



SMG - COOKSTOVE PROGRAM 3



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1 PROJECT DETAILS

1.1 Summary Description of the Project

This project will help improve the livelihoods of rural and tribal communities in the project area by providing them with improved cookstoves, job opportunities, and increased awareness of GHG emissions. Through this community engaging project, we intend to introduce and educate the target population about healthy cooking techniques, lower their overall household air pollution (HAP), and minimize the health risks in homes caused by the smoke generated by using old mud or three-stone cookstoves.

The proposed project would replace the traditional high-emission and low-efficiency stoves used in rural areas in the project area with improved stoves (ICS), which are more thermally efficient and cause less pollution. The project not only aims to reduce greenhouse gas emissions but also creates a domino effect in the community by:

- providing employment opportunities through stove maintenance,
- reducing firewood collection time
- reduce the risk of assault experienced by women while collecting firewood
- and improve the overall health of families affected by household air pollution (PAH) due to the use of old and traditional stoves

The proponent of the project comes from the area in which the project is to be implemented and has a commitment to restoring and improving the livelihoods of the community. The proponent is also registered with the Indian government under the Companies Act. Through this project, the proponent will promote and coordinate the distribution of improved stoves which will be manufactured by accredited ICS manufacturers who meet the eligibility and target efficiency criteria for the project.

The initial project location will be all over India, and we will expand to other Asian and African countries in the following phases of the project. The KML files for the project will be provided in the VCS MR at the time of project activity instance inclusion during verification of project activity. In Section 1.10, we provide more information about the location. Through this project, improved stoves (ICS) will replace traditional stoves and three-stone stoves. These ICSs burn more efficiently and improve heat transfer to the pot, thereby saving fuel and reducing greenhouse gas (GHG) emissions.

The baseline for the project is for the targeted people to continue using firewood in the project area to meet their thermal energy needs provided by our innovative stoves (ICS) when the project is inactive.

Currently, one instance of the project activity is scheduled to include the delivery of 20,000 ICS. This number is subject to change during implementation and will be updated. Average annual

GHG emission reduction from the first project activity instance is 85,432 tCO₂e for 20,000 Cook Stoves.

1.2 Project Eligibility

This project involves the distribution of energy efficient cookstoves which fall under the category of efficiency improvements in thermal applications. The ICS which will be distributed under this project has a thermal efficiency of 35.4% or 0.354. The thermal efficiency is better than the traditional stoves and thus results in energy efficiency improvement and does not exceed the equivalent of 60 giga watt hour thermal (GWhth) per year of energy savings. Hence the project activity is eligible in Sectoral scope 3 i.e., energy demand under the scope of the VCS Program.

The Sectoral Scope and Project Type:

- Sectoral Scope: 03
- Project Type: Type II – Energy Efficiency Improvement Project
- This is a grouped project.

1.3 Project Design

This is a grouped project

Eligibility Criteria

For the inclusion of new project activity instances:

No.	Criterion	How the new project activity instances to comply
1.	Meet the applicability conditions set out in the methodology applied to the project	New project activity instances (Energy Efficient Cook Stoves) will meet the applicability conditions set out in Section 3.2 where the target of the end-user is household and the ICS deployed is at least 25% of thermal efficiency.
2.	Use the technologies or measures specified in the project description.	The technology used for project activity is energy efficient cook stoves. Only energy efficient cook stoves to be adopted in the project by replacing traditional cook stoves in household.
3.	Apply the technologies or measures in the same manner as specified in the project description.	Only energy efficient cook stoves to be adopted in the project by replacing traditional cook stoves in household.
4.	Are subject to the baseline scenario determined in the project description	The new project activity instances will be installed within India initially and will expand the same for

	for the specified project activity and geographic area.	other countries and subject to the same baseline scenario determined in Section 3.4.
5.	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	All new project activity instances will use the activity method for demonstration of additionality. Step 1: Regulatory Surplus There is no mandated government programme or policy in host country of this project ensuring the distribution of new energy efficient cook stoves for each project activity instances. Step 2: Positive List The inclusion of new project activity instances will comply with positive list as it satisfies criterion 1 where it meets all the applicability conditions of the methodology.
6.	Where a capacity limit applies to a project activity included in the project, no project activity instance shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows: Each project activity instance that exceeds one percent of the capacity limit shall be identified. Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters. None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause any of	No project activity instance shall exceed the applicable limit, which is 180 GWhth/y. Thus, no divide of project activity instance into clusters is required. There is no capacity limit exceed for each project activity instances as each project activity instance meets applicable limit, which is 180 GWhth/y

	the clusters to exceed the capacity limit.	
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Along with above points, the Inclusion of New Project Activity Instances follows below criteria

Grouped projects provide for the inclusion of new project activity instances after the initial validation of the project.

