 Uganda

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)
Year 1	0	0	0	0
Year 2	10,367	0	0	10,367
Year 3	25,558	0	0	25,558
Year 4	45,365	0	0	45,365
Year 5	64,613	0	0	64,613
Year 6	83,309	0	0	83,309
Year 7	1,01,462	0	0	1,01,462
Total	3,30,674	0	0	3,30,674

5 MONITORING

5.1 Data and Parameters Available at Validation

The following parameters are fixed for the entire crediting period using default values as per the methodology:

$\eta_{\text{new},i,j}$	Fixed ex-ante using default discount factor as per methodology in equation (5)
η_{old}	Fixed ex-ante using default values as per the methodology
NCV_{biomass}	Fixed ex-ante using default values as per the methodology

Data / Parameter	η_p
Data unit	Fraction
Description	Efficiency of project stove at the start of project activity
Source of data	Manufacturer's specification
Value applied	0.381 for Dura stove (firewood) 0.457 for Jiko fresh (charcoal) 0.551 for Mama Yao (charcoal)

	0.5007 for Jiko Malkia (charcoal) XXXXX for other ICS models (to be presented at the time of verification, if applicable).
Justification of choice of data or description of measurement methods and procedures applied	Certified by technology supplier
Purpose of Data	Calculation of baseline emissions
Comments	In case of inclusion of other/new models, during project lifetime, corresponding thermal efficiency values shall be used for ER calculations

Data / Parameter	f_{NRB}																						
Data unit	Fraction																						
Description	Fraction of woody biomass that can be established as non-renewable biomass																						
Source of data	Calculated																						
Value applied	<table border="1"> <thead> <tr> <th>Country</th><th>f_{NRB}</th></tr> </thead> <tbody> <tr><td>Rwanda</td><td>0.89</td></tr> <tr><td>Malawi</td><td>0.87</td></tr> <tr><td>Nigeria</td><td>0.91</td></tr> <tr><td>Mali</td><td>0.93</td></tr> <tr><td>Madagascar</td><td>0.82</td></tr> <tr><td>Senegal</td><td>0.93</td></tr> <tr><td>Ivory Coast</td><td>0.91</td></tr> <tr><td>DRC</td><td>0.98</td></tr> <tr><td>Zambia</td><td>0.89</td></tr> <tr><td>Uganda</td><td>0.89</td></tr> </tbody> </table>	Country	f_{NRB}	Rwanda	0.89	Malawi	0.87	Nigeria	0.91	Mali	0.93	Madagascar	0.82	Senegal	0.93	Ivory Coast	0.91	DRC	0.98	Zambia	0.89	Uganda	0.89
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Senegal	0.93																						
Ivory Coast	0.91																						
DRC	0.98																						
Zambia	0.89																						
Uganda	0.89																						
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per the "TOOL30: Calculation of the fraction of non-renewable biomass"																						
Purpose of Data	Calculation of baseline emissions																						
Comments	--																						

Data / Parameter	$NCV_{wood\ fuel}$
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass
Source of data	Default value (VMR0006 ver. 1.1, page 10)
Value applied	0.0156

Justification of choice of data or description of measurement methods and procedures applied	IPCC default for wood fuel, based on the gross weight of the wood that is 'air-dried', may be used if fuel used in the project device is woody biomass/renewable biomass.
Purpose of Data	Calculation of baseline emissions
Comments	--

Data / Parameter	EF _{wf,CO2}
Data unit	tCO ₂ /TJ
Description	CO ₂ Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass
Source of data	Default value (VMR0006 ver. 1.1, page 10)
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value for wood fuel
Purpose of Data	Calculation of baseline emissions
Comments	--

Data / Parameter	EF _{wf,non CO2}
Data unit	tCO ₂ /TJ
Description	CO ₂ Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass
Source of data	Default value (VMR0006 ver. 1.1, page 10)
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value for wood fuel
Purpose of Data	Calculation of baseline emissions
Comments	--

Data / Parameter	η _{old}				
Data unit	Fraction				
Description	Efficiency of baseline cookstove				
Source of data	Default value				
Value applied	<table border="1"> <tr> <td>Country</td><td>η_{old}</td></tr> <tr> <td>Rwanda</td><td>12.09%</td></tr> </table>	Country	η _{old}	Rwanda	12.09%
Country	η _{old}				
Rwanda	12.09%				

