GLOBAL COOKSTOVE PROGRAM (EKI– PINK CITY)

EKI Energy Services Limited

Project Title	Global Cookstove Program (EKI – Pink City)
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The main purpose of the grouped project activity is distribution of fuel-efficient improved cook stoves (ICS) across rural households in Dhar, Barwani and Mandla district of Madhya Pradesh in India[1]. The ICS disseminated through this project has replaced the traditional low efficient cook stoves (three stone cookstoves) used by households in the pre project scenario. The project proponent has in addition to the distribution of ICS, also sensitized the end users about the social and health benefits of ICS usage and trained the users regarding proper usage of ICS. Mechanism has also been institutionalized through local team of ICS distributor to ensure constant users' coordination and periodic check to guarantee the usage of ICS and forbid shifting to traditional cookstove usage. Not only the use of ICS will slow down the rapidly progressing deforestation but has also reduced health hazards from indoor air/smoke pollution and women and children spending less time in collecting firewood.

Technology

The project activity includes dissemination of single pot, natural draft improved cookstoves (Model-Agneekaa Eco Mini Stove Model No 4 SE) with operating efficiency of 36.42%[2].

Location

The location of initial project activity instances (44,648 numbers of ICS) are Dhar, Barwani and Mandla district of Madhya Pradesh in India and may expand further to other parts of India. The project proponent has distributed 44,648 numbers of ICS in Madhya Pradesh till the submission of the Joint PD & MR.

Pre-Project Scenario

Through this project, the distribution of high thermal efficient improved cookstoves were carried out across households using traditional and inefficient cookstoves for cooking in the pre-project scenario[3]. Non-renewable biomass collected from the forest/ plantation outside forest area were used in the traditional three stone cookstoves for cooking resulting in emission of greenhouse gases. Distribution of ICS has in turn substituted the currently used traditional and inefficient cookstoves by households and resulted in reduced consumption of fuel wood. The baseline scenario is therefore the continued use of non-renewable biomass (fire wood) in inefficient three stone cookstoves by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

Project activity resulting in emission reduction

The ICS burns fire wood more efficiently thereby improving thermal energy transfer to pots, hence results in saving of fire wood and avoids associated emission of greenhouse gases from combustion of non-renewable biomass.

[1] The project locations for initial project activity instances are Dhar, Barwani and Mandla districts of Madhya Pradesh in India. The project boundary may expand further to other parts of India including Madhya Pradesh

[2] Detailed technical specification is presented under section 1.11 of the revised joint PD &MR

[3] Pre-distribution inspection were carried out across selected households (in accordance to the beneficiary selection criteria) to ensure beneficiary were using fire wood in rudimentary mud or three-stone stoves and are not using LPG or any kind of improved cookstoves for the purpose of cooking.

As the target population were unable to afford the ICS, project proponent have distributed ICS free of cost including commitment for undertaking of free maintenance of the ICS across the project lifetime. The end users are informed in advance that the use of ICS generates carbon finance which in turn is used to cover the price of ICS and for recovering project implementation costs.

The project proponent has considered one improved cookstove (ICS) as one instance for the current grouped project activity. Therefore, under current grouped project activity, 44,648 project activity instances (ICS) were installed (till the date of submission of this joint PD and MR). The first Instance under this grouped project activity was implemented on 05-December--2022.

Estimate of Emission Reduction

The average annual GHG emission reduction from the group project activity is expected to be 231,810 tCO_{2e} per year for the implemented 44,648 instances (i.e., ICS) and 1,622,675 tCO_{2e} for the group project activity over the entire crediting period. The average annual GHG emission reduction for each project activity instance (i.e., ICS) is expected to be 6.09 tCO_{2e} per Year.

The 1st monitoring survey for the grouped project activity was conducted between 10-April-2023 to 25-April-2023 in Dhar, Barwani and Mandla districts of Madhya Pradesh amongst the randomly selected target population revealing 100% usage in ICS. Although 100% of the stoves were found to be operating during the 1st monitoring survey, since some users may go out for a few days during the year, for a family function or some festival, the project proponent has decided to conservatively consider a 5% reduction in the number of cook-stoves in operation for current monitoring period. Based on the finding of the survey and assumed reduction of 5% of the ICS usage the total emission reduction for the monitoring period of 05-December-2022 to 30-April-2023 is 68,477 tCO_{2e}.

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	05-December-2022 -- 30-April-2023	VCS	LGAI Technological Center, S.A (Applus+ Certification)	0.403 years (Verification Period)
Total	05-December-2022 -- 30-April-2023	VCS	LGAI Technological Center, S.A (Applus+ Certification)	0.403 years (Verification Period)

1.2 Sectoral Scope and Project Type

The sectoral scope and type of project applicable are as below

Sectoral scope: 03 - Energy demand

Type: II – Energy efficiency improvement projects

The project is a grouped project

1.3 Project Eligibility

The project activity involves energy efficient cookstove distribution which falls under the category of efficiency improvements in thermal applications, therefore it is eligible under the scope of VCS Program. As per VCS Standard Version 4.4, section 2.1.3, efficiency improvements in thermal applications (e.g., cook stoves) are not excluded, hence project is eligible under VCS.

1.4 Project Design

The project activity

☐ The project includes a single location or installation only

☐ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☒ The project is a grouped project

Eligibility Criteria

For the inclusion of new project activity instances i.e., ICS, the project proponent shall ensure that it meets the eligibility criteria below:

No.	Criterion	How the new project activity instances to comply
1	Meet the applicability conditions set out in the methodology (VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves) applied to the project	New project activity instances (Energy Efficient Cook Stoves) will meet the applicability conditions set out in Section 3.2 below, where the target end-user is household and the ICS deployed shall have thermal efficiency of at least 25% (Manufacturer's specification shall be used for establishing minimum efficiency criteria in the first year of stove installation).
2	Use the technologies or measures specified in the project description.	The technology used for the project activity should be energy-efficient cookstoves. Only energy efficient cook stoves are to be adopted under the project activity by replacing traditional cookstoves in households (Manufacturer's specification shall be used for establishing minimum efficiency criteria in the first year of stove installation).
3	Apply the technologies or measures in the same manner as specified in the project description.	Only energy efficient cook stoves/ improved cook stoves (ICS) are to be adopted under the project activity by replacing traditional cook stoves in households.

		Every ICS distributed under the project activity will be provided with a label stating the unique serial number. The unique serial number is assigned against a particular beneficiary name and geographical location. The serial number will be a unique number which will allow for a clear distinction between the stoves. No individual serial number will be repeated, thus ensuring that each stove is counted only once in the proposed project and there won't be any double counting. Moreover, the agreement signed between the end user/beneficiary and the project proponent for each particular ICS establishes the ownership of the project activity instances.
4	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	The new project activity instances will be installed within India subject to the same baseline scenario determined in Section 3.4 below.
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 the host country of this project ensuring the distribution of new energy efficient cook stoves for each project activity instance. Step 2: Positive List The project activity should establish the compliance to the project activity with the applicability criteria of the methodology under section 3.2 of the project document (joint PD & MR). In addition, the project activity should also comply to the following requirement towards compliance with the positive list. 1st condition- The project activity instances should encompass ICS distributed at zero cost to the end user and the project proponent has

		no other source of revenue other than the sale of GHG credits. 2nd condition - The project activity instances should not be implemented as part of government schemes nor are supported by multilateral funds. The inclusion of new project activity instances will comply with the positive list as it satisfies criterion 1 and 2 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 the clusters to exceed the capacity limit.	No project activity instance shall exceed the applicable limit of 180 GWh_{th}/y. Since the project activity instances installed to date and proposed to be installed have/will have the same model, hence expected annual energy saving for each instance is less than 0.0151 GWh_{th}/y which is less than 0.01% of the threshold limit. (Calculation sheet demonstrating adherence to this criterion to be submitted to VVB). As the annual energy saving is below 1% of the limit, therefore no project activity instance is identified and divided into clusters.