No.	Criterion	How the new project activity instances to comply
1.	Occur within one of the designated geographic areas specified in the project description	New project activity instances (Energy Efficient Cook Stoves) will be occurred in the designated geographic areas specified in the project description.
2.	Comply with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial compliance with multiple sets of eligibility criteria is insufficient.	New project activity instances will comply with complete set of eligibility criteria as mentioned above for the inclusion of new project activity instances.
3.	Be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body.	New project activity instances information be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body
4.	Be validated at the time of verification against the applicable set of eligibility criteria	New project activity instances should be included by validating eligibility criteria as mentioned in this document
5.	Have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance (i.e., the date upon which the project activity instance began reducing or removing GHG emissions)	New project activity instances ownership needs to be evidenced from start date of respective project activity instance.

6.	Have a start date that is the same as or later than the grouped project start date	New project activity instances start date should be after the start date of grouped project activity
7.	Be eligible for crediting from the start date of the instance through to the end of the project crediting period (only). Note that where a new project activity instance starts in a previous verification period, no credit may be sought for GHG emission reductions or removals generated during a previous verification period (as set out in Section 3.4.4 of VCS standard version 4.1) and new instances are eligible for crediting from the start of the next verification period	New project activity instances are eligible to claim credits from crediting period start date to the end of the project crediting period

1.4 Project Proponent

Organization name	Shri Maa Marketing Pvt. Ltd.
Contact person	Mr. Deep Ram Gupta
Title	Vice President – Green Projects
Address	Plot 1, Sector C, Govindpura Industrial Area, Bhopal, India – 462023
Telephone	+91- 989 375 8888
Email	deep.gupta@shrimaagroup.in

Other Entities involved in the Project

Organization name	-
Contact person	-
Title	-
Address	-
Telephone	-
Email	-

1.5 Ownership

The project ownership is with Shri Maa Marketing Pvt. Ltd.

During the registration of ICS, the participating household will sign a declaration to replace existing cook stoves with the provided ICS and will transfer ownership rights of carbon assets generated from this project to the project proponent.

1.6 Project Start Date

01-January-2023 (expected start date for commissioning of the first batch of ICS).

1.7 Project Crediting Period

01 January 2023 to 31 December 2030, seven years renewable crediting period. Can be renewed 2 more times bringing the total crediting period to twenty-one years

1.8 Project Scale and Estimated GHG Emission Reductions or Removals

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

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

☐ >1,000,000 tCO₂e/year The project activity falls under small-scale project category since the annual average GHG emission reductions are less than 300,000 tCO₂e

Project Scale	
Project	[X]
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1 (01-January-2023 to 31-December-2024)	118,953
Year 2 (01-January-2024 to 31-December-2025)	105,527
Year 3 (01-January-2025 to 31-December-2026)	93,611
Year 4 (01-January-2026 to 31-December-2027)	83,035
Year 5 (01-January-2027 to 31-December-2028)	73,649
Year 6 (01-January-2028 to 31-December-2029)	65,319
Year 7 (01-January-2029 to 31-December-2030)	57,928
Total number of crediting years	7
Average annual ERs	85,432

1.9 Description of the Project Activity

The project involves distribution of fuel-efficient improved cookstoves (ICS) which are MNRE, and BIS (Bureau of Indian Standard) approved state of art and of environmentally sound technology. These stoves will replace the standard cookstoves used in the project area household. The ICS will have an average lifespan of 7 years and an efficiency of 35.40%.

The ICS to be deployed through the project is a single pot, portable stove which improves the efficiency of combustion and the thermal transfer to the pot compared to the traditional or three-stone stove. This is made possible by incorporating energy efficient technology which provide a conductive environment for clean and efficient combustion of biomass. This technology also helps in substantially reducing the biomass fuel consumption compared to the traditional stove or the three-stone stove.

