IMPROVED COOKSTOVES FOR COMMUNITIES

Document Prepared by Infinite Solutions

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CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

Outreach Projects Private Limited (OPPL) (hereafter referred as "project proponent") is the Project Proponent (PP) for the proposed grouped project activity. Outreach Projects Private Limited (OPPL) will also be acting as Coordinating and Managing entity for the proposed Grouped Project activity.

The purpose of this Grouped project activity is to promote use of improved cooking stoves (ICS) by local community in the various states across India (hereafter referred as "proposed grouped project activity").

The grouped project activity anticipates providing the households with clean cooking solutions; thereby, displacing the less efficient traditional cooking stoves used in the baseline (in this case less efficient three stone cookstoves) from the kitchen through efficient Improved cookstoves technologies. Traditional cookstoves with low efficiency and high greenhouse gas emitting would be replaced with Improved cookstove. The implementation of the project activity will result in the reduction of firewood consumption & consequent emissions from combustion sustainable leading to climate change mitigation. Overall objectives of the grouped project activity are to reduce greenhouse gases emissions, conservation of forests and woodlands while improving the health conditions of ICS users due to less emission and improve indoor air quality for everyday cooking.

The scenario existing prior to the implementation of the project activity instances is the usage of traditional inefficient cookstoves with poor ventilation, causing excessive indoor air pollution (IAP) and has been a serious health risk for women and children who spend several hours in the kitchen. And will reduce the need for women to collect firewood for longer time. The grouped project activity thus leads to reduction in Greenhouse Gas (GHG) emissions.

In this grouped project in an instance a project proponent remains same and into which the different batches are distributed depending on the term of distribution, and type of the cookstove. For eg.: In first instance, project proponent is Outreach Projects Private Limited, and Ist batch of **9,200** cookstove is been distributed in manufactured by Swami Samarth Electronics Pvt. Ltd., Nashik, Maharashtra.

The grouped project activity is promoted by individual sub project investors/associates/partners, details of subsequent instances and batches would be added to the following table as and when implemented:

Table 1 Details of different instances and batches of cookstove distributed

Instance No.	Investors/ Associates/ Partners	ICS Planned to distribute	Batch	Distributed	Start Date	ICS Manufacturer	Efficiency	District	State
Instance-1	**Outreach Projects Pvt. Ltd. (OPPL)**	100,000	Batch-1	9,200	20-Nov-2021	Swami Samarth Electronics Pvt. Ltd.	36.42%	Harda, Betul Chhindwara Dhar Chhatarpur Niwari Shajapur	Madhya Pradesh

The Grouped project activity will enable the dissemination of Improved cookstove manufactured by appropriate manufacturers in India.

Since, the grouped project activity leads to reduction in Greenhouse Gas (GHG) emissions. OPPL is looking forward to generate carbon credits under VCS mechanism for the grouped project activity.

The estimated annual emission reductions for this crediting period from first project activity instances are 449,956 tCO_2e/year and total estimated emission reductions would be 3,149,689 tCO2e .

The estimated Emission reductions for this monitoring period starting from 20 November 2021 till 31 December 2022 (inclusive of both the dates) in which 9,200 cookstove is distributed are 51,499 tCO_2e and the actual carbon emission achieved for this monitoring period is 47,426 tCO_2e.

Audit Type	Period	Program	VVB Name	Number of years
Validation	(20-November-2021—19-November-2022)	**VCS Program**	LGAI Technological Center, S.A. (Applus+)	7 year
Verification	20-November-2021—31-Decemeber-2022	VCS Program	LGAI Technological Center, S.A. (Applus+)	1 year 1 month
Total	**20-November-2021 to 31-December-2022**	**VCS Program**	LGAI Technological Center, S.A. (Applus+)	Validation (7 Years) Verification (1 year 1 month)

1.2 Sectoral Scope and Project Type

The project activity under consideration is a grouped project activity. The project activity instances as part of the grouped project will have following parameters:

Sectoral Scope: 03 Energy Demand.

Project Type: Type II Energy Efficiency Improved cookstoves project.

Methodology: VMR0006: Methodology for Installation of High-Efficiency Firewood Cookstoves.[1] Ver1.1

Project Proponent hereby confirms that the project is a grouped project.

1.3 Project Eligibility

For Grouped Project and Project Activity Instances

The VCS Standard v 4.4, section 2.1.1 specifies the scope included in the VCS Program:

Table 2 Project Eligibility for Grouped Project

SCOPE	GROUPED PROJECT SCOPE
1) The seven Kyoto Protocol greenhouse gases.	The Grouped project includes reduction of Carbon Dioxide emissions which is one of the seven, Kyoto Protocol greenhouse gases included under the scope of VCS program
2) Ozone-depleting substances. (ODS)	The Grouped project does not involve use of Ozone Depleting Substances
3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.	The Grouped Project uses VMR0006: Methodology for Installation of High-Efficiency Firewood Cookstoves which is supported by a methodology approved under an approved GHG Program by VCS
4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).	The Grouped Project does not uses other methodology approved under an approved GHG program.

[1] https://verra.org/methodologies/vmr0006-methodology-for-installation-of-high-efficiency-firewood-cookstoves/

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.	The Grouped project does not involve in Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program

Further, the Grouped project has not generated GHG emissions primarily for the purpose of their subsequent reduction, removal or destruction.

The Grouped Project Activities does not fall under the category of excluded projects in Table 1 of the VCS Standard v4.4 and is therefore eligible under the scope of the VCS Program:

Table 3 Excluded Project Activities as per VSC Standard v4.4

Excluded Large Scale Activity in Non LDC	Applicability
Activities that reduce hydrofluorocarbon-23 (HFC-23) emissions	N/A: The Grouped Project reduces GHG emissions due to energy efficiency measures by introducing improved cookstoves
Grid-connected electricity generation using hydro-power plants/units	N/A: The Grouped Project does not involve generation of electricity using hydro-power plants/units
Grid-connected electricity generation using wind, geothermal, or solar power plants/units	N/A: The Grouped Project does not involve generation of electricity using wind, geothermal, or solar power plants/units
Utilization of recovered waste heat for, inter alia combined cycle electricity generation and the provision of heat for residential commercial or industrial use	N/A: The Grouped Project does not involve generation of heat for producing electricity.
Generation of electricity and/or thermal energy using biomass. This does not include efficiency improvements in thermal applications (e.g, cookstoves)	N/A: The Grouped Project does not involve generation of electricity and/or thermal energy using biomass
Generation of electricity and/or thermal energy using fossil fuels, including activities that involve switching from a higher carbon content fuel to a lower carbon content fuel	N/A: The Grouped Project does not involve generation of electricity and/or thermal energy using fossil fuels.
Replacement of electric lighting with more energy efficient electric lighting, such as the replacement of incandescent electrical bulbs with CFLs or LEDs	N/A: The Grouped Project do not include the replacement of electric lighting with more energy efficient lighting

Installation and/or replacement of electricity transmission lines and/or energy efficient transformers	N/A: The Grouped Project do not include the installation and/or replacement of electricity transmission lines and/or energy efficient transformers.

From the above it can be concluded that the **Grouped Project and Project Activity Instances** is eligible under the scope of the VCS Program.

1.4 Project Design

Project Proponent hereby confirms that the project is developed as a grouped project, under which various instances would be deployed.

Eligibility Criteria

For inclusion of new project instances, the project proponent shall ensure that it meets the eligibility criteria below:

Table 4 Eligibility Criteria for Inclusion of new project instance in the grouped project

S. no.	Eligibility Criteria	Project Activity instances eligibility
1	Applicability Conditions: The project activity instances shall meet applicability conditions for applicable methodology as defined in section 3.2 of this document	Details of applicability conditions for initial project activity instances – Instance 1: initial project activity instances meet respective applicability conditions of methodology VMR0006 ver 1.1, In all other instances the eligibility criteria would be fulfilled. Hence this eligibility criterion is fulfilled.
2	Geographical Area: Occur within one of the designated geographic areas specified in the project description The project activity instances to be included in the grouped project activity will be located within India	The initial project activity instances – Instance – 1: is being included in the grouped project are located within geographic boundaries of India. In all other instances the eligibility criteria would be fulfilled. Hence this condition is fulfilled.
3	Start Date: The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project i.e. 20-Nov-2021. The start	The start date of initial project activity instances - Instance – 1: Start Date 20-Nov-2021,

	date of each project activity instance will be determined through documentary evidence.	The start date of project instance is in line with the Grouped Project. In all other instances the eligibility criteria would be fulfilled. Hence this condition is fulfilled.
4	Technology type: Use the technologies or measures specified in the project description. The project activity instances to be included in the grouped project activity will be energy efficiency measures by introducing improved cookstoves with at least 25% efficiency as per water boiling test or third-party certification	The initial project activity instances – Instance – 1: ICS efficiency @ 36.42%, In all other instances the distributed cookstoves would have efficiency more than 25%, hence eligibility criteria would be fulfilled. Hence this condition is fulfilled.
5	Baseline scenario: Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area. All Project Activity Instances shall meet the baseline definition as defined in respective valid methodology for geographic area and as explained in section 3.4	The initial project activity instances – Instance – 1: Have same baseline as per methodology as detailed in subsequent sections, In all other instances the eligibility criteria would be fulfilled. Hence this eligibility criterion is fulfilled.
6	Additionality: Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. The project activity instances to be added as part of the grouped project will meet additionality criteria as set out in respective methodologies (VMR0006) for geographic area and as explained in section 3.5	The initial project activity instances – Instance – 1:, under which Batch 1 of 9,200 cookstove is distributed. And the distribution meets the need of additionality as explained in section 3.5 of this document. Hence the condition is fulfilled.
7	Local Stakeholder Consultation: The Entity responsible for Individual Instances of the Grouped Project shall engage with local stakeholders during the project development and/or implementation processes.	Local stakeholder consultation has been conducted for initial project activity instances – Instance–1: Details of LSC is mentioned in section 2.2 of this document. Details are mentioned in subsequent section of this document. Hence this condition is fulfilled.

8	Apply the technologies or measures in the same manner as specified in the project description.	Only the energy efficient improved cookstoves would be distributed in any instance of the grouped project.

1.5 Project Proponent

Organization name	Outreach Projects Pvt. Ltd.
Contact person	Mr. Deepak Jain
Title	Director
Address	214-215, Milinda Manor, 2- R.N.T Marg, Indore, 452001
Telephone	+91-731-4050174
Email	deepak@infisolutions.org

1.6 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the project	Project developer (Carbon consultant)
Contact person	Mr. Jimmy Sah
Title	COO
Address	214-215, Milinda Manor, 2-R.N.T Marg, Indore, 452001
Telephone	+91-731-4050174
Email	jimmy@infisolutions.org

1.7 Ownership

The Grouped project ownership is with Outreach Projects Private Limited.