The applicability/compliance of the project activity instances (One improved cookstove (ICS) is considered as one instance for the current grouped project activity) **with the eligibility criteria for the inclusion of new project activity instances are established in the table below**:

No.	Criterion	How the new project activity instances comply

1	Meet the applicability conditions set out in the methodology (VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves) applied to the project	The project activity instance is compliant with the applicability criteria of the methodology is established in the subsequent section (section 3.2) of the project documents. The compliance of the project activity instance includes 1. The project activity instance includes distribution of ICS in domestic premise. 2. The project activity instance includes ICS (single pot, portable woody biomass ICS) with operational efficiency of 36.42% (which is higher than minimal efficiency of 25% proposed under the methodology). 3. Estimated emission reduction for the project activity instances is less than 300,000 tonnes of CO_{2e} per year. 4. Non -renewable biomass was used within the project boundary (elaborated in the subsequent section) 5. The project activity instance does not uses biomass residue is not used.
2	Use the technologies or measures specified in the project description.	The project activity instances include use of energy-efficient cookstoves the specification of which is elaborated in the project document.
3	Apply the technologies or measures in the same manner as specified in the project description.	The project activity instances adopt energy-efficient cookstoves resulting in replacement of traditional cook stoves in households. Every ICS (project activity instances) distributed under the project activity possess a unique serial number. For each ICS distributed (project activity instances), an agreement signed between the end user/beneficiary and the project proponent establishes the ownership of the project activity instances.
4	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	The new project activity instances are installed in Dhar, Barwani and Mandla district of Madhya Pradesh in India and therefore subject to the same baseline scenario determined in Section 3.4 below.

5	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	Step 1: Regulatory Surplus There is no mandated government programme or policy in the host country of this project ensuring the distribution of new energy efficient cook stoves / project activity instance and therefore all the project activity instances are voluntary. Step 2: Positive List All the project activity instances comply to the applicability criteria of the methodology (elaborated under section 3.2 of the project document (joint PD & MR)). In addition, all the project activity instances comply to the following requirement towards compliance with the positive list. 1st condition- The project proponent has distributed ICS (project activity instances) to beneficiary at free of cost (evident from end user agreement) and the project proponent has no other source of income other than the sale of GHG credit. 2nd condition - The project activity is neither implemented as part of government schemes nor is supported by multilateral funds. Since all the project activity instances complies satisfies criterion 1 and 2 where it meets all the applicability conditions of the methodology the project activity instances are deemed to be additional (positive list).
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	Since the project activity instances installed to date have the same model, hence expected annual energy saving for each instance is less than 0.0151 GWh_{th}/y which is less than 0.01% of the threshold limit. (Calculation sheet demonstrating adherence to this criterion to be submitted to VVB). As the annual energy saving is below 1% of the limit, therefore no project activity instance is identified and divided into clusters.

	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 the clusters to exceed the capacity limit.	

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 subsequent to 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 occur in the designated geographic areas specified in the project description.
2	Conform with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial conformance with multiple sets of eligibility criteria is insufficient.	New project activity instances will comply with a 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 to 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 included in an updated project description, with updated project location information (as set out in Section 3.11), which shall be validated at the time of verification against the	New project activity instances should be included by validating eligibility criteria as mentioned in this document

No.	Criterion	How the new project activity instances to comply
	applicable set of eligibility criteria.	
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 the start date of the 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 (ICS distribution/registration data recorded in project database will be used to establish the start date criteria)
7	Be eligible for crediting from the start date of the project activity instance through to the end of the project crediting period (only).	New project activity instances are eligible to claim credits from crediting period start date to the end of the project crediting period.

1.5 Project Proponent

EKI Energy Services Limited and Pinkcity Tourist Village Complex Private Limited. are the joint PP for this project however the project ownership is with EKI Energy Services Limited. for all project activity instances. Households/users of ICS has transferred the ownership rights of the carbon assets generated from this project to EKI Energy Services Ltd vide agreement between the EKI Energy Services Ltd (project proponent) and ICS user.

Organization name	EKI Energy Services Limited
Contact person	Manish Dabkara
Title	Managing Director & Chief Executive Officer
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Telephone	+91 99075 34900
Email	ramkrishna.patil@enkingint.org and registry@enkingint.org

Organization name	Pinkcity Tourist Village Complex Private Limited.

Contact person	Prateek Jain
Title	Director
Address	9-Swaroop Colony, Ajmer Road, Jaipur-303021, Rajasthan, India.
Telephone	9828444888
Email	prateek@hemsecurities.com

1.6 Other Entities Involved in the Project

Aransh Agro is associated with EKI energy for ICS distribution in MP and GHG Reduction Technologies Pvt LTD is the manufacturer of the ICS deployed under the project activity to date.

Organization name	Aransh Agro Tech
Role in the project	Distributor
Contact person	Pavan Patel
Title	Owner/ Partner
Address	1782 Kripal Chouk Gupteshwar Jabalpur (MP) 482001
Telephone	8821930305
Email	aranshgroup@gmail.com

Organization name	GHG Reduction Technologies Pvt LTD
Role in the project	Manufacturing
Contact person	Mr. Soumitra Kulkarni
Title	Director
Address	A-11/2/3, Nagargoje Industries PVT LTD, SUmmet Compound Ambad, Nashik Maharashtra – 422010
Telephone	+91 982287213
Email	Soumitra.kulkarni@enkingint.org

1.7 Ownership

The project ownership is with EKI Energy Services Limited.

The ICS are distributed to end users (households) at free of cost. The end users are informed in advance that the use of ICS generates carbon finance which in turn will be used to cover the price of ICS and for recovering project implementation costs. The participating household joined the initiative voluntarily and willingly signed a declaration (end user agreement) to transfer the ownership rights of the carbon assets generated from this project to EKI Energy Services Ltd. The detail regarding end user agreement is explained clearly to the household community. As the ICS is distributed free of cost and therefore all the households are happy with the distribution. End users are informed that their participation in this project is voluntary and the same is mentioned in the End User Agreement also, signed by the end user.

The undertaking from the manufacturer and distributor and end-user agreement is submitted to VVB to confirm that cook stove ownership is with EKI Energy Services Limited.

1.8 Project Start Date

05-December-2022 (The earliest date of commissioning date /date of distribution of first ICS (project activity instance)

Under this grouped project activity, the first project activity instance was implemented on 05-December-2022 in Madhya Pradesh. 44,648 project activity instances (ICS) have been implemented in Madhya Pradesh, till submission of the Joint PD & MR.

1.9 Project Crediting Period

First crediting period: 05- December-2022 to 04-December-2029, seven years renewable crediting period. Being renewable crediting period, total crediting period of grouped project activity is 21 years

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

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

☐ <20,000 tCO_2e/year

☐ 20,000 – 100,000 tCO_2e/year

☒ 100,001 – 1,000,000 tCO_2e/year

☐ >1,000,000 tCO_2e/year

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
05-December-2022-31-December-2022	20,980
01-January-2023-31-December-2023	282,292
01-January-2024-31-December-2024	264,334
01-January-2025-31-December-2025	246,818
01-January-2026-31-December-2026	229,725
01-January-2027-31-December-2027	213,062
01-January-2028-31-December-2028	196,816
01-January-2029-04-December-2029	168,648
Total estimated ERs	1,622,675
Total number of crediting years	7
Average annual ERs	231,810

The above ER estimation is with consideration of *44,648* operation ICS for 365 days per year and conservative 5% annual loss or non- operation of ICS. Based on survey result, annual loss or non-operation of ICS will be considered for actual ER calculations. The average lifetime of cook stove is 7 years, but it may expect that cook stove will be in operation beyond 7 years also. Thus, above ER estimation is determined considering the 7 years of operation.