Data collection of the ICS end-user:

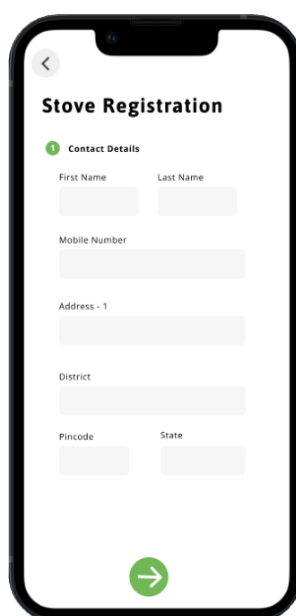
Each ICS will be given a unique serial number which will be stored in a mobile application developed by the project proponent. During the distribution and installation of ICS, the team will have a mobile application, which will be used to take picture of installation along with beneficiary and will include the following basic information for tracking and monitoring mechanism:

- Name of the ICS User/ Head of the household
- Address of the ICS User
- Contact Number of ICS User
- The serial number of ICS, wherever applicable along with pictures
- Date of installation
- Installer's name and number

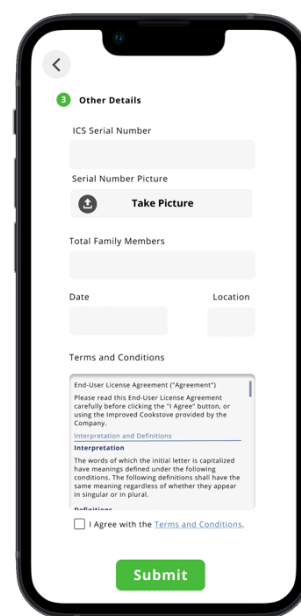
Here are some screenshots of the app, we will be using to register user and monitor ICS usage:



People helping us distribute ICS will be able to log-in to our app



App will help people register ICS users with along with their details



Stove serial number, its picture and terms & conditions for the ICS

Measures undertaken:

The project proponent will work with local non-profits, head of tribes, and head of villages to identify families living in villages of project area. We will set following parameters to select households: Type and condition of house, Availability of regular usable clothes, Protection of food or food security, Availability of drinking water, Heights /Level of literacy, Source of livelihood goods, Number of children in age group (5 to 14), and households not covered under any government schemes.

The household filtered by these parameters will be provided with an improved cook stove system. These household considered as end users of cook stoves are poor enough to not being able to afford cook stoves and are also least interested towards investment as plenty of firewood is available for free. So, in absence of the improved cook stove the household would have continued with traditional cooking practice.

1.10 Project Location

The project will initially undertake within the boundary of India and specifically in the underserved and untapped tribal communities of the country. The project will later then expand into other Asian and African countries.

The initial project instance will begin in Central India, specifically in the states of Madhya Pradesh and Chhattisgarh

The geographical boundary for the project located in India are in the form of extreme geographic coordinates of India as follows:

Latitude - 8° 4' to 37° 6' N

Longitude - 68° 7' to 97° 25' E

This information can be verified from the following link:

- https://en.wikipedia.org/wiki/Geography_of_India



1.11 Conditions Prior to Project Initiation

The conditions prior to the project initiation is the continued use of non-renewable biomass (firewood) to meet their thermal energy requirements. It is estimated that 90% of the rural India's population still cooks food using biomass fuel¹. The women also spend over 6 – 7 hours every week collecting firewood for the mud/three-stone cookstoves. Through this project we aim to reduce the use of fossil fuels and biomass needed to cook food.

¹<https://researchmatters.in/news/promoting-improved-cookstoves-can-benefit-rural-households>



Images highlight daily cooking practices in our project areas; Women and young girls use open fires, three-stone pots, cow-dung, etc. to cook and boil water

1.12 Compliance with Laws, Statutes and Other Regulatory Frameworks

According to the Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S .O.1533(E), dated 14/09/2006; the project activity of utilization of Improved Cookstove for cooking in rural households does not require environmental impact assessment study to be carried out.

The project is a voluntary effort by project proponent. Though, the government of India promotes use of clean fuel e.g., LPG, however due to the initial capital cost and operating cost, the usage levels are low and most of the rural households still use traditional stoves for cooking. There is no specific concern made on improved cookstoves project from the above laws and regulations.

1.13 Participation under Other GHG Programs

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

The project is neither registered nor seeking registration under any of the current GHG programs. The project has also not participated under any other GHG programme.

Projects Rejected by Other GHG Programs

The project participant hereby declares that it has not been rejected by any other GHG programme.

1.14 Other Forms of Credit

Emissions Trading Programs and Other Binding Limits

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

☐ Yes

☒ No

If yes, provide the name of the emissions trading program or other mechanism that allows GHG allowance trading.