Further the declaration form which was signed by end user (Primary Beneficiary: cookstove owner) to Project Proponent during the registration process includes the statutory clause: “the carbon credit generated from the usage of Improved Cookstove by the user would be transferred to the Outreach Projects Private Ltd.”

The improved cookstoves distributed and installed under this project activity owned by Outreach Projects Private Limited.

1.8 Project Start Date

Since the Batch-1 of Project Instance-1 of ICS was commissioned and distributed on 20-Nov-2021. Thus, the start date for the Grouped project is 20-Nov-2021.

1.9 Project Crediting Period

Project Crediting Period: Seven (7) years renewable crediting period. Being renewable twice after the end of first crediting period. Hence, total crediting period of grouped project activity is 21 years

Start Date: 20-November-2021 (First operating day of the project activity ICS).

End date: 19-November-2028

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The grouped project activity instances being included currently have more than 300,000 tCO_2e Emission reductions, hence these project activity instances are classified as “Large Projects”

Similarly, the estimated GHG Emission Reductions will depend upon size of individual project activity instances. The tentative Emission Reduction for the Instance-1 in which 100,000 cookstoves is planned to be distributed being included in the grouped project activity.

Project Scale	
Project	
Large project	X

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1	251,992
Year 2	500,425
Year 3	493,341
Year 4	486,328

Year 5	479,385
Year 6	472,512
Year 7	465,707
Total estimated ERs	**3,149,689**
Total number of crediting years	07 years
Average annual ERs	**449,956**

The average ER for this batch of 9,200 cookstove is 44,434 tCO_2e/year and total ERs for the project crediting period is 311,038 tCO_2e.

However, emission reductions achieved as part of grouped project activity will increase as per addition of new project activity instances in the future.

1.11 Description of the Project Activity

The project will be broadly implemented in multiple states India, which is jurisdiction under the host country of India. Improved cookstoves distributed under this project activity will target rural population and households using traditional three-stone cookstoves and use open fires for cooking for a very long time.

The project activity will distribute portable & fuel efficient cookstoves manufactured in India.

Most participant communities are poor and highly dependent on the forest to fulfil their resource and energy demand. This combination of forest fragmentation and fuelwood demand in the area drives the high reliance on fuelwood as the primary source for cooking fuel.

The project aims to reach disadvantaged people with clean cooking solution access in form of improved cookstoves. Outreach Projects have trained people appropriately at the local level to cater for the households with stove maintenance and basic repairing. After the installation, representatives from the team have to collect data for the unique identification of the beneficiary. A baseline survey was conducted and found that the people were using traditional Three-Stone cookstoves in the baseline for cooking and usage of fuelwood.

The improved cookstoves models are fuel-efficient, resulting in a decrease in fuelwood consumption in comparison to conventional pre-project stoves that are traditional three stone cookstoves or mud cookstoves, project activity also helps in reducing particulate matter and indoor emissions. Design considerations for this project activity have also incorporated ergonomics and safety of the beneficiary through manual and training were provided to project participants for use of the improved cookstove.

The project will promote usage of improved cookstove. The main design improvement is the use of a prefabricated metallic combustion chamber. This combustion chamber ensures consistent quality and durability of the improved cookstove and will improve the lifespan of the stove with consistent performance in terms of efficiency, reduction of indoor air pollution and emissions, and safety.

In the first instance, Batch 1 of the project where 9,200 cookstove are distributed, the cookstove has metallic combustion chamber which is surrounded by an isolative material, then the outer body is constructed in a hexagonal shape. The improved cookstove for this phase have an average lifespan of 7years with a thermal efficiency of about 36.42%. other subsequent details about the cookstove would be added as per each batch in the table below:

Table 5 Information about cookstoves in batches of instance

Instance	Batch	Number of cookstove	Efficiency	Life Span
Instance 1	Batch 1	9,200	36.42%	07
…				

Greater convective heat transfer is the result of improved combustion and increased surface area contact. With the high-power combustion, emission of indoor air pollutants is minimized rendering a smoke-free kitchen. It is pertinent to clarify that the project stove has a lifetime of 7years which requires the stoves to be replaced after 7 years of installation. The other technical description about the cookstove is mentioned in the *Appendix 2: Cookstove technical details* section of this document.

Data Collection of ICS beneficiaries:

Project proponent is gathering the information regarding the household using the ICS during the course of the project. To facilitate this process, a unique identifiable serial number is put on the improved Cookstoves. This number is recorded during the initial data collection and registration process together with the following information (as appropriate and as available)

- Name of the ICS user or head of the household
- Address location of the house
- Govt. ID proof for the identity of the person
- Stove serial number and model

- Date of distribution and installation.

Figure 1 Cookstove distributed in first phase

1.12 Project Location

Project activity would be in multiple states of India and distributed in phases. Thus, the geographical area of project activity is considered as India. The cookstove distribution is started in phases and the first batch is distributed in the state of Madhya Pradesh.

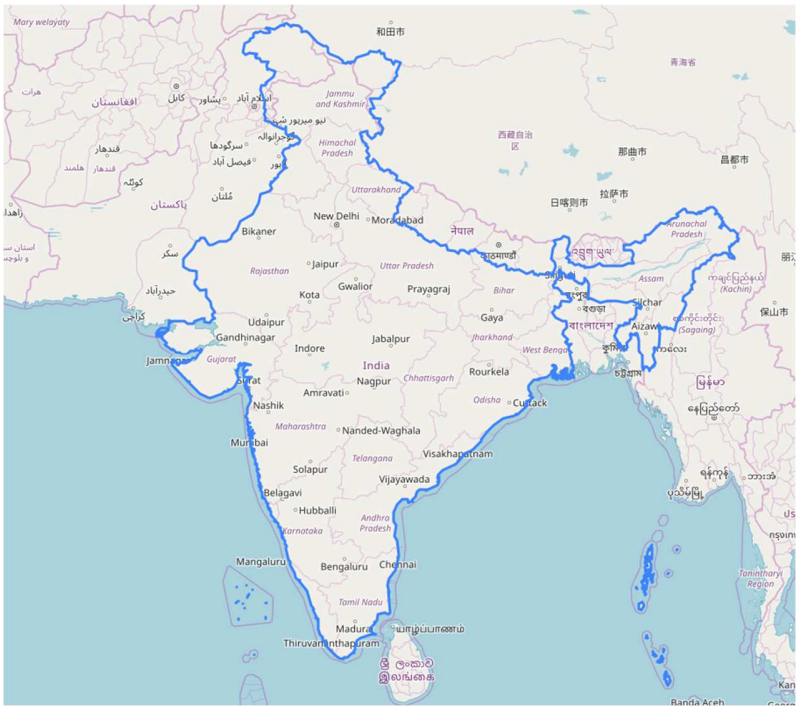

Figure 2 Project Location

In the batch 1, of first instance, 9,200 cookstove were distributed in Madhya Pradesh.

Instance	Batch	Number	Distributing region
Instance-1	Batch 1	9,200	Madhya Pradesh

Project Co-ordinates-

	Start Coordinate	End-Coordinate
Latitude	21^{0}2' N	26^{0}87' N
Longitude	74^{0}02' E	82^{0}48' E

Figure 3 Location Madhya Pradesh

1.13 Conditions Prior to Project Initiation

The scenario existing prior to the implementation of the project activity instances is the usage of traditional fuelwood in inefficient Cookstoves mainly the mud cookstove or 3 stone cookstove with poor ventilation, causing excessive indoor air pollution (IAP) and has been a serious health risk for women and children who spend several hours in the vicinity of smoke from kitchen.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no mandatory laws or regulations in the host country (India) requiring the introduction of Improved cookstove in India, the project includes the distribution of Improved cookstoves and is completely voluntary. The ongoing project does not violate any laws, statutes or other regulatory frameworks in India.

1.15 Participation under Other GHG Programs

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

The project activity has not been registered and is not seeking registration under any other GHG emission program to avail carbon benefits during the crediting period of the project activity, for which the declaration of no-double accounting is provided.

1.15.2 Projects Rejected by Other GHG Programs

The project proponent hereby corroborates that the project activity has not been rejected by any other GHG program

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The net GHG emission reductions generated by the project activity will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.

1.16.2 Other Forms of Environmental Credit

The project proponent hereby corroborates that the project activity has not created sought or received any other form of environmental credit:

1.16.3 Supply Chain (Scope 3) Emissions

It is not applicable.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

Project's contribution to Sustainable Development Goals-

The contributions of proposed project activity towards sustainable development are explained with indicators viz. social, economic, environmental, technological well-being, legislative and temporal as follows:

Environmental well-being

Improved cooking conditions, resulting from reduced smoke and carbon buildup in the kitchen, can lead to an increase in the percentage of the population relying on clean fuel and technology as their primary source (as per SDG 7.1.2).

Social well being

Less usage of fuelwood results in lower physical burden for women, who often have to travel long distances and spend extended hours collecting it. Additionally, it minimizes conflicts between wildlife and humans. As a result, there is a decrease in the proportion of unpaid domestic and care work, as stated in SDG 5.4.1.

The amount of indoor pollutants from burning of fuelwood in the kitchen will be reduced. Less carbon-di-oxide, carbon mono oxide, black carbon will be emitted due to the decrease in total fuelwood consumption. (SDG 13)

Economic well being

The reduction of smoke in the kitchen improves the health of women and children, leading to a decrease in health risks from indoor air pollution. As a result, it contributes to the reduction of mortality rates attributed to household and ambient air pollution, in alignment with SDG 3.9.