1.11 Description of the Project Activity

The project involves distribution of fuel-efficient improved cook stoves (ICS) to replace the baseline traditional cook stoves (three stone stoves) in households.

The ICS deployed under this project activity is energy efficient and thereby substantially reduces fuel consumption and associated emissions from cooking and water heating tasks in homes. The ICS includes insulated combustion chamber around the firing zone which leads to a better mixing of gases, flames and air. This enhances the heat retention and maximize transfer of heat of combustion from the flame and the hot gases to the cooking pot with the consequences of improved efficiency of combustion and thermal energy transfer to the pot in compared with a traditional cookstoves or three-stone fire.

The project proponent will procure the ICS from the manufacturer and will be responsible to provide the same to the distribution agency at a central point near the distribution area. The distribution agency will train its team for the distribution and registration process. Further, the distribution team will distribute the stoves to the end users. The distribution team will train and sensitize the end-user on the proper use of the ICS, its benefits for the user, and how it will improve the environment. Additionally, the project proponent will plan to conduct regular training programs and field visits for ensuring continual communication with the local stakeholders. In case of any support for repair/maintenance of the stove, the end-user can contact the support team using the customer support number made available to the end users.

Technical Specifications of Cook Stoves for all project activity instance GHG Reduction Technologies Pvt LTD:

TECHNICAL DETAILS			
A)	Cook Stove Type/Category	AGNEEKAA ECO MINI STOVE MODEL4 (Manufactured by GHG Reduction Technologies Pvt LTD. an ISO 9001:2015 Certified Organization) 	
		Natural Draft	
B)	Secondary Air Supply	Through Natural Draft	
C)	Stove Material Used	Body	Galvanized Iron Sheet
		Body Material Thickness	0.6mm
		Combustion Chamber	Stainless Steel SS 202 grade
		Combustion Chamber Material Thickness	1 mm SS 202 grade
		Insulating Material	Thermal Wool
		Insulating Material Thickness	6 to 8mm
		Top Plate	Stainless Steel SS 202 grade
		Top Plate Material Thickness	1 mm
D)	Physical Structure	External Dimension	Length :- 260mm
			Width :- 260mm
			Height :- 248mm
		Combustion Chamber Dimension	Diameter: - 125mm
E)	Grate Thickness	2 mm Material HR sheet	
F)	Wight Of the Stove	3.8 Kg	
G)	Type of Fuel Wood	Firewood 30 to 50 mm diameter	
H)	Feeding Process	Continuous Feeding Front Loading	
I)	Expected life of stove	7 Years	
J)	Guarantee /Warranty Period	1 Years	
K)	Box Dimension	Outer Side Box Dimension	Length: - 300mm
			Width: - 300mm
			Height: - 270mm

TECHNICAL DETAILS		
L)	Thermal Efficiency	36.42% Thermal efficiency is determined by the Indian Institute of Technology Delhi. The thermal efficiency of the implemented cookstove was tested at the manufacturer's end as per BIS protocols IS: 13152: 2013.

Further, continuous research and development activities are being conducted by the manufacturer to improve the efficiency, quality, and design of the stove, by incorporating feedback from end users through routine follow-ups and site visits. In this backdrop the project proponent may adopt the modified stove with improved efficiency for future distribution under the current grouped project activity and therefore the ICS model may change for future project activity instances and same will be transparently reflected during verification. The details and specifications of respective cook stoves will be considered for ER calculation of project activity instance.

Deployment

The ICS is procured by the project proponent (EKI Energy Services Limited) from the manufacturer and distributed to identified beneficiary through distribution agency. The distribution agency is entitled to distribute ICS to users, complete users' registration process (signing of end user agreement), sensitize/ train the users over ICS operational process. In addition, representative of the project proponent facilitates regular training/sensitization event for end users towards ensuring continual communication with the local stakeholders. The users were also briefed over the process of registering complaint regarding the ICS malfunction and support to be provisioned by the project proponent/its representatives for repair/maintenance of the ICS.

Data collection of ICS end-user

Project proponent (through ICS distribution agency) as part of end user registration process has gathered the necessary information to identify households using its ICS during the course of the project. To facilitate this process, each ICS is assigned a unique serial number. This number will be recorded during the registration process together with the following information (as appropriate and as available):

- Name of ICS user or head of the household
- Address/ Village name of ICS household
- Stove model Distributed
- Date of distribution/installation
- ICS serial number
- Retailer/distributer/Manufacturer information

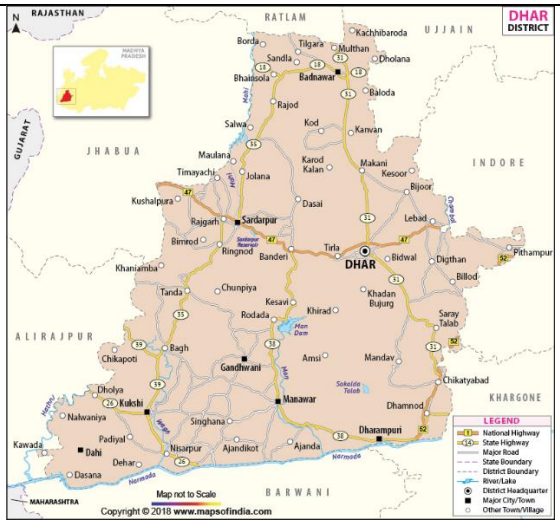
The information collected will be stored in the hard copy and/or electronic database excel sheet which will serve as project database for project monitoring and sampling purposes.

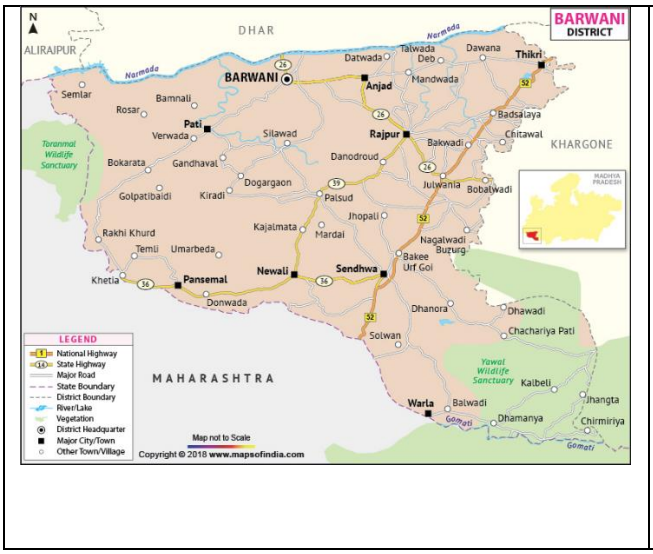
1.12 Project Location

All the project activity instances in the proposed grouped project activity is located within geographical boundaries of Indian state of Madhya Pradesh in Dhar, Barwani and Mandla districts.