Other Forms of Environmental Credit

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

☐ Yes

☒ No

If yes, provide the name of the other program(s) under which the project has sought or received another form of GHG-related credit.

1.15 Sustainable Development Contributions

The project contributes in various ways toward the social, environmental, economic, and technological benefits for continuous development of not only the environment but also the country:

Social Benefits:

- Improves overall health of the women and children by reducing household air pollution (HAP), which in turn decreases health hazards
- Faster cooking time - the materials used in making ICS transmit the heat effectively cooking the food faster

- The cooking environment is better due to less smoke and carbon residue in the kitchen
- Reduces drudgery to women (due to reduced fuelwood use) who spend long hours and travel long distances to collect fuelwood
- Better quality of life – the rural communities get more family time as the whole family can sit and eat together

Environmental benefits:

- Improves the local environment by reducing the rate of degradation of forests and deforestation in the project location
- Reduces global and local environmental pollution and environmental degradation by less usage of non-renewable biomass thus leading to a reduction in GHG emissions
- Reduces the indoor pollution – the ICS emits very less smoke when compared to the traditional three-stone chulhas used in most of the project area. This lower smoke helps in reducing respiratory diseases and other health hazards, as well as medical expenditure.
- Requires less water and effort to clean vessels and kitchen since less smoke is generated

Economic benefits:

- Employment will be generated in the project area through the maintenance of the improved cookstoves in the project area
- Reduce the cost of purchase of fuelwood, if any and/or increases wage equivalent time as it reduces firewood collection time

Technological Benefits:

- Helps introduce newer technologies to the rural communities.
- Transfers knowledge to users, trainers and technicians for usage and maintenance of ICSs
- Influences other communities in different states to adopt to better and more efficient practices

1.16 Additional Information Relevant to the Project

Leakage Management

Not applicable for this project report.

Commercially Sensitive Information

No commercially sensitive information has been hidden/excluded from the public version of the project report.

Further Information

No further information.

2 SAFEGUARDS

2.1 No Net Harm

No potential negative environmental or socio-economic impact have been identified for the project, according Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S.O. 1533 (E), dated 14/09/2006. Instead, the project will bring positive impacts on the environmental and socio-economic aspects to the project area as mentioned in section 1.16.

2.2 Local Stakeholder Consultation

This section will be filled once the local stakeholder consultation is concluded.

2.3 Environmental Impact

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

2.4 Public Comments

This section will be completed after 30 days public comment period.

2.5 AFOLU-Specific Safeguards

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

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The following approved baseline & monitoring methodology is applied:

Methodology: VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves

Version: 1.1

Date of Issue: 22-07-2021

Sectoral Scope: Scope 03 – Efficiency Improvement

- <https://verra.org/methodology/vmr0006-methodology-for-installation-of-high-efficiency-firewood-cookstoves/>

This methodology also refers the latest version of AMS II.G version 12 - Energy efficiency measures in thermal applications of non-renewable biomass

- <https://cdm.unfccc.int/methodologies/DB/10PELMPDW951SVSW1B2NRCQEBAX96C>

For calculation of fraction of non-renewable biomass, the below tool is used “TOOL30: Calculation of the fraction of non-renewable biomass”

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

3.2 Applicability of Methodology

S. No.	VCS Methodology requirement	Project Justification
1.	Project activities shall be implemented in domestic premises, or in community-based kitchens.	The project will replace the traditional or three-stone cookstoves in households of tribal/ rural communities of project area.
2.	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	The stoves that are being planned to be deployed in the project area have a thermal efficiency of 35.40% as per the manufacturer's specifications.
3.	Both 'Projects' and 'Large Projects' can use this methodology.	Each project activity will be under the 'project' part.
4.	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports, or statistics	The justification for the presence of the use of non-renewable biomass is demonstrated below.
5.	For the specific case of biomass residues processed as a fuel (e.g., briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g., shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with	The ICS is being introduced as an energy efficient replacement to the traditional & three-stone stoves and to also reduce the use of non-renewable biomass. The consumption of the fuel used in project activity will be monitored. The utilization of Briquettes along with their manufacturing and transportation will be monitored to calculate the emissions.

	the processing of the displaced fossil fuel and hence disregarded.	
6.	The CDM-PDD or CDM-PoA-DD/CPA-DD 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)	Every improved cookstove that will be distributed will have a unique serial number. During the distribution, the serial number and the exact location of ICS sold will be recorded in our app. No double counting of emission reductions occurred due to unique identifications of product and end-user location.
7.	The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The manufacturer or the cook stove distributors will make sure that no double counting for carbon emission takes place. All the credit that is generated from the project will be owned by the project proponent, i.e., Shri Maa Marketing Private Limited.