Technological well being

The proposed project activity will promote improved cookstoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes. (SDG 7.1.2)

1.17.2 Sustainable Development Contributions Activity Monitoring

Table 6 Sustainable Development Goals addressed by the project

Sustainable Development Goals Targeted	SDG Impact	Estimated Annual Average	Units or Products
SDG 3: Good health and well being	Reduction in smoke related illness due to use of ICS instead of traditional cookstoves. Therefore, the SDG indicator 3.9.1 'mortality rate attributed to household and ambient air pollution' which will be accessed through 'improvement of air quality' in project households due to successful operation of ICS.	100,000 households (in first instance of project)	
Goal 5: Achieve gender equality and empower all women and girls	The project is empowering women to volunteer for community engagement and monitor the usage of the cookstove in the households. This activity meets the Target 5.5: "Ensure women's full and effective participation and equal opportunities for leadership at all levels of the decisions making in political, economic and public life	100 women were involved in the distribution and monitoring of the project (in first phase of project)	
Goal 7. Ensure access to	The project is designed to provide cleaner, safer, more affordable and more efficient cooking equipment than	Usage of 100,000 improved cookstoves by the	

affordable, reliable, sustainable and modern energy for all	traditional stoves to poor household by means of carbon finance. The indicator to monitor the access to affordable and clean energy is the increase in number of households using clean cooking devices such as Improved Cook Stoves. This project is aim to full fill the target 7.1: "Ensure access to affordable, reliable and modern energy services"	beneficiaries in the first instance of the grouped project.
SDG 8: Decent Work and Economic Growth	The project will contribute towards below SGD target 8.5 & 8.5.1, "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.	Employment of local volunteers and local NGOs for management of the project
Goal 12. Ensure sustainable consumption and production patterns	The project will lead to reduction in fuelwood consumption on daily basis which was earlier directly harvested from the forest. The indicator to monitor the target is consumption of fuelwood by the project device The project is aiming to achieve target 12.2: "By 2030, achieve the sustainable management and efficient use of natural resources."	The improved cookstoves consume less fuelwood as compared to the three stove cookstove used in baseline. Average fuel saving per-household in a year is 3.81 tonne/annum
SDG 13: Climate Action (mandatory)	Indicator taken by the project is 13.2.2 "Tonnes of greenhouse gas emissions avoided or removed."	Estimated 3,149,689 tCO_2 in next seven years, for the instance 1 of the grouped project.
Goal 15. Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	The efficient cookstoves will use less fuelwood for the cooking task and thus reduce GHG emissions compared to the traditional way of cooking. The indicator to monitor the target is the amount of fuel wood consumed by the project device This project aims to target 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"	The improved cookstoves consume less fuelwood as compared to the three stove cookstove used in baseline

.

Table 7: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	Implemented activities to decrease household air pollution	Usage of improved cookstove will decrease the household air pollution	household air pollution would get reduced by the usage of the improved cookstoves. PP will ensure the proper usage of the cookstove so that health problem related to the indoor air pollution also decreases.
2)	5.5	5.5.2 Proportion of women in managerial position	Implemented activities to increase women participation	In this monitoring period around 60 women were trained for the distribution of the improved cookstoves	MP 1: In this monitoring period around 60 women were trained for the distribution of the improved cookstoves.
3)	7.1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Implemented activities to increase use of clean technology	In this monitoring period 9,200 improved cookstoves had been distributed amongst rural households.	MP 1: 9,200 improved cookstoves had been distributed amongst rural households.
4)	8.3	8.3.1 Proportion of informal employment in total employment, by sector and sex	Implemented activities to increase employment	150 people were employed in distribution of cookstove	MP 1: 150 people were employed in distribution of cookstove

5)	12.0	Tonne of fuelwood consumption for energy purposes	Implemented activities to decrease fuelwood consumption	2.70 tonne per year in each household is saved during the monitoring period	2.70 tonne per year in each household would be saved in this instance of the grouped project
6)	13.0	Tonne of greenhouse gas emissions avoided or removed	Implemented activities to decrease the green-house gas emissions	In this monitoring period, 47,426 tonne of CO_2e is reduced by the usage of improved cookstoves	MP 1: 47,426 tonne of CO_2e is reduced by the usage of improved cookstoves
7)	15.2	15.2.1 Progress towards sustainable forest management	Implemented activities to decrease the fuelwood consumption	2.70 tonne per year in each household is saved during the monitoring period	2.70 tonne of firewood which was directly fetched from the forest would be saved per year in each household in this instance of the grouped project

1.18 Additional Information Relevant to the Project

Leakage Management

The project activity is already including 0.95 as a discount factor for leakage factor as per the requirement of the methodology VMR0006 version 1.1.

Commercially Sensitive Information

Commercially sensitive information will have made available to VVB (Validation/Verification Body) on request.

Further Information

Not applicable

2 SAFEGUARDS

2.1 No Net Harm

No negative impact of project activity. The project is implemented to reduce carbon emission from the open burning of fuelwood in three-stone cookstove. The project will only bring the positive impacts on environmental and social economic as described in section 1.17.

2.2 Local Stakeholder Consultation

The local stakeholder consultation under the grouped project activity was conducted on 07 October 2021 at Community Hall, Alamgarh, village Chicholi, district Betul at 10:00 am. The stakeholder consultation was conducted at the group project activity level as the technology and its impact will be similar for all the project activities implemented in this group project activity. All interested stakeholders representing the following groups: traditional stove users, representatives from local self-help groups, field assistants working in the project, local leaders and NGO representatives attended the meeting.

Different instances in the grouped project would have different LSCs, the details about the different LSCs would be mentioned in the table below

Instance	Date of LSC	Place
Instance 1	07 October 2021	Community Hall, Alamgarh Village, Chicholi, Betul, Madhya Pradesh.

For LSC of the first instance, description of the activity is explained below:

The stakeholders were informed over phone and messaging applications. Detailed contact information such as the phone number and email address of the representative of the project implementor has also made available for the stakeholders. A total of 38 participants attended the meeting.

The project representatives from Outreach Projects explained in detail about the improved cookstoves which are to be employed. The detailed aspects of the grouped project activity including its objectives, associated benefits and environmental and socio-economic issues were also discussed.

Outreach Briefed the stakeholders on design of the project:

a. This project will implement 100,000 cookstoves in this instance of grouped project in India, and the first phase of first instance is started from Harda district.

b. The program would involve distribution of improved cookstove which has an efficiency greater than 25% and would reduce the indoor air pollution.

c. By reducing firewood use and preserving the forest in this area, is the conservation of the biodiversity of the region. Women will also save time because improved cookstove cooks food more quickly and uses less wood than traditional stoves.

d. The distribution of the cookstoves is not free and a small token amount is charged for the cookstove, this cost would be used in the maintenance and running of the program. The cost of the NGOs involved in distribution and monitoring is financed by the carbon financing.

e. Community volunteers and working members were also introduced to register any complain or suggestion about the cookstoves.

After the detailed presentation on the grouped project the participants got involved asking them questions regarding the Improved cookstove. The following feedbacks were recorded during the meeting.

Table 8 Feedback and Questions asked during LSC round

Ms Laxmi bisone asked, how new cookstoves could reduce smoke?	The ICS is designed in a way to reduce smoke. The project will replace conventional firewood stoves with higher efficiency, clean Cookstove models. The models have improved cookstoves are fuel-efficient resulting in a decrease in fuel use while also reducing particulate matter and carbon emissions. The cookstoves reduce heat loss and improve heat transfer and combustion efficiency.
Ms Divya Bhagwe asked, does the project help in employment generation?	Yes. The project would make a significant contribution to the socio-economic development of the region, as it'll provide direct employment to villagers.
Ms Sangeeta bai asked, how efficient are the new cookstoves?	The traditional cookstoves had a thermal efficiency of around 10%. The new and improved cookstoves will provide a thermal efficiency of around 36.42%. This is more than 3 times the efficiency of the old cookstove
Ms Shanta bai asked, will everyone be able to gain access to the new cookstove and will any government subsidy be availed to buy the stoves?	The project will primarily target vulnerable households. However, Clean cookstoves are available for all interested households. The participation fee is defined according to the economic capacity of rural households. It is also possible to pay the subsidized price of the cookstove in monthly instalments lasting up to six months. A local representative will be assigned to collect the instalments from households that find it difficult to pay the sum at once.

Mr. Sunil Bishone asked, what about the time spent on cooking with the improved cookstove compared to the habitual stove?	Based on several tests conducted, the time required for cooking using an improved stove is significantly lesser than other traditional stoves. It is advanced by 10 minutes compared to the traditional stove.
Ms. Sangeeta Baagahe, what will be the lifetime of one new cookstove and if any breakage occurs, how to deal with it?	The Improved stoves have demonstrated the average lifespan of each cookstove as 7 years. The stoves or any part will be replaced if there occurs any breakage.
Ms. Bramha bai also asked, can the stoves be cleaned for spillage?	Yes. The stove can be wiped clean with a wet cloth after being used and after the body has cooled down.
Mr. Kokila asked, how will the community be able to access stoves once the project ends?	Using clean cooking methods is a behaviour change process by substituting the usual method by the efficient method of cooking. For the first step, we are looking for facilitating the access of clean stoves to the villagers; and secondly by making it as a normal way of cooking. Once the target population will be accustomed to this technology, they will continue to seek to use it. And to ensure the availability of stoves once the project is completed, we plan to find ways to make the factory still functional to produce stoves, and also, to reduce the production costs.
Mr. Radha suggested that there should be a practical demonstration of cooking to sensitize the population on the use of the cookstove.	Outreach Projects is considering various approaches for the promotion of cookstove in all regions of the country and we will discuss with our team and gather feedback through our field staff for developing the promotional scheme to create awareness among users on its short and long-term benefit.
Ms. Ritu asked the audience: What is the price they are willing to pay for a clean, efficient cookstove?	Most of the participants answered the price range in between INR 350 to INR 450. Some participants remarked about the challenges of lockdown and their inability to pay the sum at once. They were relieved to know about the credit-based scheme that would allow them to pay in instalments.

Figure 6 LSC at Location 1

Figure 5 LSC at Location 2

Figure 4 LSC at Location 3

All the documents related to Local Stakeholder Consultation – Notice, invitation letters, Attendance sheet, feedback forms will be shared with the VVB.

Outreach Projects ensures the regular monitoring of the cookstoves, and would provide any maintenance required for the smooth running of the device. Outreach Projects will also ensure to take up the feedback from stakeholders at regular intervals. A grievance register is maintained at the local office. Stakeholder can also contact the PP with the help of contact details provided in the register. There were no major comments from the stakeholders that could impact the Design of the Grouped Project and hence no update is required to the Project Design.

Contact details for on-going communication

Outreach Projects Pvt. Ltd.
214-215, Milinda Manor,
2, RNT Marg,
Indore - 452001

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

No Comments were raised during the public comment period. The public comment period was started from 15-April-2022 and ended till 15- May-2022.

2.5 AFOLU-Specific Safeguards

The project activity is not a AFOLU project, hence this section is not required.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied.

Methodology:

VMR0006- Methodology for Installation of High Efficiency Firewood Cookstoves. Ver: 1.1.

AMS.II.G: Energy Efficiency measures in thermal applications of non-renewable biomass ver 13.0

Sectoral Scope: 03 Energy Demand

Tools:

CDM TOOL30: Calculation of the fraction of non-renewable biomass"; Version-04.

CDM Tool 1: Tool for the demonstration and assessment of additionality Version 07.0.0

3.2 Applicability of Methodology

The methodology measures below constitute the justification for the choice of the selected methodology by showing that project instances under the project activity meets each applicability condition of the methodology.