The geographical boundary of the current projects instances are Dhar, Barwani and Mandla districts of Madhya Pradesh in India and is delineated in the form of extreme geographic coordinates of Dhar, Barwani and Mandla districts of Madhya Pradesh in India and is as follows:

	Dhar	Barwani	Mandla
Latitude	21°57' to 23°15' N	22.036316 °N	22.597921°N
Longitude	74°37' to 75°37' E	74.903339 °E	80.371384°E





1.13 Conditions Prior to Project Initiation

The conditions prior to project initiation are the use of non-renewable firewood in traditional inefficient cookstoves by the target population to meet thermal energy needs for cooking, which the target population would have continued to use to meet the similar thermal energy requirement as provided by project cookstoves in absence of project activity.

The baseline scenario is therefore the same as the conditions existing prior to the project initiation i,e. continued use of non-renewable biomass by the target population to meet similar thermal energy needs as provided by the project cookstoves in absence of the project activity.

These traditional mud or three-stone stoves not only have very low thermal efficiency (10% as per the methodology) but also contribute to health hazards from indoor air (smoke) pollution.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no laws and regulations governing the use of improved cookstoves in India for households. The project is a voluntary effort by the project proponent.

1.15 Participation under Other GHG Programs

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

The project has not been registered, nor is it seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project 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 project is not included in an emissions trading program or any other mechanism (CDM, Gold Standard, GCC, etc.) that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit (for example CDM, Gold Standard, GCC, etc.)

1.16.3 Supply Chain (Scope 3) Emissions

There are no measurable Scope 3 emissions associated with the project activity.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The project includes distribution of fuel efficient improved cookstoves thereby replacing use of inefficient cookstoves. The project contributes to social, environmental, economic and technological benefits which contribute to sustainable development of the local environment and the country as follows:

Social benefits

- Reduces drudgery to women (due to reduced fuel wood use) who spend long hours and travel long distances to collect fuel wood. Hence reducing the proportion of time spent on unpaid domestic and care work (SDG 5.4.1)
- Improves overall health of women and children by reducing smoke in the kitchen, thus reducing health hazards from indoor air pollution. Therefore, contribute to a decrease in the mortality rate attributed to household and ambient air pollution (SDG 3.9.1)
- Better cooking time – the materials used in making the ICS transmit the heat effectively, cooking the food faster. Hence reducing the proportion of time spent on unpaid domestic and care work (SDG 5.4.1)
- Better cooking environment due to less smoke and carbon residue in the kitchen. Therefore, contribute to an increase in the proportion of the population with primary reliance on clean fuels and technology (SDG 7.1.2)
- Better quality of life – the rural communities get family time as the whole family can sit and eat together as the cooking on ICS is faster due to its thermal energy-based mechanism.

Environmental benefits

- Improves the local environment by reducing rate of degradation of forests and deforestation in the project area(SDG 15.2.1)
- Reduce indoor pollution – ICS emits less smoke and reduces morbidity from respiratory diseases and other health hazards, as well as the medical expenditure involved. A resource-poor household would need to spend limited available finances on medicines, further exacerbated by loss of wages from both not being able to work and having to look after the ill-person. Therefore, contribute to reducing the poverty of the participating households (SDG 1.1.1)
- Reduce global and local environmental pollution and environmental degradation by reduction in use of non-renewable biomass thus leading to reduction in GHG emissions (SDG 13.0).

- Less water and effort is needed for cleaning vessels as the cooking process is relatively smoke free.

Economic benefits

- Employment opportunities for local communities through the CDM activity (SDG 8.3).
- Reduces purchase of fuel wood and/or wage equivalent from reduced firewood collection time.

Technological benefits:

- Introduction of new technology to the rural communities

1.17.2 Sustainable Development Contributions Activity Monitoring

Evidence of the project's SD contributions submitted to VVB for verification.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
Sequential row number	*SDG Target number*	*Number and text of SDG indicator or, if no official SDG indicator is applicable, user-defined indicator*	*Indicate the project's contribution to the SDG Indicator (implemented activities to increase or decrease)*	*Brief description of the quantifiable impact of the project's activities related to the SDG indicator, during the monitoring period.*	*Brief description of the cumulative quantifiable impact of the project's activities related to the SDG indicator, over the project lifetime.*

1)	1.1	1.1.1 Proportion of population below the international poverty line	Implemented activities to decrease	The project activity has contributed to the employment generation for 415 persons (male and female) in the stove manufacturing company and employment of 98 persons (male and female) in the ICS distribution & monitoring agency. Employment of individual with monthly income in the range of INR 12,000 – 35,000, has helped in enhancing the daily income of individual below international poverty line and thereby improve the proportion of population living below international poverty line.	The project activity has contributed to the employment generation for 415 persons (male and female) in the stove manufacturing company and employment of 98 persons (male and female) in the ICS distribution & monitoring agency. Employment of individual with monthly income in the range of INR 12,000 – 35,000, has helped in enhancing the daily income of individual below international poverty line and thereby improve the proportion of population living below international poverty line.

2)	3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	Implemented activities to decrease	Use of ICS distributed under the project activity in 44,648 households will reduce the particulate matter and other pollutants emanated from improper burning of solid biomass in the traditional cookstoves in the pre project scenario and will thereby reduce the mortality due to lower respiratory infection, chronic obstructive pulmonary disease (COPD), ischaemic heart disease and others.	Use of ICS distributed under the project activity in 44,648 households will reduce the particulate matter and other pollutants emanated from improper burning of solid biomass in the traditional cookstoves in the pre project scenario and will thereby reduce the mortality due to lower respiratory infection, chronic obstructive pulmonary disease (COPD), ischaemic heart disease and others.
3)	4.7	4.7.1 Extent to which (ii) education for sustainable development are mainstreamed in	Implemented activities to increase	All the project beneficiary households (44,648 households) were appraised/ sensitized about the impact of use of traditional cookstoves on human health, environment and gender equality and how use of ICS could foster sustainable development.	All the project beneficiary households (44,648 households) were appraised/ sensitized about the impact of use of traditional cookstoves on human health, environment and gender equality and how use of ICS could foster sustainable development.

4)	5.4	5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location	Implemented activities to decrease	Reduce drudgery of women and children in 44,648 households covered under the project activity. Use of ICS reduces the wood requirement in compared to the traditional cookstoves and also the cooking time due to proper heat transfer and therefore time is saved in terms of time spent for collecting of fuelwood and cooking.	Reduce drudgery of women and children in 44,648 households covered under the project activity. Use of ICS reduces the fire wood requirement in compared to the traditional cookstoves and also the cooking time due to proper heat transfer and therefore time is saved in terms of time spent for collecting of fuelwood and cooking.
5)	7.1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Implemented activities to increases	Increase access to clean cooking technology with ICS installations in 44,648 households under the project activity	Increase access to clean cooking technology with ICS installations in 44,648 households under the project activity

6)	8.5	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities	Implemented activities to increase	The project activity has contributed to the employment generation for 415 persons (male and female) in the stove manufacturing company and employment of 98 persons (male and female) in the ICS distribution & monitoring agency. Employment of individual with monthly income in the range of INR 12,000 – 35,000, has helped in enhancing the hourly earnings of employees, by sex, age.	The project activity has contributed to the employment generation for 415 persons (male and female) in the stove manufacturing company and employment of 98 persons (male and female) in the ICS distribution & monitoring agency. Employment of individual with monthly income in the range of INR 12,000 – 35,000, has helped in enhancing the hourly earnings of employees, by sex, age.
7)	9.3	9.3.1 Proportion of small-scale industries in total industry value added.	Implemented activities to increase	The project activity has supported the promotion of small-scale industries growth through sourcing/ procurement of 44,648 improved cookstoves from the MSME unit (GHG Reduction Technologies Pvt Ltd)	The project activity has supported the promotion of small-scale industries growth through sourcing/ procurement of 44,648 improved cookstoves from the MSME unit (GHG Reduction Technologies Pvt Ltd)
8)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to decrease	Contribute to greenhouse gas emission reduction of 68,477 tCO_2e	Contribute to greenhouse gas emission reduction of 68,477 tCO_2e

9)	15.3	15.3.1 Proportion of land that is degraded over total land area	Implemented activities to decrease	Contribute in reduction of deforestation through reduction in consumption of 37,473 tonnes of fire wood.	Contribute in reduction of deforestation through reduction in consumption of 37,473 tonnes of fire wood.