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.

Justification:

The proof that the use of biomass has been popular since 31st December 1989 is available through widespread documentations, one of reports¹ by National Sample Survey Organization (NSSO) shows that 79% of the Indian population were dependent on firewood and chips in the year 1987-88.

The same article then reports that 78% of the rural households in India were dependent on firewood and chips in the year 1993-94. In the same report, NSSO talks about how firewood is one of main sources of energy in the rural India.

This clearly shows that the project region, the rural part of India, has been dependent on firewood and other non-renewable biomass as a source of thermal energy before and after 1989.

¹http://mospi.nic.in/sites/default/files/publication_reports/410_2_part2_final.pdf

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 ₂ O	YES	Major Source
Project	Emission from use of non- renewable biomass/Fossil fuel	CO ₂	YES	Major Source
		CH ₄	YES	Major Source
		N ₂ O	YES	Major Source

3.4 Baseline Scenario

The baseline scenario for the project is the continued use of non-renewable biofuel in the project area by the targeted people to meet their thermal energy needs as provided by our Improved Cookstoves (IC) in absence of the project activity.

3.5 Additionality

The methodology uses activity method for the demonstration of additionality

Activity Method:

Step 1: Regulatory Surplus

There is no mandated government program or policy in host country (India) of this project ensuring the distribution of domestic fuel-efficient cookstoves. The project is not mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework.

Households may only participate voluntarily in this project. It is hereby confirmed that the proposed project is a voluntary coordinated action by Shri Maa Marketing Pvt Ltd.

Step 2: Positive List:

As per the section 3.2, this project meets the applicability conditions of the methodology which represents the positive list.

The project is not implemented as part of any government scheme or supported by any multilateral funds.

Conclusion: As the project fulfils the conditions above, it is deemed additional.

3.6 Methodology Deviations

Not Applicable, as there are no methodological deviations for this project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

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

4.2 Project Emissions

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

4.3 Leakage

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

4.4 Net GHG Emission Reductions and Removals

The equations 1 and 2 of the methodology will be considered and applied to calculate the net Green House Gas emission reductions.

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

Where:

i	Indices for the situation where more than one type/model of improved cook stove is introduced to replace three-stone fire
j	Indices for the situation where there is more than one batch of improved cook stove of type i
ER_y	Emission reductions during year y in t CO ₂ e
$ER_{y,i,j}$	Emission reductions by improved cook stove of type i and batch j during year y in t CO ₂ e

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

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
$f_{NRB,y}$	Fraction of woody biomass that can be established as non-renewable biomass (fNRB)

Rural Population of India: 900,239,774

% Of population dependent on Firewood: 74%

Population dependent on Firewood: 666,177,433

Total Firewood used per household: 121.19 kg/month

Firewood Requirement: 242,202,129 tonne/year

Total Sustainable Biomass Available: 18,374,674.86

NRB: 204,892,738

$$f_{NRB,y} = 0.846 \text{ or } 84.6\%$$

$NCV_{wood\ fuel}$	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne) ⁶
$EF_{wf,CO2}$	CO2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO2/TJ)
$EF_{wf,non\ CO2}$	CO2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO2 /TJ)
$N_{y,i,j}$	Number of improved cook stoves of type <i>i</i> and batch <i>j</i> operating during year <i>y</i>
0.95	Discount factor to account for leakage

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cook stoves can be estimated by the following equation:

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

Where:

η_{old}	Efficiency of baseline cookstoves
$\eta_{new,y,i,j}$	Efficiency of the improved cook stove type <i>i</i> and batch <i>j</i> determined through water boiling test (WBT)
$B_{y=1,new,i,j,survey}$	Annual quantity of woody biomass used by improved cook stoves in tonnes per device of type <i>i</i> and batch <i>j</i> , determined in the first year of the implementation of the project through a sample survey

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

Where:

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

publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.