Sr. No	VCS Methodology requirement	Project justification
01	Project activities shall be implemented in domestic premises, or in community-based kitchens.	The Proposed Grouped project activity will include project instances that will distribute high efficiency improved cookstove, which will replace inefficient traditional cookstove leading to saving of non-renewable biomass/fossil fuels. Distribution of the improved cookstoves would be done in domestic premises. Instance-1 involves deployment of ICS in households
02	The project stove shall have specified high-power thermal efficiency of at least 25% as per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it	The Proposed Grouped project activity will include project instances that will distribute high efficiency improved cookstove which have an efficiency more than 25% as per water boiling test and/or certified by a third party.

	shall exclusively use renewable biomass	Instance-1 involves deployment of ICS with energy efficiency of 36.42%
03	Both 'Projects' and 'Large Projects' can use this methodology	Estimated average annual emission reductions for each Project Instance may be more than 300,000 tonnes CO_2e per year. Instance-1 Instance qualifies the "Large Projects" criteria.
04	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 in used since December 31, 1989, as evidenced through widespread documentation. A number of studies in the project location shows that the use of non-renewable biomass has been used since 31/12/1989. Fuelwood has remained the principal component of rural domestic energy in India. Most of the firewood (fuelwood) has been reported to be derived from forests with some from trees growing on homesteads, farmlands, and common Lands outside forests. Because of the increasing population, the area under agriculture expanded and forests shrunk. Based on statistics from Forest Survey of India (FSI1987: Page 45)[2] which estimated a gap of 130 million tonnes between the demand and internal production of firewood in the country in 1987. It is clearly evident that the has been used since 1987 which is earlier to 1989 for fuelwood consumption. A survey was also conducted before the distribution of improved cookstove for determination of the baseline. It was done to confirm the usage of firewood and use of traditional cookstove. this random survey of 400 household revealed that all the households have been using firewood for more than 35-40 years which further

[2] Forest Survey of India, 1987 report https://fsi.nic.in/documents/sfr_1987_hindi.pdf

		confirms about the usage of the firewood and traditional cookstoves. Instance-1 involves deployment of Improved cookstoves in India
05	For the specific case of biomass residues processed as a fuel (e.g., briquettes, wood chips), it shall be demonstrated that: It is produced using exclusively renewable biomass (more than one type of biomass may be used). The consumption of the fuel should be monitored during the crediting period and 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	Not applicable. The ICS is introduced as energy efficiency measure to replace the baseline stoves and reduce the use of non-renewable biomass for combustion.
06	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 project proponent will ensure that every cookstove that will be distributed within the project areas will have unique ID comprising of a combination of alpha numeric. No individual serial number can be repeated within the project, thus ensuring that each stove is counted only once in the proposed project.

		Instance-1 involves deployment of ICS with Unique ID to household, which are unique to individual beneficiary.
07	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.	An undertaking will be taken by all the beneficiaries, i.e., the end-users indicating that the ownership of the current project solely lies with Outreach Projects Pvt. Ltd. or its, Investors or Associates or Partners. The beneficiaries are completely dependent on our experts and field staff who provide capacity building and required training to the community to use the ICS. Instance-1 Was deployed by Outreach Projects Pvt. Ltd. to household and Household has given undertaking or declaration for transfer of carbon credit rights to Outreach Projects Pvt. Ltd.

3.3 Project Boundary

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_2O	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_2O	Yes	Major source
		Other	No	No other source identified

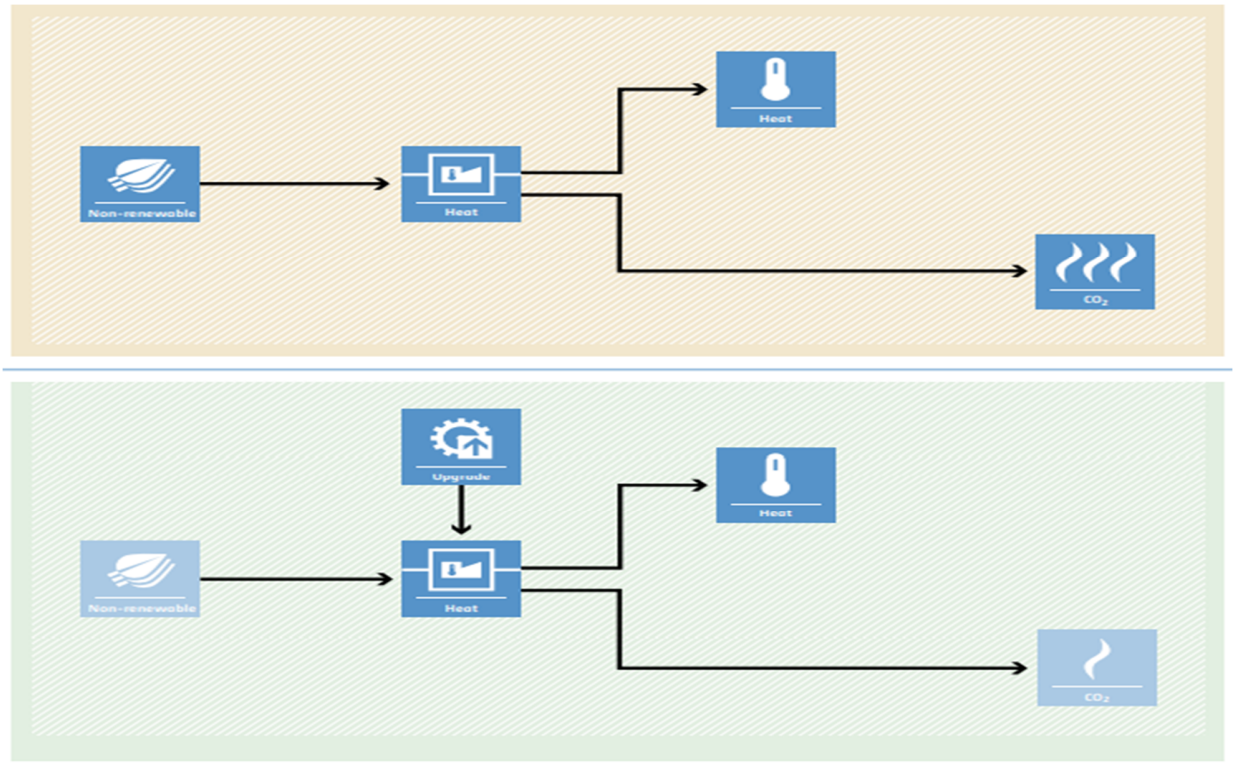

Figure 7 Project Boundary

3.4 Baseline Scenario

The baseline scenario is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by improved cookstoves in absence of project activity.

Baseline Scenario:

The project distributes improved cookstoves to users who rely heavily on traditional cookstoves and forged fuelwood directly from the forest, without combustion air supply, flue gas ventilation, chimney, or grate. The selection criteria do not include those who have flue gas ventilation systems or grates. During the handover process, information about the existing cookstoves and fuel usage is physically verified. The distribution of the improved cookstoves is only done after inspecting the existing cookstoves and signing an end-user agreement. All beneficiaries selected for the project activity use non-renewable wood fuel (firewood) in traditional cookstoves to meet their thermal energy requirements. Therefore, the baseline scenario for the project is the continued use of non-renewable wood fuel (firewood) by the target population to meet their thermal energy needs in the absence of the project activity.

For this project the efficiency of the baseline three-stone cookstove has been considered as 10% which is VMR0006 default for efficiency of baseline stove.

3.5 Additionality

The methodology uses the activity method for the demonstration of additionality

1: Regulatory Surplus

There is no mandated government programme or policy in the host country of this project ensuring the distribution of domestic fuel-efficient cookstoves. The project is not mandated by any law, statute, or another regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory frameworks. Households may only participate voluntarily in this project. It is hereby confirmed that the proposed project is a voluntary coordinated action by Outreach Projects Pvt. Ltd. or its, investor or associate or partners.

Step 2: Positive List

The project participant will distribute the cookstove at a subsidized rate, apart from the sale of GHG credits. Therefore, Project Proponent chose option 3 for demonstration of additionality.

The project is not implemented as part of government schemes or supported by multilateral funds. The project did not apply any methodology deviations.

Step 3: Project Method

Additionality for Instance-1

In line with Methodology VMR0006: Version 1.1, para 7 step 3 "For any project activity where stoves are not provided at zero cost to the end-user or has any other source of revenues other than the sale of GHG credits, then the project activity shall apply investment analysis method set out in the CDM Tool for the Demonstration and Assessment of Additionality included in AMS-II.G to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible"

Hence, in line with AMS-II.G. Version 13.0 section 5.2; additionality is demonstrated using Option 2, by applying the "TOOL21: Demonstration of additionality of small-scale project activities"; section 5, i.e. *Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions*.

PP has identified realistic and credible alternative scenario(s) to the project activity. The alternative identified are

(a) The proposed project activity (i.e. distribution of improved cookstove that are efficient and have lower emissions) undertaken without being registered as a VCS project activity;

(b) Continuation of the current situation (i.e. continuation use of traditional mud stoves which are free of cost but have higher emissions).

Investment Barrier:

Alternative (a) i.e. proposed project activity:

The proposed project intends to distribute the ICS at 64% subsidy to users i.e. households; hence financial return from the programme will be less than cost incurred.

A sum of 200 rupees, (this cost ranges from Nil to 450, depends on the cost for local distribution) is collected from each of the beneficiary for the purpose of a partial contribution towards the cost of cookstove and to ensure effective implementation of project. There is no other revenue generated in the project by the project proponent other than the sale of GHG credits. Moreover, the distribution cost is documented in the agreement between PP and Distribution Agency.

S. No	District	Number of cookstoves	Distribution cost recovered by distribution agency
01	Harda	1000	Rs. 350/-
02	Betul	2000	Rs. 400/-
03	Shajapur	1000	Rs. 400/-
04	Dhar	1000	Nil
05	Niwari	1000	Rs. 220/-
06	Chhindwara	2200	Rs. 350/-
07	Chhatrpur	1000	Rs. 350/-

Moreover, the recovered cost is clearly documented in the user agreement between PP and cookstove beneficiaries:

S. No	State	Cost recovered from individual beneficiaries
01	Madhya Pradesh	Rs. 450/- (Maximum)

Further each ICS has certain costs associated with the production/purchase, distribution, repairs and maintenance, project management, monitoring and verification etc., the programme will not occur in absence of the carbon revenue.

Hence a **simple cost analysis** is chosen by PP.

PP has carried out simple cost analysis for the demonstration of additionality and from above explanation it is very clear that the ICS has been distributed at a 64% subsidised cost to the end-user or beneficiaries. Hence the proposed project activity is not economically or financially feasible without the revenue from sale of GHG credits.

The below table shows the revenue and subsidy for the Improved cookstove

S. No	Particular	Cost (INR)t	Source
01	Cost of Improved Cookstove	1250	Invoice
03	Cost to beneficiary	450	Contract with distribution agency. (This is maximum value)
04	Percentage subsidy to beneficiary	64%	Calculated

The action is not financially viable without the support of revenues from the sale of VCUs. As the end-user does not benefit from a direct financial return and procuring ICSs requires capital, which is a barrier to rural consumers due to difficulties in accessing capital, a wide dissemination of ICSs in the Host Country is unlikely. The actions under the project will alleviate these barriers by promoting distribution of ICSs to end-users at an affordable price.