1.18 Additional Information Relevant to the Project

Leakage Management

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

Commercially Sensitive Information

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

Further Information

Not Applicable

2 SAFEGUARDS

2.1 No Net Harm

The project will only bring positive impacts on environmental and socio-economic aspects as elaborated in Section 1.17. No potential negative environmental or socio-economic impacts have been identified for the project thus this section is not applicable.

2.2 Local Stakeholder Consultation

The villages were identified and village representatives like village heads and sarpanch were invited. For the proposed project activity, household owners (end users), village heads, distributors, and their representatives are relevant main local stakeholders. Public notice was placed in common places of villages and village heads were invited telephonically and personally to consult their feedback.

The details of the stakeholders meeting are outlined in the table below:

Date of invitation	Date of the Meeting	Location	District	State
25/10/2022	20/11/2022	Rehgun	Barwani	Madhya Pradesh

In the introductory speech, the representative of EKI Energy Services Limited (Project Proponent), welcomed the gathering and briefed the stakeholders about the aspects of climate change and how the project activity is likely to result in climate change mitigation and contribute towards the sustainable development (social, environmental & economic benefits of ICS usage). Subsequent to the introductory speech, stakeholders were explained about the technical aspects of the ICS and purpose of distribution

of highly efficient cook stoves which will burn firewood more efficiently and improve the thermal energy transfer to pots, thereby reducing the consumption of fire wood and cooking time. Stakeholders were also appraised on how the project activity will reduces the rapidly progressing deforestation, contribute in reduction of health hazards from indoor smoke pollution of women and children, and reduce the drudgery of women and children by reducing the time spent in collection of the fire wood. The stakeholders were also intimated about the carbon mechanism & its requirement for the current project. After the detailed introductory brief, the session was open for questions from stakeholders. The question raised by the villagers are summarized below:

Question	Response by Project Proponent
We can wash it by water?	No you cannot wash it with water, you can clean it by dry cloths
How wood will be used inside the cookstoves?	You need to break the wood logs into small pieces and try to use small pieces of wood in the cookstoves
Is this cookstove produce smoke?	No, this cookstove will not produce smoke
Is cookstove distributed for free?	Yes, cookstoves is distributed for free.
Can we use kerosene or plastic?	No, it can't be used for igniting.

Most of the question from the stakeholders were related to improved cookstoves usage, its impact, benefits from the project to villagers, and there were no negative comments and feedback registered during the stakeholder's consultation. There no comments/ suggestion/ recommendations from the stakeholders during the consultation regarding the project design/recommendation for updates to the project design, technology or any other aspects related to the project activity. The question and answer during the stakeholder's consultation meeting is submitted to the VVB for verification.

As a part of on-going communication with local stakeholders,

1. End users were informed about grievance register and process of registering of grievance. The distributors were entitled with the responsibility of registering the grievances regarding the project activity and communicate the same to the project proponent during operation of project activity. If any concerns received during operation of project activity, same will be addressed if relevant to project activity.
2. Visits to the households -On-ground team/distribution agency are scheduled to visit each beneficiary (ICS user) at least once in a year. Usually, this follow-up visit is initiated after the ICS distribution/registration with the objective to ensure that project cookstoves are being properly used and also to sensitize the users over operational procedure, cookstove maintenance, best practices, and health benefit. Such visit and in person interaction will also addresses the grievances and also provide maintenance to cookstoves as needed.
3. Check by project proponent team – The team of EKI to make visit ICS users on a sample basis to ensure that grievance is properly registered and addressed by the end user/distribution agency.

The overall response from the local stakeholders on the project was encouraging and positive. No adverse or negative comments or response were received during the meeting. The participants of the meeting had not raised any significant concerns nor seek any clarification related to potential impacts of the project activity or any other issue. The project as a whole give's positive impression towards the issue of sustainable development of the country.

As a part of ongoing communication with local stakeholders/ end users no comments/ grievance or recommendation for updates to the project design was received during the operation of the project activity in course of the current monitoring period till the point of submission of the project activity for validation/verification.

Copy of public notice, minutes of meeting and attendance register submitted for verification.

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. In fact, project activity supports positive environmental impacts such as -

1. Improves the local environment by reducing the rate of degradation of forests and deforestation in the project area.
2. Reduce indoor pollution –In accordance to WHO cook using open fires or inefficient stoves generates harmful household air pollution and was responsible for an estimated 3.2 million deaths per year in 2020, including over 237000 deaths of children under the age of 5[4]. Household air pollution exposure leads to noncommunicable diseases including stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer. ICS[5] in comparison to traditional cookstoves emits less smoke resulting from complete/efficient combustion of biomass and thereby reduces morbidity from respiratory diseases and other health hazards, as well as the medical expenditure involved. A resource-poor household would need to spend limited available finances on medicines, further exacerbated by the loss of wages from both not being able to work and having to look after the ill person.
3. Reduce global and local environmental pollution and environmental degradation by a reduction in the use of non-renewable biomass thus leading to a reduction in GHG emissions.
4. Less water and effort are needed for cleaning vessels as the cooking process is relatively smoke-free

2.4 Public Comments

The project was open for public comment at Verra website between 15/04/2022 to 15/05/2022. No public comments were received for the project activity during 30 days public comment period

[4] https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health
[5] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278415/

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

VCS Methodology: VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1 dated 22 July 2021, Sectoral scope 3
https://verra.org/wp-content/uploads/2021/07/VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf

This methodology also refers AMS II.G version 12 - Energy efficiency measures in thermal applications of non-renewable biomass
https://cdm.unfccc.int/methodologies/DB/GNFWB3Y6GM4WPXFRR2SXKS9XR908IO

For the calculation of the fraction of non-renewable biomass, the below tool is used "TOOL30 version 4.0: Calculation of the fraction of non-renewable biomass"
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf.

3.2 Applicability of Methodology

The applicability of the methodology is justified below

Applicability criterion	How the project complies
Project activities shall be implemented in domestic premises or community-based kitchen	The proposed project involves deployment of all project activity instances /ICS in households.
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;	Energy efficient, single-pot and portable cook stoves are deployed as part of the project activity with operational efficiency of 36.42% (higher than 25%). The specified design efficiency of the ICS is based on the third-party test report for the ICS model. For future project activity instances, the manufacturer may change, the cook stove model and in such cases ICS with operating efficiency higher than 25% as required for applicability of the methodology will be selected.