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

For the scope our project area, following assumption are considered:

- The project effort will install 20,000 Improved Cook Stoves
- Life span of Improved Cook Stoves is 7 years, as provided by the manufacturer

Calculation 1: Yearly new stove efficiency using (equation 5)

Assumptions:

- Starting efficiency of new stove = 35.4%
- Value of $DF_n = 0.99$, based on default value as per methodology mentioned above

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

Outputs:

Year	$\eta_{new,i,y}$
1	33.28%
2	32.94%
3	32.61%
4	32.29%
5	31.96%
6	31.65%
7	31.33%

Calculation 2: Yearly number of operational stoves

Assumptions:

- Annual stove loss rate is considered 10%

$N_{y,,}$ = Number of stoves in scope x $(1-(y-1) \times \text{loss rate})$

Outputs:

Year	N_y
1	20,000
2	18,000
3	16,200
4	14,580
5	13,122
6	11,810
7	10,629

Calculation 3: Yearly woody biomass saved in tonne per ICS per year

Assumptions:

- Upon initial survey with the households in our project region, it is concluded that Estimated wood biomass consumption in households is ~4.04kg, resulting into $B_{y=1,new}$ to be 1.474/ tonne/stove/ year; assuming stove being operational 365 days
- Efficiency of traditional stoves being replaced – 10%

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

Outputs:

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,i,y}$	η_{old}	$B_{y,savings,i,j}$
1	1.47	33.28%	10%	3.432
2	1.47	32.94%	10%	3.383
3	1.47	32.61%	10%	3.334
4	1.47	32.29%	10%	3.286
5	1.47	31.96%	10%	3.239
6	1.47	31.65%	10%	3.192
7	1.47	31.33%	10%	3.145

Calculation 4: Yearly emission reductions by ICS

Assumptions:

- $NCV_{wood\ fuel}$ is going to be 0.0156 TJ/ tonne, as per default value indicated in the methodology above

- EF_{wf,CO_2} to be 112 tCO₂/TJ and $EF_{wf,non\ CO_2}$ to be 26.23 tCO₂/TJ, as per default value indicated in the methodology above

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

Year (y)	$B_{y,savings,i,j}$	$(EF_{wf,CO_2} + EF_{wf,non\ CO_2})$	N_y	$ER_{y,i,j}$
1	3.432	138.23	20,000	118,953
2	3.383	138.23	18,000	105,527
3	3.334	138.23	16,200	93,611
4	3.286	138.23	14,580	83,035
5	3.239	138.23	13,122	73,649
6	3.192	138.23	11,810	65,319
7	3.145	138.23	10,629	57,928

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1	118,953	0	0	118,953
Year 2	105,527	0	0	105,527
Year 3	93,611	0	0	93,611
Year 4	83,035	0	0	83,035
Year 5	73,649	0	0	73,649
Year 6	65,319	0	0	65,319
Year 7	57,928	0	0	57,928
Total	598,022	0	0	598,022

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	NCV _{wood fuel}
Data unit	TJ/Tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	Default as per applied approved methodology VMR0006
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology
Purpose of Data	Calculation of emission reduction
Comments	-

Data / Parameter	EF _{WF, CO2}
Data unit	tCO2/TJ
Description	CO2 emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology
Purpose of Data	Calculation of emission reductions
Comments	-

Data / Parameter	EF _{WF, non-CO2}
Data unit	tCO ₂ /TJ
Description	Non- CO ₂ emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006
Value applied	26.3
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology
Purpose of Data	Calculation of emission reductions
Comments	-

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	Methodological default value
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
Purpose of Data	Calculation of emission reductions
Comments	-

Data / Parameter	η_p
Data unit	Fraction
Description	Efficiency of project stove at the start of project activity
Source of data	Manufacturer specification
Value applied	0.354
Justification of choice of data or description of measurement methods and procedures applied	The parameter shall be determined ex-ante
Purpose of Data	Calculation of emission reductions
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,j}$
Data unit	Number
Description	Number of project devices of type I and batch j operating during year y
Source of data	Monitoring
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and program of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	For ex-ante emission reduction calculation, it is assumed that the project will distribute up to 20,000 ICS for project activity instance
Monitoring equipment	Monitoring Survey

QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of data	Calculation of emission reductions
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	-