Alternative (b) i.e. Continuation of the current situation:

Continuation use of traditional mud stoves which are free of cost and financially more viable alternative which leads to higher emissions.

Hence, the project faces investment barrier and is considered to be additional.

Conclusion:

From the above explanation, it is very clear that the end users have a financially more viable alternative to the project activity i.e. continuation use of traditional mud stoves which are free of cost but have higher emissions. Hence it can be concluded that the project faces Investment Barrier.

3.6 Methodology Deviations

The project activity has not taken any deviation in the applied approved methodology VMR0006 Ver. 1.1.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The grouped project activity is promoted by individual sub project investors/associates/partners, details of subsequent instances and batches would be added to the following table as and when implemented:

Table 9 Details of different instances and batches of cookstove distributed

Instance No.	Investors/ Associates/ Partners	ICS Planned to distribute	Batch	Distributed	Start Date	ICS Manufacturer	Efficiency	District	State
Instance-1	**Outreach Projects Pvt. Ltd. (OPPL)**	100,000	Batch-1	9,200	20-Nov-2021	Swami Samarth Electronics Pvt. Ltd.	36.42%	Harda, Betul Chhindwara Dhar Chhatarpur Niwari Shajapur	Madhya Pradesh

Distribution details of current instance is mentioned below:

S. No	District	Number of cookstoves
01	Harda	1000
02	Betul	2000
03	Shajapur	1000
04	Dhar	1000
05	Niwari	1000
06	Chhindwara	2200
07	Chhatrpur	1000

5 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The methodology does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 5.4, for the ER calculations.

5.2 Project Emissions

The methodology does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 5.4.

5.3 Leakage

Leakage shall be considered as default 0.95 in accordance to section 8.3 of the methodology VMR0006 Ver 1.1.

5.4 Estimated Net GHG Emission Reductions and Removals

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

Equation 1

$$ER_y = \sum_i \sum_j ER_{y,i,j}$$

Where:

i = Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire

j = Indices for the situation where there is more than one batch of improved cookstove of type i

ER_y = Emission reductions during year y in t CO_2e

$ER_{y,i,j}$ = Emission reductions by improved cookstove of type i and batch j during year y in tCO_2e and;

$$ER_{y,i,j} = B_{\text{y,savings,i.j}} \times NCV_{woodfuel} \times f_{NRB} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95$$

.....Equation (2)

Where,

$B_{y,savings,i,j}$ = Quantity of woody biomass that is saved in tonnes per improved cookstove of type I and batch j during year y

$NCV_{wood\ fuel}$ = Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)

f_{NRB} = Fraction of woody biomass that can be established as non-renewable biomass fNRB value (Calculated: 91.19% for India)

$EF_{wf,\ CO2}$ = CO2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 112 tCO_2/TJ)

$EF_{wf,non\ CO2}$ = Non-CO2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 26.23 tCO_2/TJ)

$N_{y,i,j}$ = Number of improved cookstoves of type i and batch j operating during year y

0.95 = Discount factor to account for leakage

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cookstoves is estimated by the following Equations:

$$B_{y,saving,i,j} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,i,j}}{\eta_{old}} - 1\right) \quad \text{..... Equation (3)}$$

Where,

η_{old} = Efficiency of baseline cookstove (10%)

$\eta_{new,i,j}$ = Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y, Alternatively, efficiency may be determined using Equation 5 of applied approved methodology

$B_{y=1,\ new,\ i,\ survey}$ = 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. (1.1132 tonnes/cookstove/year)

The efficiency of the cookstove in subsequent years is calculated using

$$\eta_{new,i,y} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad \text{..... (Equation (4)}$$

η_p = Efficiency of project stove (Fraction) at the start of the project activity

$(DF_n)^{y-1}$ = Discount factor to the account for the efficiency loss of the project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on the manufacturer's declaration on expected loss in efficiency or through publically 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 Cookstoves efficiency test.

f_{NRB} is calculated using the Tool 30: Calculation of the fraction of non-renewable biomass Version 04.0

the fraction of woody biomass that can be established as non-renewable is

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

Were,

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

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

$$NRB = H - RB$$

Where

H = Total consumption of woody biomass in the applicable area in the relevant period. (tonnes)

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

Where;

HW = Average consumption of wood fuel per household, including fuelwood and charcoal, in the applicable area in the relevant period (tonnes//household)

CE = Commercial woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of woody biomass in ovens, boilers etc.) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

NE = Commercial woody biomass consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

N = Number of households consuming wood fuel within the applicable area in the relevant period (number)

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

$MAI_{forest,i}$	=	Mean Annual Increment of woody biomass growth per hectare in sub-category i of forest areas in the relevant period (tonnes/ha/yr)
$MAI_{other,i}$	=	Mean Annual Increment of woody biomass growth per hectare in sub-category i of other land areas in the relevant period (tonnes/ha/yr)
$F_{forest,i}$	=	Extent of forest in sub-category i in the relevant period (ha)
$F_{other,i}$	=	Extent of other land in sub-category i in the relevant period (ha)
$P_{forest,i}$	=	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (in sub-category i) in the relevant period (ha)
$P_{other,i}$	=	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other land areas (in sub-category i) in the relevant period (ha
i	=	Sub-category i of forest areas and other land areas

$$RB = 1.66(77.53 - 44.23) + 1.66(33.30 - 0)$$

$$\mathbf{RB = 110.63 \text{ million tonnes}}$$

$$H = 200.52 + 0 + 1054.877$$

$$\mathbf{H = 1255.395}$$

H	Calculated	1255.39
RB	Calculated	110.63
NRB	Calculated	1144.76
FNRB		**91.19%**

Comparision of the f_{NRB} values calculated that too reported in the literature:

The significant difference between the values of f_{NRB} achieved by the Bailis report "The carbon footprint of traditional woodfuels. Nature Climate Change, 5(3), pp. 266–272." (25.8%) and the values achieved by our project (91.19%) is indeed notable. To address the feasibility of the value calculated based on CDM Tool 30 version 4 and its alignment with the conservative principle in the VCS Standard section 2.2, the following points should be considered:

1. **Data Source and Accuracy**:

   VCS 2922: The project's f_{NRB} calculation relies on the most recent data of forest cover, fuelwood consumption, annual increment from the "Forest Survey of India" report published by Ministry of

Environment Forest and Climate Change (MoEFCC). The report is published every two years and the latest report referred in the project is of 2021(FSI)[3]. While the demographic details (family size, household data using fuel wood for cooking) are based on the National Family Health Survey (NHFS) report, NFHS surveys have been conducted under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India. MoHFW has designated the International Institute for Population Sciences (IIPS) which publishes the survey report. The project applies the data from the latest available report of NFHS-5[4] 2021. The fNRB value is calculated based on the above-mentioned reports specifically for the country India, i.e., project boundary.

Bailis report: The report uses global-level data from the Food and Agriculture Organization (FAO), the International Energy Agency (IEA) and the United Nations (UN)[5] for various data along with other published literature for specific countries.

1) For specific f_{NRB} data for India, Bailis report estimates the NRB values of the region using the WISDOM Model[6] (as referred literature of the paper *"Drigo, R. & Salbitano, F. WISDOM for Cities: Analysis of Wood Energy and Urbanization Using WISDOM Methodology (FAO Forestry Department Report, 2008", Drigo, R. WISDOM Case Studies (2014); http://www.wisdomprojects.net/global/cs.asp", "Masera, O., Ghilardi, A., Drigo, R. & Trossero, M. A. WISDOM: A GIS-based supply demand mapping tool for woodfuel management. Biomass Bioenergy 30, 618–637 (2006)."*). which takes the values of supply and demand module of a given spatial base of the region, and reliance on the local surveys for the same was one of the parameters in the model. Since, there was no survey conducted in the region for the demand of the woodfuel, the Bailis report has referred to the published data of woodfuel consumption for India as per two reference literature;

a) Paper titled "*Comparative study of fuelwood consumption by villagers and seasonal ''Dhaba owners'' in the tourist affected regions of Garhwal Himalaya, India*" [7]. This report

[3] The data of the Forest Survey of India is published regionally as well as at the national level. The latest reports for India and the project boundary could be downloaded from https://fsi.nic.in/fsiwebsite/forest-report-2021

[4] National Family Health Survey is conducted every two years and the latest published data are provided on the link http://rchiips.org/nfhs/NFHS-5_State_Report.shtml . This report was published in the year 2021.

[5] As mentioned in the section 'Methods' of the paper: The carbon footprint of Traditional Woodfuels.

[6] Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) Model which estimates the value of the fuelwood consumptions in the areas. https://www.sciencedirect.com/science/article/abs/pii/S0961953406000262

[7] This study is based on the fuelwood consumption for the small restaurants of the Garhwal Region in Uttarakhand, this demand cannot be used for estimating the fuelwood consumption for the country. https://www.sciencedirect.com/science/article/abs/pii/S0301421509009197

refers to wood fuel consumption for "Dhaba owners" i.e. small restaurants in local language. The region of study was tourist affected region of Garhwal which is in Uttarakhand state of India. This paper was published in year 2010.

b) Paper titled "*Firewood consumption along an altitudinal gradient in mountain villages of India*"[8]. This report refers to fuel wood consumption of village households in Uttarakhand state of India. This paper was published in year 2004.

Inference: The data used by Bailis report specifically for India is based on a paper of 2004 and 2010, thus not representing the latest data as published by the national agencies as well as regional data available for the project boundary, i.e., India. There is considerable difference in the values as published by the national agencies. Further Bailis report does not take into account the values for the project boundary, i.e. India.

2. **Adherence to Tool 30:** The project applies VMR0006 version 1.1 which refers the calculation of f_{NRB} based on latest applicable version of Tool 30[9] as published by CDM EB, i.e version 4.0. The tool provides detailed steps to calculate the f_{NRB} value for a given region.
   VCS 2922: The project has detailed step wise calculation for assessment of f_{NRB} values. The value has been calculated for the applicable project boundary i.e., India by using latest regional level data as published by the various government agencies. The f_{NRB} value arrived is 91.19% for the project boundary.

   Bailis Report: The report is based on WISDOM Model. The f_{NRB} values published for India is 23-25%. The tool also published a default value of f_{NRB} value that can be used which is 30%.

   Inference: the fNRB value as calculated by the VCS 2983 is in adherence to the Tool 30 version 4.0.

3. Limitations of Bailis Report: As published in the Bailis report we would like to highlight the below: Section "Discussion and Implementation" on page number 4 mentions *"**One limitation of the study is a lack of reliable woodfuel consumption data. When possible, we used national and sub national data sets. However, for most countries, we relied on data compiled by international organizations containing unknown uncertainties that make it difficult to communicate the uncertainty in these results. A second limitation is that the analysis considers a single year and does not account for potential behavioural changes among woodfuel users**"*.