Both 'Projects' and 'Large Projects' can use the methodology	Estimated average annual emission reductions for the grouped project activity are lower than 300,000 tonnes of CO_2e per year. Therefore, the proposed project qualifies for the "Projects" criteria.
Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports, or statistics;	Non-renewable biomass has been used since 31 December 1989 as demonstrated by UN Data[6] and as demonstrated below by referring to published literature, official reports, or statistics;
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 (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of displaced fossil fuel and hence disregarded.	Not applicable, as the project activity does not use processed biomass as a fuel. The ICS is introduced as an energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass for combustion.
The VCS PD shall explain the proposed method for the 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 above criteria are as per the VCS methodology requirement (Additionally, applicability criteria numbers 8 and 9 set out in Section 2.2 of AMS II.G, version 11.1 shall apply) in alignment with para 7 of the latest version of meth AMS II.G version 13 is followed.	Each ICS in this project will be identified by a unique combination of customer name and geographical location, as well as a serial number. The serial number will be a unique number which will allow for a clear distinction between the stoves. No individual serial number can be repeated within the project, thus ensuring that each stove is counted only once in the proposed project. In addition, the project has been cross-checked against other CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes to ensure that the ICS is not included in any other CDM project activity or voluntary project activity.
The VCS PD shall also explain how the proposed procedures prevent double counting of emission reductions, for example, to avoid the project stove manufacturer, wholesale providers, or others claiming credit for emission reductions from the project devices. The above criteria are as per the below VCS meth requirement and para 8 of the latest version of meth AMS II.G version 13 is followed. (Additionally, applicability criteria numbers 8 and 9 set out in Section 2.2 of AMS II.G, version 11.1 shall apply)	Manufacturers/ cook stove distributors undertaking is provided that EKI will be the owner of that carbon credits and Manufacturers/ cook stove distributors will not claim any credits for such cook stoves.

[6] http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW

Applicability of Tool 30: Calculation of the fraction of non-renewable biomass – Version 4.0

Applicability Criteria	Compliance to the applicability criteria
This tool may be used by: (a) DNAs to submit region- or country-specific default fNRB values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants to calculate project- or PoA-specific fNRB values.	The tool is being used to calculate the project specific fNRB value for Indian State of Madhya Pradesh.

Demonstration that non-renewable biomass has been used since 31 December 1989

Justification: The use of non-renewable biomass is established through a demonstration of the gap between the demand for firewood wood and silviculturally permissible production of biomass from forests and trees outside the forest. The fact is established using published literature referring to the following studies:

Food and Agricultural Organization of United Nation[7] Regional Wood Energy Development Programme in Asia

The literature highlights a gap in the demand and supply of fuel wood across the country. By the study, fuel wood consumption in real terms is much higher than the recorded production of about 30%; thus, leaving a wide gap leading towards unsustainable extraction of firewood. Moreover, on account of population pressure, demand for firewood has outstripped natural regeneration and planting, so much so that in some areas there is food to eat but not enough wood is available to cook it (Mathur, 1987)". The report also highlights the statistics from the Forest Survey of India (FSI1988:46) which estimated a gap of 130 million tonnes between the demand and internal production of firewood in the country in 1987.

State of Forest Report 1987[8], MoEF, Govt. of India

The report highlights a gap between the demand and production of firewood as a major cause of deforestation. The reported consumption and production across the country within silvicultural permissible limits across the following years are indicated as follows –

Year	Consumption in million tones	Recorded Production in million tones
1953-54	86.3	6.49
1960-61	99.6	8.15
1965-66	109.3	9.16
1970-71	117.9	11.62
1975-76	133.1	19 m. from the forest and 30 m. from trees outside the forest

In accordance, the gap between demand and production is met through pilferage leading to the continuous depletion of forest land.

Wood Fuel Trade in India: Food and Agricultural Organisation of United Nation:

The report outlines the demand-supply gap which has referred to the expert committee report of MoEF dated 30.01.1998 as below –

7 Regional Wood Energy Development Programme In Asia GCP/RAS/154/NET, RWEDP Report No49, The Wood Fuel Scenario and Policy issues in India. Published by the FAO Regional Wood Energy Development Programme in Asia, Bangkok, Thailand (https://wgbis.ces.iisc.ac.in/energy/HC270799/RWEDP/acrobat/fd49.pdf)

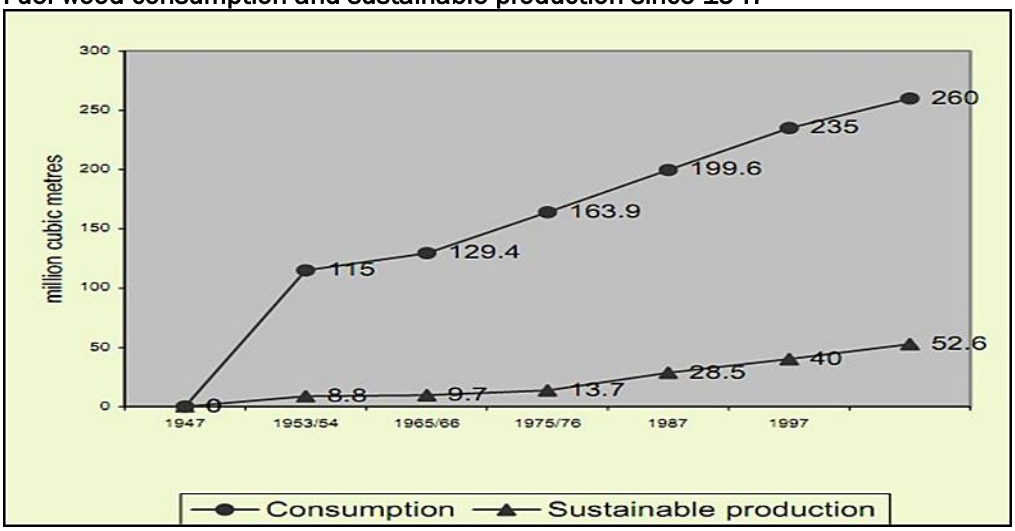
8 https://fsi.nic.in/documents/sfr_1987_hindi.pdf (refer page 44 of document, section 3.4 of Chapter III Demand On Forests"

			In million cubic meters
Year	**Consumption**	**Sustainable Production**	**Gap**
1953-54	115.0	8.8	106.2
1965-66	163.9	13.7	150.2
1975-76	199.6	28.5	171.4
1987-88	235.0	40.0	195.0

Rural Energy data sources and estimations in India – TERI[9]

The report refers to the gap between consumption and recorded production of fuel-wood has, however, increasing, indicating the seriousness of the fuel-wood scarcity in India.

Fuel wood consumption and sustainable production since 1947



Also, as per Forest Survey report 2011 (This is the latest survey report for India where demand and supply are determined. Due to the COVID-19 pandemic, no survey done for the year 2021), (https://fsi.nic.in/cover_2011/chapter7.pdf) has been considered for the production of fuelwood (from forests 1.232 million Tonnes (table 7.4.2) and availability of fuel wood from trees outside the forest is 19.254 million tonnes (table 7.4.3) annual fuel wood consumption is 216.421 million tonnes (table 7.4.7). This indicates that demand is more than sustainable production/availability of, thus in the present scenario, non-renewable biomass is used in the project region

Conclusion:

Therefore, it is established from the above studies that, a staggering gap exists between the demand and potential for sustainably extractable fuel wood from forest land. While the first three studies refer to the fuel wood supply scenario and the gap that was precedent before 1989; the study by TERI highlights the widening of the gap between the demand and supply of biomass after 1989. The widening of the gap has been both due to the increased population pressure as well as the conversion of dense forest to medium dense, scrub and open type forest land due to unsustainable extraction even after the government's initiative towards the promotion of afforestation. Thus, it can therefore be concluded that the gap exists from and before 1989 and continued thereafter, forcing the population in using biomass extracted in an unsustainable manner which is identified as a non-renewable component.