	Malawi	11.77%
	Nigeria	10.87%
	Mali	11.99%
	Madagascar	12.97%
	Senegal	19.81%
	Ivory Coast	11.92%
	DRC	13.76%
	Zambia	14.69%
	Uganda	12.23%
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 shall be used if the baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is, without a grate or a chimney. A default value of 0.2 shall be used for other types of devices. Further as per the methodology, this value has to be fixed for each household at the time of project implementation. Thus, a weighted average value representing the host country (based on demographics data sourced from DHS, MIS, MICS for corresponding country) and using default values from the meth, has been established in the Ex-ante ER calculator (refer tab "Default Values and Assumptions", columns G7:S10). This fixed shall be applied for each household that receives project ICS, during the project crediting period.	
Purpose of Data	Calculation of baseline emissions	
Comments	To be updated at renewal of crediting period	

Data / Parameter	DF_n
Data unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstove per year of operation (fraction).
Source of data	Default value
Value applied	0.99
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	--

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction

Description	Efficiency of the device of each type i and batch j implemented as part of the project activity																
Source of data	Calculation																
Value applied	47.24%¹⁹ As per equation (5) above the applicable efficiency of two example ICS models to be used in Ex-post ER calculations is as follows: <table border="1"> <thead> <tr> <th>Age of stove</th><th>η_{new}</th></tr> </thead> <tbody> <tr> <td>0-1 year</td><td>44.41%</td></tr> <tr> <td>1-2 year</td><td>43.96%</td></tr> <tr> <td>2-3 year</td><td>43.52%</td></tr> <tr> <td>3-4 year</td><td>43.09%</td></tr> <tr> <td>4-5 year</td><td>42.66%</td></tr> <tr> <td>5-6 year</td><td>42.23%</td></tr> <tr> <td>6-7 year</td><td>41.81%</td></tr> </tbody> </table>	Age of stove	η_{new}	0-1 year	44.41%	1-2 year	43.96%	2-3 year	43.52%	3-4 year	43.09%	4-5 year	42.66%	5-6 year	42.23%	6-7 year	41.81%
Age of stove	η_{new}																
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4-5 year	42.66%																
5-6 year	42.23%																
6-7 year	41.81%																
Justification of choice of data or description of measurement methods and procedures applied	To adopt Option V given in the methodology: "Efficiency of the improved cookstoves to be estimated using equation 5 of applied approved methodology where, loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored"																
Purpose of Data	Calculation of baseline emissions																
Comments	In case of inclusion of other/new models, during project lifetime, corresponding rated thermal efficiency value and applicable efficiency as per equation 5 shall be used for ER calculations. In case a pot-skirt is distributed with the project stove, the corresponding value of the thermal efficiency of the project ICS with pot skirt will be used.																

5.2 Data and Parameters Monitored

The following parameters as per section 9.2 of the methodology are deemed not applicable:

$\eta_{new,i,j}$	Fixed ex-ante using default discount factor as per methodology in equation (5)
η_{old}	Fixed ex-ante using default values as per the methodology
B_{old}	Applicable only in case of use of equation (3)
$B_{renewable,y}$	Applicable only in case of use of equation (7)
$\eta_{PJ,BL}$	Applicable only in case of use of equation (7)
$NCV_{biomass}$	Fixed ex-ante using default values as per the methodology

¹⁹ A weighted average efficiency value of example ICS has been used for ex-ante calculations only. However, during verification, for ex-post calculations of ERs, the corresponding value of thermal efficiency as per equation (5) above shall be used. In case the project involves ICS models other than those listed above, its corresponding thermal efficiency value calculated in accordance with equation (5) shall be used.