[8]The woodfuel consumption for Uttarakhand state and that too variation in the consumption pattern as per altitude change. https://www.sciencedirect.com/science/article/abs/pii/S0961953403001909

[9] The https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf

Inference: The Bailis report is not a correct representative of the f_{NRB} for the given project boundary, i.e. India.

4. Values published in other projects: The f_{NRB} values of various other registered projects having similar project boundary, a summary of the same is mentioned below:

VCS: details about other VCS projects:

VCS ID	fNRB values	Date of Registration
2607	93%	19/01/2023
2533	90.10%	02/07/2022
2473	93.10%	09/06/2022

Gold Standard:

GS ID	fNRB values	Date of Registration
PoA 916 and all VPAs	93.10%	
11358	80.13%	07/04/2022
PoA: 11450 and all its CPAs	87%	18/04/2021

Inference: The f_{NRB} values are comparable to other similar projects in the region, which has been registered by the Verra and Gold Standard Mechanism and verified by VVB. Therefore, the conservative principle does not apply in this context.

Conclusion: There are considerable differences in the approach and value determined by the project as compared to the Bailis report. Since the value of f_{NRB} as calculated in the project is based on latest specific regional area of country thus it represents actual scenario as compared to f_{NRB} as reported by Bailis report which is for the country. The report itself claims data to be from 2004 and 2010 thus it does not represent the actual scenario. The report fails to mention the uncertainty in the results. Further, the value is calculated for a single year and does not take into account the trend in the past decade.

We would thus like to mention that the f_{NRB} value as calculated in the project is appropriate for the given project boundary.

Conservative assessment: The comparison with Bailis report is not applicable since the data and uncertainty for f_{NRB} values in Bailis report are not reliable for the project boundary, i.e. India.

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

Since the project devices were distributed in the batches, therefore, for determining the value of parameter $B_{Y= i new, i, j, survey}$ a survey was conducted in two phases as, for cookstove distributed in month of November and December 2021, the survey for parameter was done from 07 to 22 Feb 2022, and for cookstoves distributed in month of January and February 2022, the monitoring was conducted from 10 to 20 April 2022. The sampling plan for both is discusses in the section 6.3 of this document.

The parameters and calculations of emission reductions with reference to above parameters is given below as

Parameters	Value	Unit	Source
Wood Used by ICS	3.05	kg/day	Sample Survey
$B_{Y= i new, i, j, survey}$	1.1132	tonne/ICS/Year	Calculated
Total Days in a year	365	days	
η_{old}	10%	(For 3 Stone)	Default Value as per Methodology VMR0006 V1.1 - Page no. 19
η_{p}	36.42%	%	Manufacturer's Specification
$B_{Y savings i, j}$	2.70	tonne/ICS	Calculated
f_{NRB}	91.19	%	f_{NRB} calculation sheet as per the Tool 30 (Madhya Pradesh)
$NCV_{wood fuel}$	0.0156	TJ/tonne	Default Value as per Methodology VMR0006 V1.1 - Page no. 23
$EF_{wf, CO2}$	112	tCO_2/TJ	Default Value as per Methodology VMR0006 V1.1 - Page no. 10
$EF_{wf, nonCO2}$	26.23	tCO_2/TJ	Default Value as per Methodology VMR0006 V1.1 - Page no. 10
$N_{y, i, j}$	100,000	Number	Number of cookstoves
Discount Factor	0.95	fraction	To account for leakage, Default Value as per Methodology VMR0006 V1.1 - Page no. 09
$(DF_{n})^{y-1}$	0.99	fraction	Default Value as per Methodology VMR0006 V1.1 - Page no. 11
Adjustment Factor	0.94	fraction	Adjustment factor to account for uncertainty related to project cookstove efficiency test

The number of ERs generated by this Grouped Project is estimated in the table below:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1	0	251,992	0	251,992
Year 2	0	500,425	0	500,425

Year 3	0	493,341	0	493,341
Year 4	0	486,328	0	486,328
Year 5	0	479,385	0	479,385
Year 6	0	472,512	0	472,512
Year 7	0	465,707	0	465,707
Total	0	**3,149,689**	0	**3,149,689**

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	f_{NRB}
Data unit	%
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Determined by using Tool 30: Calculation of the fraction of non-renewable biomass. Version:04.0
Value applied:	**India : 91.19%**
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of Emission Reductions
Comments	Parameter f_{NRB} once fixed shall remain fixed for the entire crediting period, detailed calculation for each state f_{NRB} is provided in separate spreadsheet.

Data / Parameter	η_p
Data unit	Fraction
Description	The efficiency of the project stove at the start of project activity
Source of data	Manufacturer's Specification
Value applied:	0.3642
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante.
Purpose of Data	Calculation of η_{new}

Comments	This value will change according to the model of cookstove

Data / Parameter	B_{old}
Data unit	tonne/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices.
Source of data	calculated according to options stated in 'Determination of quantity of firewood consumed in absence of project activity as per options provided in Section 8.4 above Baseline survey is conducted to see the actual usage of fuelwood in baseline conditions
Value applied:	3.81
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante
Purpose of Data	Calculation of Emission Reductions
Comments	This parameter shall be determined ex-ante

6.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,k}$
Data unit	Number
Description	Number of project devices of type i and batch j operating during year k
Source of data	Monitoring

Description of measurement methods and procedures applied	Measured directly or based on a representative sample. Sampling the standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest the version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied:	100,000
Monitoring equipment	Monitoring survey.
QA/QC procedures applied	The project proponent shall maintain a distribution record to calculate this parameter.
Purpose of data	Calculation of Emission reductions
Calculation method	Sample Survey
Comments	The proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value.

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	The efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	Calculated using the Equation no. 05 in methodology VMR0006 ver 1.1
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 the loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored"
Frequency of monitoring/recording	Annually
Value applied:	0.3423 at start of operation (for instance 1, Batch 1 of 9200 cookstove)
Monitoring equipment	Not applicable

QA/QC procedures applied	Not applicable.
Purpose of data	Calculation of emission reductions
Calculation method	As per equation 5 of VMR0006 i.e. $\eta_{new,i,y} = \eta_p \times (DF_n)^{y-1} \times 0.94$
Comments	Calculated using the Equation no. 05 in methodology VMR0006 ver 1.1

Year	$\eta_{new,i,y}$
1	0.3423
2	0.3389
3	0.3355
4	0.3322
5	0.3289
6	0.3256
7	0.3223

Data / Parameter	$B_{y=1,new,i,j,survey}$
Data unit	Tonne
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 applied	The 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, which is 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; If multiple devices are used in the project, it is possible from the results of the survey questions to differentiate the quantity of firewood being used by each device. In other words, if more than one device, or another device that consumes firewood, are in use in project households, then the sample survey needs to distinguish the quantity of firewood used by the project device and the other devices that use firewood.
Frequency of monitoring/recording	Determined in the first year of project implementation
Value applied:	For ex-ante assumed 1.1132 tonne/device/year
Monitoring equipment	Monitoring survey
QA/QC procedures applied	Not applicable.
Purpose of data	Calculation of Emissions Reductions
Calculation method	Not applicable
Comments	This parameter shall be determined in the monitoring survey.

Data / Parameter	Life span
Data unit	Years
Description	The operating lifetime of the project device. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency
Source of data	Manufacturer specification
Description of measurement methods and procedures applied	The data source as per manufacturer specification
Frequency of monitoring/recording	Once at the time of installation of the batch of type of stove
Value applied:	7 years

Monitoring equipment	Not applicable
QA/QC procedures applied	Not applicable.
Purpose of data	Calculation of emission reductions
Calculation method	Not applicable.
Comments	This will change with different model of cookstove

Data / Parameter	$N_{y,i}$
Data unit	Number
Description	Number of project devices of type i operating during year y
Source of data	Monitoring
Description of measurement methods and procedures applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision according to the latest version of Standard for sampling and surveys for project activities and programme of activities Alternately, simplified approach proposed in option (b) under Section 8.4 above may be used for determining the minimum sample size in which case compliance with 95/10 confidence precision is not obligatory.
Frequency of monitoring/recording	Annual
Value applied:	100,000
Monitoring equipment	Sample Survey
QA/QC procedures applied	Not applicable
Purpose of data	Calculation of emission reductions
Calculation method	Sample survey
Comments	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value.

Data / Parameter	η_{old}
Data unit	Fraction
Description	The efficiency of baseline cookstove
Source of data	default value
Description of measurement methods and procedure applied	A default value of 0.1 shall be used if baseline device is a three-stone fire using fuelwood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
Frequency of Monitoring/recording	Fixed for each individual household at the time of project implementation
Value applied:	0.1
Monitoring Equipment	Use of default value for the baseline cookstove
QA/QC procedure applied	NA
Purpose of data	Calculation of emission reductions
Calculation Method	Use of default value
Comments	This value is fixed ex-ante

6.3 Monitoring Plan

Sample Plan:

The monitoring plan is designed to monitor the parameters listed in Section above, which are required for the calculation of the actual GHG emission reduction achieved by the project activity using ex-post sampling survey. The share of operating stoves and the continued use of pre-project devices will be determined based on sampling procedures as outlined below. The Project Proponent will be responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

No monitoring for leakage through competitive uses of fuelwood is required, as the parameter wood usage is multiplied by 95% to account for leakage as per methodology VMR0006 ver 1.1.

As per the Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 04, the sampling plan is the following:

(a) Sampling Design

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 project instance-wide Sampling Plan (by grouping and sampling across project activities) that is designed in line with the requirements of the Guideline "Sampling and surveys for CDM project activities and programme of activities", version 04.

(i) Objective and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period. As per CDM Methodology AMS-II. G version 13.0, 90/10 confidence/precision shall be applied for the annual sampling requirement and 95/10 for biennial sampling inspection. As per Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities version 09, 90/10 confidence/precision to be adopted for the small-scale project and 95/10 for the large-scale project. Since, this is a grouped project in which each instance can be categorised as a small- and large-scale project. The confidence and precision interval will be mentioned with instance in the table given below:

Table 10 Description for monitoring of instances

Instance	Small/Large Project	Confidence/Precision Interval
Instance1	Large Project	95/10

Given that the size of the first instance of the grouped project is under the category of large projects, hence 95/10 confidence/precision shall be adopted for all parameters unless the average annual emission reductions of the project are below the threshold.