9 https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.581.9840&rep=rep1&type=pdf

3.3 Project Boundary

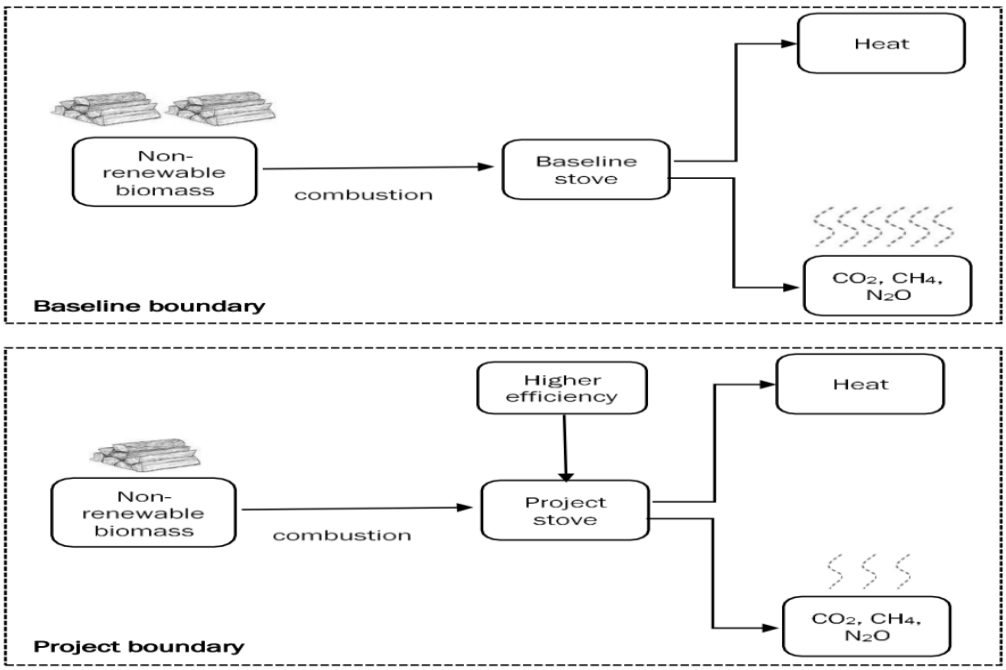
The project boundary is the physical, geographical site of the improved cookstoves that utilize biomass. The project activity includes consumption of non-renewable biomass both in the baseline and the project scenario with the difference being in the reduction of consumption of non-renewable biomass in the project scenario in compared to the baseline scenario due to enhanced efficiency of the project cookstoves. The source wise emission is elaborated in the table below:

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from use of nonrenewable biomass	CO_2	Yes	Major source (CO_2 emission associated with combustion of non- renewable biomass)
		CH_4	Yes	Major source (CH_4 emission associated with combustion of non- renewable biomass)
		N_2O	Yes	Major source (N_2O emission associated with combustion of non- renewable biomass)
		Other	No	No other source identified
	Production & Transport of Fuel	CO_2	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
		CH_4	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
		N_2O	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
		Other	No	No other source identified
Project		CO_2	Yes	Major source (CO_2 emission associated with combustion of non- renewable biomass)

Source		Gas	Included?	Justification/Explanation
	Emission from use of nonrenewable biomass	CH_4	Yes	Major source (CH_4 emission associated with combustion of non- renewable biomass)
		N_2O	Yes	Major source (N_2O emission associated with combustion of non- renewable biomass)
		Other	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
	Production & Transport of Fuel	CO_2	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
		CH_4	No	Not Considered. Since biomass residue is not used therefore emission associated with production of fuelwood is not considered, moreover firewood is collected by beneficiary from nearby forest and hence no emission is associated with transportation of firewood.
		N_2O	No	No other source identified
		Other	No	

According to methodology the spatial extent of the project boundary is the physical, geographical site of the efficient devices that utilize biomass. Also, as per methodology a net to gross adjustment factor (i.e. default value of 0.95) has been considered in the project activity to account for leakages, as an ex-ante parameter. Therefore, no other emission sources for leakage emission are required in the project boundary, hence not included in the table above.

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



3.4 Baseline Scenario

The baseline scenario in accordance to VCS Methodology: VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1 is the continued use of non-renewable wood fuel (firewood) by the target population to meet the similar thermal energy needs as provided by the project cookstoves in absence of the project activity,

Since the grouped project activity provides improved cookstoves (ICS) to selected/identified households where firewood was only used as the cooking fuel, and the cooking device was an inefficient traditional cookstoves/three stone stoves, the usage of biomass in less efficient traditional cooking devices three stone stoves is considered as the baseline scenario. Households using fuel other than biomass or using improved cookstoves/ cook stoves with chimney, flue gas ventilation system and grate are not selected under the project activity in accordance to beneficiary selection criteria.

The criterion for selection of beneficiary for allocation ICS at free of cost under the project activity includes:

1. The households/beneficiary were using only firewood as fuel for cooking.
2. Cooking device was either an inefficient traditional cookstoves or three stone stoves and the households/beneficiary don possess improved cookstoves/ cook stoves with chimney, flue gas ventilation system and grate.

The information pertaining to baseline scenario i.e., existing cookstoves used and fuel usage were/are physically verified during the ICS handover process. The handover of ICS at free of cost is facilitated only upon physical inspection of the existing cookstoves (traditional cookstoves or three stone stoves) in use, fuel used (firewood) and signing of carbon credit ownership agreement. Baseline scenario can thus also be verified from the carbon credit ownership agreement signed by the project beneficiary (registered

stove owner) at the time of acceptance of the project device (ICS). The agreement establishes that, the beneficiaries were using inefficient traditional cookstoves/three stone stoves before adopting the ICS (baseline scenario) and the adoption of ICS is a voluntary activity. As part of the agreement the end user also consented from refraining from use of traditional/ baseline cookstoves.

Since all the beneficiary selected under the project activity complies to the baseline requirement of use of firewood (non-renewable wood fuel) in traditional cookstoves to meet the thermal energy requirement therefore for all project activity instance, the baseline scenario is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity. For this project activity the efficiency of the baseline three stone cookstove has been considered as 10% which is VMR0006 default for efficiency of baseline stoves.
For first project activity instance, the baseline scenario is thus the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity

3.5 Additionality

The methodology uses activity method for the demonstration of additionality.

Activity Method

Step 1: Regulatory Surplus

There is no mandated government programme or policy in host country 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 EKI.

Step 2: Positive List

As elaborated under Section 3.2 (of the joint PD & MR), the project activity instance meets the applicability conditions of the methodology which represent the positive list. In addition, the project activity meets the following conditions:

1. The project activity installs/distributes the ICS at zero cost to the households (end user) and the project proponent has no other source of revenue other than the sale of GHG credits and therefore complies condition 1 of the step 2 (positive list)
2. The project is not implemented as part of government schemes or supported by multilateral funds and therefore complies condition 3 of the step 2 (positive list).

Conclusion: As the project fulfills the conditions above, it is deemed additional.
If any project activity instance does not follow the positive list as stipulated by methodology, then additionality need to demonstrate as per tool requirement.

3.6 Methodology Deviations

The project did not apply any methodology deviations

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

Till the end of the monitoring period, 44,648 project activity instances (ICS) were deployed under this grouped project. Only one stove model (AGNEEKAA ECO MINI STOVE MODEL 4 SE) was distributed in the project.