Data / Parameter	$N_{y,i,j}$																								
Data unit	Number																								
Description	Number of project devices of type i and batch j operating during year y																								
Source of data	Installation database and monitoring survey																								
Description of measurement methods and procedures to be applied	CME shall maintain a database of all ICS distributed. The usage rate of installed ICS shall be measured based on a representative sample. CDM Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of CDM Standard for sampling and surveys for project activities and programme of activities. Alternatively, the simplified approach proposed in option (b), page 12 under Section 8.4 of the methodology may be used for determining the minimum sample size in which case compliance with 90/10 confidence precision is not obligatory.																								
Frequency of monitoring/recording	At least once every two years																								
Value applied	<table border="1"> <thead> <tr> <th>Country</th><th>Estimated Number of ICS</th></tr> </thead> <tbody> <tr><td>Rwanda</td><td>143,000</td></tr> <tr><td>Malawi</td><td>55,000</td></tr> <tr><td>Nigeria</td><td>28,500</td></tr> <tr><td>Mali</td><td>28,500</td></tr> <tr><td>Madagascar</td><td>28,500</td></tr> <tr><td>Senegal</td><td>28,500</td></tr> <tr><td>Ivory Coast</td><td>28,500</td></tr> <tr><td>DRC</td><td>28,500</td></tr> <tr><td>Zambia</td><td>22,000</td></tr> <tr><td>Uganda</td><td>21,000</td></tr> <tr><td>Total</td><td>412,000</td></tr> </tbody> </table>	Country	Estimated Number of ICS	Rwanda	143,000	Malawi	55,000	Nigeria	28,500	Mali	28,500	Madagascar	28,500	Senegal	28,500	Ivory Coast	28,500	DRC	28,500	Zambia	22,000	Uganda	21,000	Total	412,000
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Uganda	21,000																								
Total	412,000																								
Monitoring equipment	Sampling based Monitoring survey																								
QA/QC procedures to be applied	In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of ICS																								
Purpose of data	Calculation of emission reductions																								
Calculation method	The results from sample-based monitoring will be used to calculate $N_{y,i,j}$ as follows $N_{y,i,j} = (n_{i,j,operational} / n_{i,j,total}) * N_{y,i,j,distributed}$ Where: N = number of stoves n = number of samples																								
Comments	During the stove distribution, the presence of existing project ICS, if any, shall be monitored and in case an existing project ICS is																								

	found in the same household, the subsequent (second) ICS will not be included in the ER calculations. Alternatively, the presence of multiple project ICS in a household may be determined ex-post during sampling surveys and the total ICS population shall be discounted by the fraction of sampled households found using more than one project ICS. At the time of distribution, it shall be recorded if the ICS is distributed with or without pot-skirt. Further, ex-post monitoring shall assess (on sampling basis), the continuity of usage of pot skirt and shall calculate ERs accordingly discounting for any drop off of pot skirts.
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Data / Parameter	$B_{y=1,new,i,j,survey}$				
Data unit	tonnes/device/year				
Description	Annual quantity of woody biomass used by improved cookstoves 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				
Source of data	Monitoring survey				
Description of measurement methods and procedures to be applied	Minimum sample size of each type i and batch j should be in line with the latest version of Standard for sampling and surveys for CDM project activities and programme of activities or guidelines provided in methodology Section 8.4 option (b). 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) Baseline cookstoves have been completely decommissioned and only improved cookstoves are exclusively used in the project households; (ii) 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 woody biomass used by the project device and the other devices that use woody biomass				
Frequency of monitoring/recording	Determined in the first year of project implementation				
Value applied	For ex-ante calculation purpose, the value is assumed as <table border="1"> <tr> <th>Country</th><th>$B_{y=1,new,i,j,survey}$ (tonnes/device/year)</th></tr> <tr> <td>Rwanda</td><td>1.40</td></tr> </table>	Country	$B_{y=1,new,i,j,survey}$ (tonnes/device/year)	Rwanda	1.40
Country	$B_{y=1,new,i,j,survey}$ (tonnes/device/year)				
Rwanda	1.40				

	Malawi	1.37
	Nigeria	1.35
	Mali	1.45
	Madagascar	1.42
	Senegal	1.68
	Ivory Coast	1.45
	DRC	1.40
	Zambia	1.48
	Uganda	1.22
Monitoring equipment	Monitoring survey	
QA/QC procedures to be applied		
Purpose of Data	Calculation of baseline emissions	
Calculation method		
Comments		