Monitored Parameter-

Table 11 Parameters Monitored

Parameter	Description	Parameter type/ Frequency
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y	Proportion/Biennially
$B_{y=1,new,i,j,survey}$	Quantity of woody biomass used by project devices in tonnes per device of type i and batch j	Mean value
η_{new}	The efficiency of the device of each type i and batch j implemented as the part of project activity.	Calculated as per equation 5 of the methodology VMR0006.
η_{old}	The efficiency of baseline stove	Use of default value of 0.10

(ii) Target Populations:

The target population for the proportion of Improved Cookstoves still in operation ($N_{y,i,j}$) of this project are all households in the project database which are using fuelwood in Improved

Cookstoves distributed under the project for cooking. The target population for pre-project appliances ($\mu_{y,i,j}$) is the set of old stoves still in use under the project database

(iii) Sampling Frame

To ensure the continuity of the project instances included for a single sampling plan, two sampling frames shall be defined. Overall, all project instances will have the same group of end-users which is from households from rural/semi-urban areas. The projects are to be implemented in rural areas; thus, it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all above-mentioned parameters can be assumed to be highly homogeneous for each Improved Cookstove model regardless of how the end-user group and distribution/installation location is defined.

1) The sampling frame for the proportion of Improved Cookstove in operation ($N_{y,i,j}$)

- The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: The Registration Process for newly distributed/installed Improved Cookstove and the Monitoring Survey (which includes a household questionnaire and visual inspection of traditional as well as improved cookstove) that will be used throughout the lifetime of the Improved cookstove. The detailed information collected from the Registration Process is used to populate the stoves Database and the Monitoring Survey follows Guideline for "Sampling and Surveys for CDM Project Activities and Programme of Activities", version 04.

- As explained below (in section "Sampling Method"), to take the different characteristics of different project instances Implemented and Improved cookstoves models into consideration, Project instances shall be grouped together to create a Primary Sampling Unit, which is homogenous. As per EB 86 Annex 04, Appendix-2, paragraph 1, for the use of a single sampling plan covering a group of projects, provided the homogeneity of the population can be demonstrated, or differences are taken into account in the sample size calculation, a 95/10 confidence/precision is applied for biennial sampling. The first step is to identify the Primary Sampling Units. Primary sampling units are project instances, which have:

1) The same ICS models

In a batch of any instance, the model of the cookstove would be same and sampling of each type of cookstove would be done. That is batch with the same Improved cookstove model can therefore be clubbed together and form a Primary Sampling Unit. In case the instances having two different ICS models being implemented – this will form two Primary Sampling Units. This is justified by the fact that the project might vary in terms of performance, and it is important for the Project Proponent to collect and monitor accurate data for each stove model.

a. Adjustment to account for any continued use of pre-project devices during the year($\mu_{y,i,j}$)

In line with applied approved methodology VMR0006, as installing data logger is not practical and if any use of -pre-project device can be monitored in a common survey with other monitoring parameters; therefore, a random sub-sample within the common survey can be taken to

determine continued use of old cookstoves and its proportional usage by including suitable questionnaire.

There will be two situations 1) project Improved Cookstove are completely discarded 2) the old stoves used along with project ICS.

Hence in the first case, it will be simple multiplication of a fraction of the total number of project Improved cookstove displaced by old cookstoves by the total number of cookstoves in the project, to achieve precise results based on survey result sample size calculation can be repeated.

However, for the second case, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidence to determine the frequency of usage of both the project devices and baseline devices.

Quantity of woody biomass used by project devices in tonnes per device of type i and batch j ($B_{y=1,new,i,j,survey}$)

As mentioned above either separate sampling can be done for this parameter or can be clubbed with a sampling of the above parameters, wherein interview questions are to be included to determine the average fuelwood used by the project device.

(iv) Sampling Method

The sampling method for monitored parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ is Simple Random Sampling and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each Improved Cookstove in the target population is uniquely identifiable by its unique ID number. Each Improved Cookstove can thus be allocated a Sample Selection Number in each monitoring period, starting from 1 and increasing up to the total number of Improved Cookstove in the Database for that pre-defined sampling frame. Applying the random number generators, the Improved Cookstoves can then be randomly chosen from the defined population up to the required sample size as calculated by the Project Proponent.

To determine the parameters, sampling will involve the following approaches (outcome in brackets):

$N_{y,i,j}$: Visual inspection of the premises to see if improved cookstove is operational and in use. Interview with end-user is required to verify that improved cookstove is still in use (Yes/No)

$\mu_{y,i,j}$: Pre-project device only is in use then fraction to be used to calculate the total number, however, if -the pre-project device is used along with project improved cookstove, the proportion of usage of each will be determined by cooking habits evaluated by survey questionnaire during the monitoring period.

$B_{y=1,new,i,j,survey}$: Quantity of woody biomass used by improved cookstoves devices in tonnes per device (first year of installation)

Using the formulas in the section "Sample Size" below, the Project Proponent will randomly sample the required number of Improved cookstoves from the primary sampling units. It is important to note that for $\mu_{y,i,j}$: where partial usage of both old stoves and project improved cookstoves are observed, for each household under-sample cooking habits must be taken into consideration.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision for annual and 95/5 confidence/precision for biennial sampling.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, 95 per cent confidence level, and a 5 per cent margin of error, random samples will be selected from each Primary Sampling Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($N_{y,i,j}$), Quantity of woody biomass used by project devices in tonnes per device ($B_{y=1,new,i,j,survey}$) and the continued use of old stoves, ($\mu_{y,i,j}$). In line with sampling guidelines, all can be sampled in a single survey with a random sample of households using the above-described confidence/precision levels depending on annual or biennial monitoring frequency. The $N_{y,i,j}$) and $\mu_{y,i,j}$ requires proportion/percentage parameters, however, the wood consumption by ICS may have variation and will be a mean value.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guidelines for Sampling and surveys for CDM project activities and programmes of activities, version 04.0 Appendix 1 paragraph 5, there are different ways available to obtain the estimates of the parameter of interest.

(a) Refer to the result of previous studies and use these results.

(b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates.

(c) Use best guesses based on the researcher's own experiences.

For the registration purpose of the project, option C shall be applied. For the first monitoring period, values from a pilot shall be applied. For the following monitoring periods, the estimates shall be adjusted to take into account the results of the previous monitoring period(s) or the result from the recent pilot study, which is conducted after the previous monitoring periods.

To estimate the sample size for parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ the following equation is used.

$$n \geq \frac{1.96^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times p(1-P)}$$

Where:

n = Sample size
N = Population size (Total number of households/ICS)

p = Expected proportion
1.96 = Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1 = Represents the 10% relative precision

The following assumptions are made to exemplify the sample size calculation for parameters: $N_{y,i,j}$ and $\mu_{y,i,j}$. The Project Proponent envisage the distribution of 100,000 Improved cookstoves over the next 2 years year. Hence, population size, N, is taken as 100,000 households/ICS (Assuming one ICS for one household). It is expected at least 90% of ICS will be operational, hence the expected proportion p for $N_{y,i,j}$ is taken as 0.9.

Sample size calculation:

The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision (for biennial monitoring periods the sample sizes will be recalculated using 95/5 confidence/precision values). In all cases a conservative approach is taken, however, if for any parameter the required 95/10 confidence/precision is not met then the project proponent will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Parameter $N_{y,i,j}$: Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated as:

$$n \geq \frac{1.96^2 \times 100000 \times 0.5(1-0.5)}{(100000-1) \times 0.1^2 \times 0.5^2 + 1.96^2 \times 0.5(1-0.5)}$$

Inter Which comes out to be,
n ≥ 383
n= 400
Therefore, in this case, a sample size of 400 is to be sampled from each primary sampling unit. Project proponent has taken more number of sample cookstoves than required, to further decrease the margin of errors.

Data recording –

Data will be recorded for a-year post verification for the same monitoring period.

- Including-
- Sampling forms
- Stakeholders feedback forms
- ICS specifications
- Name and telephone number (if available), and address of recipient and Model/type of project technology sold/distributed
- unique identification alpha/numeric ID for each device that is sold/distributed

Monitoring and Maintenance Plan

The improved cookstove distribution grouped project implemented by Outreach Projects includes a plan for regular monitoring and maintenance of the cookstoves. To ensure that the cookstoves are well-maintained and continue to provide benefits to households, a ground level team has been assigned to each household where the cookstoves have been distributed. The team will visit households on a annual frequency to check the condition of the cookstove and provide any necessary maintenance or replacement. A designated team leader will be responsible for monitoring the team's activities and ensuring that all households are visited as scheduled. A register will be maintained for household, documenting the date of each visit, the condition of the cookstove, and any maintenance or replacement actions taken. In the event that a cookstove cannot be repaired or replaced on site, the team will coordinate with the project head to arrange for replacement from the site. The project head will oversee the team's activities, monitor the condition of the cookstoves, and coordinate with other project staff as needed.
The ground level team will also provide education and training to households on how to properly use and maintain the cookstoves, and will collect feedback from households on their experience with the cookstoves. By following this plan, the project will ensure that the improved cookstoves are well-maintained, replaced as needed, and continue to provide benefits to households over the long term.

The policies used for oversight and accountability of monitoring activities for improved cookstove project will include regular site visits by project managers to monitor the progress of the project, ensure that the installation and usage of the improved cookstoves is on regular basis and the users are properly trained. In addition, data collection on stove usage and fuel consumption would be carried out at regular intervals. Community meetings are also held to discuss the project and receive feedback from the users to ensure that the project is meeting their needs and expectations. Finally, the data collected would be properly analyzed and that any issues that arise are addressed promptly.

For the internal auditing and quality assurance/quality control procedures, the following steps are taken:

1. An internal audit team in Outreach Projects Pvt. Ltd. is appointed, which will conduct periodically meetings to ensure that the monitoring plan is being implemented effectively and efficiently.
2. The audit team will review the monitoring plan, data collection procedures, data management, and reporting processes.
3. The team will identify any non-conformances and suggest corrective actions to be taken by the implementing partners.
4. The implementing partners will take corrective actions to address the identified non-conformances.
5. The corrective actions taken will be documented and reported to the oversight agency for review and approval.

The internal audit and quality control procedures will be an ongoing process to ensure that the project is implemented as per the monitoring plan and is meeting its objectives.

For current distributed 9,200 cookstoves, the sample size calculation is done as follows:

$$n \geq \frac{1.96^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.96^2 \times p(1-p)}$$

Where;

n = Sample size
N = Population size (Total number of households/ICS)
p = Expected proportion
1.96 = Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1 = Represents the 10% relative precision

Putting the values for current monitoring period.

$$n \geq \frac{1.96^2 \times 9{,}200 \times 0.5(1-0.5)}{(9{,}200-1) \times 0.1^2 \times 0.5^2 + 1.96^2 \times 0.5(1-0.5)}$$

n = Sample size (369)
N = Population size (9,200)
p = Expected proportion (0.5)

To be reliable on the sample results and decrease the error, total of 400 random samples were conducted in the monitoring. The random number were generated using the data analysis tool of the excel and the survey were carried out on those.