Data / Parameter	$\eta_{new,i,j}$																
Data unit	Fraction																
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity																
Source of data	Manufacturer specification or Certification by a national standards body or an appropriate certifying agent recognized by that body																
Description of measurement methods and procedures to be applied	To adopt Option V given in the methodology: "Efficiency of the improved cookstoves to be estimated using equation 5 of applied approved methodology where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored"																
Frequency of monitoring/recording	Annual																
Value applied	0.354 at start of operations <table border="1"> <thead> <tr> <th>Year (y)</th><th>$\eta_{new,i,j}$</th></tr> </thead> <tbody> <tr> <td>Year 1</td><td>33.28%</td></tr> <tr> <td>Year 2</td><td>32.94%</td></tr> <tr> <td>Year 3</td><td>32.61%</td></tr> <tr> <td>Year 4</td><td>32.29%</td></tr> <tr> <td>Year 5</td><td>31.96%</td></tr> <tr> <td>Year 6</td><td>31.65%</td></tr> <tr> <td>Year 7</td><td>31.33%</td></tr> </tbody> </table>	Year (y)	$\eta_{new,i,j}$	Year 1	33.28%	Year 2	32.94%	Year 3	32.61%	Year 4	32.29%	Year 5	31.96%	Year 6	31.65%	Year 7	31.33%
Year (y)	$\eta_{new,i,j}$																
Year 1	33.28%																
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Year 3	32.61%																
Year 4	32.29%																
Year 5	31.96%																
Year 6	31.65%																
Year 7	31.33%																
Monitoring equipment	Not Applicable																

QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	As per equation 5 of VMR0006 i.e. $\eta_{\text{new},i,j} = \eta_P \times (DF_n)^{y-1} \times 0.94$
Comments	-

Data / Parameter	$B_{y=1,\text{new},i,j,\text{survey}}$
Data unit	Tonnes
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 Data
Description of measurement methods and procedures to be applied	Minimum sample size of each type i and batch j should be in line with the latest version of Standard for sampling and surveys for CDM project activities and programme of activities or guidelines provided in methodology Section 8.4 option (b). Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, $y=1$) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied. (i) Baseline cookstoves have been completely decommissioned and only improved cookstoves are exclusively used in the project households; (ii) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of 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 calculation, the value is assumed to be 4.04kg/device/day or equal to 1.474 tonnes/device/year.
Monitoring equipment	Monitoring Survey

QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	-

Data / Parameter	Life Span
Data unit	Number of 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 to be applied	The data source as per manufacturer specification
Frequency of monitoring/recording	Once at the time of installation of batch of type of stove
Value Applied	7
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	-

Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of

	commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.
Source of data	Project Database
Description of measurement methods and procedures to be applied	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Value Applied	Expected Start Date January 1, 2023
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	-

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	This parameter should be monitored using one of the following methods: If the baseline cookstoves are decommissioned and no longer used, as determined by the monitoring survey its value is 0 and Bold, adjusted is equal to Bold. If both the improved cookstove and baseline cookstoves are used together then surveys shall be conducted to record the average continued operation of baseline cookstoves in a sample of households. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidences to determine

	the frequency of usage of both the improved cookstoves and baseline cookstoves.
Frequency of monitoring/recording	At least once in 2 years
Value Applied	1
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	A 95 /10 confidence / margin of error shall be achieved for the sampling parameter irrespective of annual / biennial monitoring frequency as per para 22 of Standard: Sampling and surveys for CDM project activities and program of activities, Version 07.0. In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves.
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	-

5.3 Monitoring Plan

The main purpose of this monitoring plan is to ensure a successful monitoring of carbon emission reduction in the above-mentioned project area. The overall monitoring will be conducted by project participant: Shri Maa Marketing Pvt Ltd, India.

The monitoring will involve data collection during distribution of ICSs as well as its usage information post distribution. Project participant has developed its proprietary cloud-based mobile application that will be used to gather end-user data, including customer contact details along with identification number, wherever applicable and photographs of customers receiving ICS. Following details stored on the app will be available real-time for any analysis:

- Name of the customer
- Address of the customer
- Phone Number of the customer
- Customer's government identification
- Total number of family members

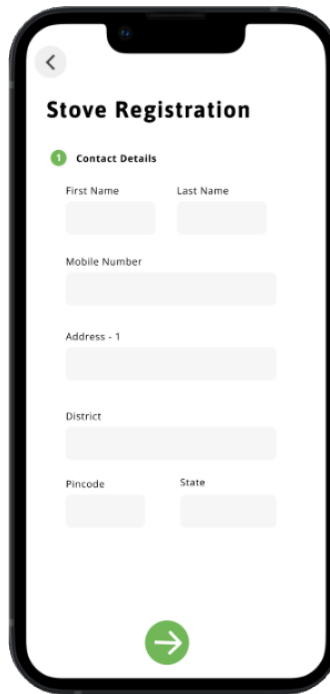
- Date of Distribution

After distribution monitoring will involve choosing a sample of ICS customers from several districts/ villages where ICS has been distributed and these locations will be visited for verification. Other methods that will be used for monitoring will involve calls to random customers to get updates about ICS and its performance. All the data collection and handling will be done in a transparent way on the mobile application and will be available on the cloud server to be accessed anytime. If any uncertainty occurs, it will be rectified, and a revised monitoring plan will be implemented.