Data / Parameter	Life Span
Data unit	Number of years
Description	The operating lifetime of project technology for projects opting Equation 5 for determining project stove efficiency.
Source of data	Manufacturer's specification
Description of measurement methods and procedures to be applied	The cookstoves will be manufactured to match the fixed design specification. This will ensure that ICS delivered to project households is standardized wrt to dimensions and performance.
Frequency of monitoring/recording	Once at the time of project stove installation
Value applied	5.0 years
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	In case of inclusion of other/new models, during the project lifetime, corresponding thermal efficiency values shall be used for ER calculations. Also, the PP shall either replace the ICS after end of its life with an equivalent device to continue claim credits or otherwise shall cease claiming credits after the rated lifespan.

5.3 Monitoring Plan

The monitoring plan is based on the applied methodology VMR0006, Version V1.1.

Management Plan and Operational Framework

1. General management of the project, including appointing all personnel / groups of personnel involved in the grouped project development and project activity implementation.
2. PP will coordinate with different manufacturers to produce ICSs. PP will provide guidelines for manufacturing including material and other specifications, serial identification, and quality standards of the cookstoves.
3. The distribution of the ICS will be managed by through their own distribution network, or with help of local partners
4. The PP shall agree with / obtain approval from project beneficiaries during distribution to exclusively assign unconditional rights to the carbon credit generated by project ICS to the PP.
5. In line with the operational and management monitoring implementation, the PP shall maintain and update the ICS distribution records and database continuously. To facilitate this process, each ICS will be assigned a unique serial number. The required data collection includes, but is not limited to, the following.
 - (a) Date of distribution
 - (b) Geographic area of distribution
 - (c) Model/type of project ICS distributed
 - (d) Quantity of project ICS distributed
 - (e) Name of the beneficiary, address, and telephone number (if available)
 - (f) Unique serial number for each project ICS
 - (g) Primary Baseline fuel / technology being used
6. The information collected will be stored in a database which will serve as the project database for ex-post project sampling and monitoring purposes. Also, this shall serve to avoid any double counting and duplicity of data.
7. The PP will coordinate ex-post monitoring activities as follows:
 - a) Implement the monitoring plan,
 - b) Determine the sample size as per sampling plan and identify the samples to be monitored (the sampling plan is detailed below)
 - c) Ex-post monitoring - the data will be collected using survey questionnaires designed by experts. The surveys will be carried out by external parties or by project implementer teams experience / trained to conduct such surveys. PP will be responsible for ensuring that staff responsible for monitoring and reporting have received adequate training, as applicable.
 - d) Ensure the quality of monitoring data (QA/QC) as per section 5.2 above. The monitoring results and statistical robustness will be reviewed internally and approved by competent staff.
 - e) Use the data collected for emissions reduction calculations.

Sampling plan

Due to the large number of ICS envisioned to be distributed as part of the project activity, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling will be undertaken as part of a cross-PAI Sampling Plan in line with the requirements of the methodology applied and the Standard: Sampling and surveys for CDM project activities and programmes of activities, version 9.0

Sample sizes will be sufficient to ensure that the precision of the sample means/proportions are in accordance with the methodological / standard requirements. In cases where survey results indicate that desired precision is not achieved, the lower bound value of the corresponding confidence interval of the parameter value may be used as an alternative to repeating the survey. Alternatively, the survey may be expanded to reach the required confidence/precision, unless option (b) on page 12 of the VMR0006 is used.

The sampling methodology will be in accordance with the representative sampling methods provided by the sampling guidelines and standards as indicated along this section, with the applied methodology having precedence.

Sampling Methodology

Sampling Objective – The sampling objective for each parameter is to determine, via sampling survey, a statistically significant parameter value for the emission reduction calculations. These parameters are as listed in section 5.2:

No.	Monitoring Parameters	Sampling Parameters	Parameter type	Monitoring frequency
1	$N_{y,i,j}$	Proportion of operational ICS	Proportion	Biennially
2	$B_{y=1, new,i,j,survey}$	Quantity of woody biomass used by project devices	Mean	First year of project implementation

Field Measurement Objective and data to be collected – As listed in Section 5.2 above

Target population and sampling frame – The target population is the total population served under the grouped project, and the sampling frame consists of aggregated data of end-users of the ICS as recorded in the PAI Databases. The sampling frame will be kept for 2 years following the crediting period or the last issuance of the CERs of the project activity.