The random number generated are described as below:

Random Sample Number of cookstove									
5186	4220	110	4797	2000	8617	1200	5022	2581	2083
6963	6898	7562	6727	8939	8903	1725	1428	7729	1408
4582	2425	8590	101	4943	6162	1467	3192	5779	3319
3799	8088	6774	7031	4311	829	6690	2144	6758	498
6662	4704	1996	6428	3517	1199	3788	4171	3958	6211
1664	5553	5013	8702	6955	4852	5214	764	7184	7510
1004	4711	1481	4751	5071	663	8678	5796	1585	2219
1829	4588	2287	1872	8871	4501	4842	5012	1917	4391
2516	2903	6432	2505	3026	5327	8741	132	210	3151
1040	4255	2991	268	6316	1714	3218	5063	6144	8812

3713	399	7219	4192	550	6171	5342	6339	7008	2785
6417	3324	4373	4990	2893	465	4880	3131	2857	1042
995	2552	254	6818	931	4227	776	794	8258	8775
2577	4261	5358	6296	7336	6637	1908	8455	8183	2843
8459	8940	5976	1337	7944	3502	5668	5639	5813	8336
2704	6573	8096	3456	406	3269	3497	8854	5627	2902
1715	3101	6169	87	4901	999	3848	870	3431	5106
4820	6017	1606	5167	4101	5850	361	3330	2343	622
2487	7271	8091	7347	7171	5825	7099	7466	4458	1202
7264	7311	4180	1376	1366	8186	3336	8071	8436	6533
7675	3350	448	2092	74	187	5552	5644	2093	7625
7390	1686	7159	2301	5369	8271	6315	2190	3116	1393
2668	2011	6520	6759	1222	1615	8542	4092	6661	5220
4245	7560	3499	7835	5829	7025	8589	6676	2941	8511
6585	7592	5307	5698	6559	6553	4060	3754	6217	1733
633	8823	8705	7932	2442	4215	4806	8977	850	748
8117	6802	3781	4493	3113	6244	7803	7313	1121	33
3090	7349	3962	1415	5381	1125	5332	1474	7989	8450
234	7092	5197	6982	3947	1901	4279	1495	5619	857
759	4345	3373	6653	1628	5255	4360	8434	1749	2041
3925	3018	6659	765	2949	2783	8861	7262	4497	6275
1112	1212	8754	8521	2587	6547	954	23	745	4785
3217	4875	8457	121	7458	6523	5412	5874	44	141
2307	1705	7621	2184	7564	5420	3177	642	989	3729
2315	3424	3732	6594	3666	7235	1598	2637	2620	1909
469	4737	5580	1051	6435	7194	6527	3587	710	5704
5956	3929	7563	3214	3302	2149	439	4089	34	7733
2710	2730	2490	587	8048	181	4935	7545	6160	1687
6375	56	4074	2250	6984	3606	1721	8576	404	2708
7902	350	2927	1156	8319	5513	8897	7798	4614	7888

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Project Proponent has started the distribution of First instance, in this grouped project. In first batch of the Instance 1: 9,200 improved cookstoves were distributed in various districts of Madhya Pradesh.

Monitoring period of the project: 20 November 2021 to 31 December 2022.

Data / Parameter	$N_{y,i=1,k}$
Data unit	Number
Description	Number of project devices
Value applied:	9,200
Comments	Cookstoves are distributed in different districts of Madhya Pradesh

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline stove
Value applied:	0.10
Comments	Default value as per methodology VMR0006 for baseline device as three-stone firewood stoves.

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
Value applied:	0.3423
Comments	Eco-mini cookstove

Data / Parameter	$B_{y=1,new,i,j,survey}$
Data unit	Tonne
Description	Quantity of woody biomass used by project device in tonne per device of type i
Value applied:	1.095
Comments	Survey was carried out with minimum sample size. For the improved stoves distributed in November and December-2021, the monitoring for the parameter $B_{y=1,new,i,j,survey}$ was carried out in month of February-2022 and for cookstoves distributed in month of January and February-2022 the monitoring of the parameter was done in month of April-2022.

Data / Parameter	Life span
Data unit	Years
Description	Project promoters to state the operating lifetime of the project device for projects opting Equation 5 for determining project stove efficiency
Value applied:	7
Comments	Manufacturer's specification for Eco-mini cookstove

Data / Parameter	$N_{y,i=1}$
Data unit	Number
Description	Number of project devices of type i operating in year y
Value applied:	9,200
Comments	NA

7.2 Baseline Emissions

The methodology does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves.

7.3 Project Emissions

The methodology does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves.

7.4 Leakage

Leakage shall be considered as default 0.95 in accordance to section 8.3 of the methodology VMR0006 Ver 1.1.

7.5 Net GHG Emission Reductions and Removals

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

$$ER_y = \sum_i \sum_j ER_{y,i,j} \quad \text{..... Equation 2}$$

Where:

i = Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire

j = Indices for the situation where there is more than one batch of improved cookstove of type i

ER_y = Emission reductions during year y in t CO2e

$ER_{y,i=1,j}$ = Emission reductions by improved cookstove of type i and batch j during year y in tCO2e And,

$$ER_{y,i,j} = B_{y,\text{savings},i,j} \times NCV_{woodfuel} \times f_{NRB} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95$$

Where,

$B_{y,savings,i,j}$ = Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y

$NCV_{wood\ fuel}$ = Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)

f_{NRB} = Fraction of woody biomass that can be established as non-renewable biomass f_{NRB} value (India= 91.19%)

$EF_{wf,CO2}$ = CO2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 112 tCO2/TJ)

$EF_{wf,non-CO2}$ = Non-CO2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 26.23 tCO2/TJ)

$N_{y,i,j}$ = Number of improved cookstoves of type i and batch j operating during year y

0.95 = Discount factor to account for leakage

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cookstoves is estimated by the following Equation:

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

Where:

η_{old} = Efficiency of baseline cookstove (10%)

$\eta_{new,I,j}$ = Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y, Alternatively, efficiency may be determined using Equation 5 of applied approved methodology (For instance 1, batch 1 efficiency of Improved cookstove is 36.42%)

$B_{y=1,new,i,survey}$ = 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. (Monitoring Survey: 2.982 kg /day/ household)

Example of calculation for woody biomass saving

$$B_{y,saving,i,j} = 1.095 \times \left(\frac{34.23}{10} - 1\right)$$

$$B_{y,saving,i,j} = 2.66\ tonnes$$

For emission reductions

$$ER_{y,i,j} = B_{\text{y,savings,i,j}} \times NCV_{woodfuel} \times f_{NRB} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95$$

$$ER_{y,i,j} = 2.66 \times 0.0156 \times 91.19\% \times (112.0 + 26.23) \times 9200 \times 0.95$$

$$\boldsymbol{ER_{y,i,j} = 47,426\ tCO_2e}$$

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Year 1 20-Nov- 2021 to 31-Dec-2021	0	2,309	0	2,309
Year 2: 01-Jan-2022 to 31-Dec-2022	0	45,118	0	45,118
Total	**0**	**47,426**	**0**	**47,426**

Vintage Year	Ex-ante emission reductions	Achieved Emission Reductions	Percentage Difference	Justification for the Difference
Total	51,449	47,426	7.82%	The cookstove are distributed in different months, hence the actual ERs are calculated on the basis of the number of days a cookstove have operated.
Year 1 20-Nov- 2021 to 31-Dec-2021	5,081	2,309	54.56%	only 5000 cookstove could be distributed in the period
Year 2: 01-Jan-2022 to 31-Dec-2022	46,367	45,118	2.69%	remaining other were distributed in the year

APPENDIX 1: DATA COLLECTION FORM

Cookstove Dissemination	
Surveyor Name (Enter the Unique ID)	
Cookstove Unique ID	
Household Information	
Name	
Husband/Father's Name	
Age	
Address	
Village, Tehsil	
District	
State	
Household Location	
Lat /Long	
Altitude	
Accuracy	
Number of Adult family members in the household	
Number of Children (<6Years) in household	
Government Documents	Voter Id Aadhar Card Pan card Driving License Other.
Document Number	
Is Document Verified	Yes/ No
Photo of the person with cookstove	
Current Cookstove details	Mud stove LPG stove Biogas stove Induction Other
Time is taken for forgoing wood (in hrs.)	
How much firewood is consumed in a day (in kg) in the baseline?	
From how long the cookstove and the firewood is used in the household?	
Declaration	

APPENDIX 2: COOKSTOVE TECHNICAL DETAILS

Cookstove technology has performance-based indicators mentioned below:

Sr.no	Indicators	ICS Performance (Based on section Appendix-1 of the methodology VMR0006)
1	Thermal efficiency	36.42%
2	Carbon monoxide emissions	2.13
3	Fine Particulate Matter Emissions	424.38
4	Safety	77.50
5	Durability	7 year

AGNEEKA ECO-MINI COOKSTOVE TECHNICAL DETAILS

Cook Stove Type/Category	Natural Draft	
Secondary Air Supply	Through Natural Draft	
Stove Material Used	Body	Mild Steel
	Body material thickness	0.6mm
	Combustion chamber	Stainless Steel
	Combustion chamber material thickness	1 mm
	Insulating Material	Thermal Wool
	Insulating Material Thickness	6 to 8mm
	Top Plate	Stainless Steel
	Top Plate Material Thickness	1 mm
Physical structure	External dissemination	Length: - 260mm Width: - 260mm

		Height: - 248m
	Combustion Chamber Dimension	Diameter: - 125mm
Grate Thickness	2 mm Material Mild Steel	
Weight Of the Stove	3.8 Kg	
Type of Fuel Wood	Firewood	
Feeding Process	Continuous Feeding Front Loading	
Expected life of stove	07 Years	
Guarantee /Warranty Period	2 Years	
Box Dimension	Outer Side Box Dimension	Length: - 300mm Width: - 300mm Height: - 270mm

APPENDIX 3: MONITORING SURVEY

Survey Form

Date: _____

1. General information /Household Profile:

Name (Household representative)	
Household Size (total number of people	
Address	
Phone number (if available)	
Date of Survey	
ICS Unique number	

2. Stove Description prior to the project implementation.

" A three – stone fire or a conventional system with no improved combustion air supply or flue gas ventilation system i.e. without a grate or chimney".	
Any other type of stove	

3. Household fuel consumption pattern in the project device for cooking:

How many meals did you prepare last week or last month?		Meals /Week or month	
	Yes /No	Meals / Week	Unit
Charcoal			Kg/month or year
Firewood			Kg/month
LPG			Kg or cylinder/month or year
Kerosene			Liters/ month or year
Coal			Kg/month or year
Electricity			Kwh/Month or year
Other Fuels (explain)			

4. Is there any smoke reduction while cooking by use of improved cookstove provided in the project?

Yes ☐
No ☐

5. How many times in a day, does new improved cookstove is being used?

_____

Name of the surveyor
Signature

Name of User
Signature