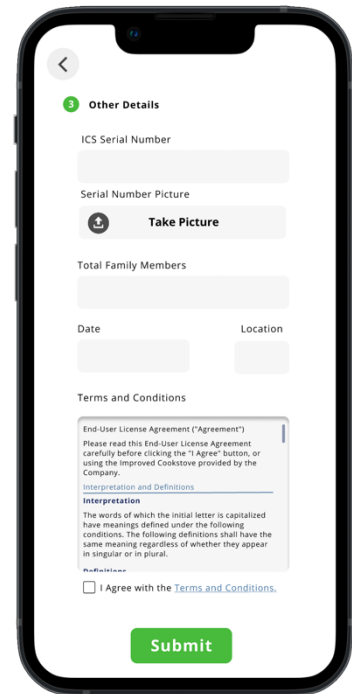
Attaching below the screenshots of mobile application that will be used to store, analyze, and monitor customer and ICSs:



People helping us distribute ICS will be able to log-in to our app



App will help people register ICS users with along with their details



Governemnt ID, customer picture, and stove details will be uploaded

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 “Sampling and surveys for CDM project activities and programme of activities”, version 04.

○ 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, 90/10 confidence/precision shall be applied for 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, 90/10 confidence/precision to be adopted for small-scale project and 95/10 for large-scale project. Given that the size of the project is under the category of small projects, hence 90/10 confidence/precision shall be adopted for all parameters unless the average annual emission reductions of the project below the threshold

Monitored Parameters:

S. No.	Monitoring Parameters	Sampling Parameters	Parameter Type	Monitoring Frequency
1.	$N_{y,i,j}$	Proportion of ICS still in operation	Proportion	Biennially
2.	$B_{y=1,new,i,j,survey}$	Daily consumption of woody biomass per ICS	Mean Value	Determined in the first year of project implementation

Target Population:

The target population will be set of ICS deployed under the project.

Sampling Method:

The project involves distribution of ICS throughout the project area where it will replace the traditional cookstoves and the traditional cooking practices. The population is heterogeneous in nature i.e., common technology with similar operating characteristics but dispersed i.e., distribution of ICS is spread across different districts within Madhya Pradesh, Chhattisgarh, Uttar Pradesh. The population consists of sub-populations which are homogeneous called as Strata. The characteristics of population (for example quantity of biomass consumed) are more similar within the stratum (ICS of same type, vintage and zone in which they are operating) than across the strata. Therefore, Stratified Sampling technique will be used to conduct sampling survey among ICS batches.

The populations of each batch will be combined together, the sample size is determined, and a single survey will be undertaken to collect data. To ensure the survey result is representative of the entire population, the dissimilarity (such as ICS type, vintage and zone in which they are operating) within the included CPAs will be taken into account in the sample size calculation. The ICS of same type, vintage and zone in which they are operating will be grouped in the same strata. Samples will be drawn by using the random number generator.

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

$N_{y,ij}$	Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)
$B_{y=1,new,ij,survey}$	Interview with end user and estimate the daily consumption of woody biomass of ICS (Daily consumption of woody biomass)

Sample Size:

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, a 90 per cent confidence level, and a 10 per cent margin of error, a random sample will be selected from each strata.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guideline for Sampling and surveys for CDM project activities and programmes of activities, version 04.0, 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.

Proportion Parameter

To estimate the sample size for proportion parameters, the following equation is used:

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

Where:

$$V = \left(\frac{SD}{p} \right)^2$$

n		Sample Size
N		Population Size (Total number of households or ICS)
p		Weighted overall expected mean
SD²		Weighted overall expected variance

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

Sample Size Calculator:

Proportion Parameter:

To estimate the sample size for proportion parameters, the following equation is used:

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

Where:

$$V = \left(\frac{SD}{p} \right)^2$$

n	Sample Size
N	Population Size (Total number of households or ICS)
p	Weighted overall expected mean
SD²	Weighted overall expected variance
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

We will plan to collect more samples than the required/ calculated sample size from the above method.

The representatives will check the identified sample stoves. These details will include name, number, address, government ID, etc. The data collection will take after 3-month of distributing the ICSs.