Sample method – Sampling will be conducted using stratified random sampling techniques over the sampling frame, and detailed calculations are provided below as per CDM guidelines “Sampling and surveys for CDM project activities and programmes of activities” the ICS in the sampling frame shall be stratified by ICS model type i (model) and batch j (year of installation).

Stratified Random Sampling will be used to select samples from the Project Database for monitoring parameters. Optionally, other sampling approaches may be used in accordance with Standard “Sampling and surveys for CDM project activities and programmes of activities” and Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities when sampling techniques or statistical analysis necessitates it.

The sample size shall be determined using the following formula:

$$n \geq \frac{z^2 * N * V}{(N - 1) * precision^2 + z^2 * V}$$

Where,

n = number of ICS to be sampled

N = Total number of ICS in the population

Z = Constant referring to level of confidence (1.96 for 95 %, 1.646 for 90%)

Precision = Required precision (e.g. 10% = 0.1)

$$V = \frac{SD^2}{\bar{p}^2}$$

Where (for proportion parameters):

$$SD^2 = \frac{\sum_{i=1}^k g_i * p_i * (1 - p_i)}{N}$$

$$\bar{p} = \frac{\sum_{i=1}^k g_i * p_i}{N}$$

Where,

g_i = weight of strata i in the population

p_i = expected proportion of strata i in the population

k = total number of strata in the population

and where (for mean parameters):

$$SD^2 = \frac{\sum_{i=1}^k g_i * SD_i^2}{N}$$

$$\bar{p} = \frac{\sum_{i=1}^k g_i * m_i}{N}$$

Where,

SD_i = expected standard deviation of strata i in the population

m_i = expected mean of strata i in the population

To ensure a random stratified sample selection, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its Serial ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined stratified sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size as calculated by the CME.

In the case of parameters monitored for the first time the expected variation for that measure in the sample may be based on results from similar studies, pilot studies, or from the project planner's own knowledge / experience of the data.

At the time of stove distribution, ICS is distributed with or without pot-skirt will be recorded in the database. Accordingly, the corresponding thermal efficiency of the ICS with pot skirt shall be used for ER calculations. In such case, ex-post monitoring shall assess (on sampling basis) the continuity of usage of pot skirt and shall calculate ERs accordingly discounting for any drop off of pot skirts.

The data will be collected using surveys carried out either by external third parties or by project implementer teams. Data collected from the surveys will be compiled into an Excel spreadsheet.

Data obtained from the samples will be used to estimate proportions and mean values for the parameters described above. The values will then be being factored into the emissions reduction calculations.

During sampling, there may be non-response from the target population. Over-sampling may be used to avoid non-response; however, sampling may be ceased once required confidence/precision is met.

Alternatively, a simplified approach proposed in option (b) under Section 8.4 of methodology may be used for determining the minimum sample size in which case compliance with required confidence/precision is not obligatory.

The minimum sample size for project cookstove to conduct the usage survey should be:

1. Project target population < 300: Minimum sample size 30
2. Project target population 300 to 1000: Minimum sample size 10% of group size
3. Project target population > 1000: Minimum sample size 100

The PP may chose not do cross-PAI sampling and rather conduct separate sampling and monitoring for each PAI. In such case, the approached defined above shall be applied to each PAI, albeit with 90/10 confidence / precision levels for annual sampling and 95/10 for biennial sampling (instead of 95/10 for annual/biennial sampling for cross-PAI sampling).

Training for monitoring personnel

The Staff involved in monitoring and reporting shall be trained to ensure that the relevant monitoring and reporting procedures that need to be followed as part of the above monitoring plan are well understood and executed. PP will be responsible for ensuring that staff responsible for monitoring and reporting have received adequate training.

Internal Auditing and QA/QC

QA/QC measures to be followed as per section 5.2 above. The monitoring results and statistical robustness must be reviewed internally and approved by competent staff.