VCS methodology VMR0006, version 1.1 allows the use of a correction factor of 0.95 applied to the overall emissions reductions to account for any possible leakage. This factor has been applied to the emission reductions presented in this report.

During the current monitoring period, no incident or event occurred, that could affect GHG emissions reduction and the approved monitoring plan.

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 reduction of non-renewable biomass consumption in efficient project stoves as compared to baseline stoves. Please refer to Section 5.4 below for the procedure for quantification of emission reduction.

5.2 Project Emissions

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

5.3 Leakage

In accordance to section 8.3 of the methodology, Leakage shall be considered as default 0.95 in accordance with methodology section 5.4 of AMS.II.G.

5.4 Estimated Net GHG Emission Reductions and Removals

In accordance to section 8.4 of the methodology, since the project activity replaces baseline stoves using nonrenewable biomass the emission reduction is calculated using equations 1 and 2 of the applied methodology and is as follows:

$$ER_y = \sum_i \sum_j ER_{y,i,j}$$ 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 tCO_2e
$ER_{y,i,j}$	=	Emission reductions by improved cookstove of type *i* and batch *j* during year *y* in tCO_2e

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95$$ Equation (2)

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass (firewood) 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 (f_{NRB})[10]
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)[11]
$EF_{wf,CO2}$	=	CO_2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 112 tCO_2/TJ)[12]
$EF_{wf,non\ CO2}$	=	Non-CO_2 emission factor for the use of wood fuel in the baseline scenario (IPCC default for wood fuel, 26.23 tCO_2/TJ)[13]
$N_{y,i,j}$	=	Number of improved cookstoves of type *i* and batch *j* operating during year *y*

[10] Default values endorsed by designated national authorities and approved by the Board are available at https://cdm.unfccc.int/DNA/fNRB/index.html

[11] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1Introduction

[12] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

[13] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

0.95 = Discount factor to account for leakage

The quantification of firewood saved due to the implementation of improved cookstoves to be estimated using the equation below:

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

Where:

η_{old} = Efficiency of baseline cookstove

$\eta_{new,y,i,j}$ = 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 4.

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

Equation (4)

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

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 ex-ante calculation purpose, the assumption below is applied:

1. The project will install up to 44,648 ICS.
2. The end date of installation of project activity instance is considered as operational date of that project activity instance.
3. The life span of ICS is 7 years; thus, the operational lifetime of each project activity instance is taken as 7 years. The end users can repair the ICS through the service providers (PP representative) who will repair the cook stove for further use. After 7 years of lifetime, a report from Maintenance Company will be provided to confirm the extended life of cook stove. The project will claim credits beyond 7 years only for balanced year till cook stove is replaced by new cook stoves.
4. The expected operational lifetime of each project activity instance will determine based on end date of commissioning of last ICS. If project activity includes, project activity instance wise installation,

then ER should be estimated project activity instance wise. The ex-ante calculation will be performed for first project activity instances.

5. Annual stove loss rate is assumed to be 5%. This is assumed as conservative. During actual ER calculation, this value will vary. This value will vary during actual verification based on survey results.
6. By=1, new,i, survey, For Madhya Pradesh – 3.93 kg/device/day or equal to 1.43 tonnes/device/year. This is based on first monitoring survey results. The result of survey is being considered for ex-ante ER estimation.

Determination of number of ICS operating during year y assuming annual stove loss rate of 5%. However, the actual ER calculation will be based on the finding of survey pertaining to the proportion of ICS in operation.

$N_{y,i,j}$ = 44,648 x [1 - (y-1) x 5%]

Example of calculation:

If y = 2,

$N_{y,i,j,,}$ = 44,648 x [1 - (2-1) x 5%]
= 42,415

Hence, the number of ICS operating during year y is as below:

Year (y)	$N_{y,i,j}$
1	44,648
2	42,415
3	40,183
4	37,950
5	35,718
6	33,486
7	31,253

Determination of efficiency of ICS during year y

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

Where

η_p = 36.42%

DF_n = 0.99

Example of calculation:

If y= 1

$\eta_{new,y,i,j}$ = 36.42% X $(0.99)^{1-1}$ X 0.94

34.23%

Hence the efficiency of ICS during year y is as below:

Year (y)	$\eta_{new,y,i,j}$
1	34.23%
2	33.89%
3	33.55%
4	33.22%
5	32.89%
6	32.56%
7	32.23%

Determination of the quantity of firewood that is saved in tonnes per ICS during year y

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

Estimation of quantity of biomass saved for the project activity:

If y= 1,

$B_{y,savings,i,j}$= 1.43 X [(0.3423/0.1) -1] = 3.4764 tonnes

The year wise quantity of biomass saved is presented in the table below:

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
1	1.43	34.23%	0.1	3.48
2	1.43	33.89%	0.1	3.43
3	1.43	33.55%	0.1	3.38
4	1.43	33.22%	0.1	3.33
5	1.43	32.89%	0.1	3.28
6	1.43	32.56%	0.1	3.24
7	1.43	32.23%	0.1	3.19

Determination of $f_{NRB,y}$

In accordance to the applied methodology the fraction of non-renewable biomass ($f_{NRB,y}$) is calculated in accordance to Tool 30: Calculation of the fraction of non-renewable biomass, Version 04.0

In accordance to paragraph 07 of the applied tool, the fraction of woody biomass that is non-renewable is estimated as:

$$fNRB = NRB/(NRB + RB)$$

Where:

fNRB = Fraction of non-renewable biomass in the applicable area in the relevant period (fraction or %)

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

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

In furtherance:

The quantity of non-renewable biomass consumed in the applicable area (NRB) shall be determined as the difference between the total consumption of woody biomass in the applicable area (H) and the quantity of renewable biomass that can be sustainably harvested in the applicable area (RB):

$$NRB = H - RB$$

Where:

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

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

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

The total consumption of woody biomass (H) is calculated using the following equation, accounting for all consumption within the applicable area (not only wood fuel but also timber and industrial consumption):

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

Where:

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

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

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

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

Estimation the quantity of renewable biomass available (RB)

The quantity of renewable biomass available in the applicable area (RB) is estimated using the following equation:

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

Where:

$MAI_{forest,i}$	Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas in the relevant period (tonnes/ha/yr)
$F_{forest,i}$	Extent of forest 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 subcategory i) in the relevant period (ha)
$MAI_{other,i}$	Mean Annual Increment of woody biomass growth per hectare in subcategory i of other land areas in the relevant period (tonnes/ha/yr)
$F_{other,i}$	Extent of other land 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

Estimation of total consumption of woody biomass (H)

Fuel Wood Consumption based on secondary literature[14]	13.67 million tonnes/ yr	https://fsi.nic.in/cover_2011/chapter7.pdf
Commercial wood consumption [15]	1.494 million tonnes	https://fsi.nic.in/cover_2011/chapter7.pdf
Total consumption of woody biomass (H)	15.1593 million tonnes	

Estimation of quantity of renewable biomass that is available on a sustainable basis

Parameters		Value	Unit
Mean Annual Increment of above ground biomass of Indian Forest	$MAI_{forest,i}$ [16]	0.5	m^3/ha/yr
Density[17]		0.64	t/m^3
Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas in the relevant period	$MAI_{forest,i}$	0.33	t/ha/yr
Mean Annual Increment of woody biomass growth per hectare in subcategory i of other land areas in the relevant period[18]	$MAI_{other,i}$	0.32	t/ha/yr

[14] Household firewood consumption were also estimated based on the percentage of population using fire wood, total number of rural households and methodology default of per capita firewood consumption. Since the estimated value of fire wood/ firewood consumption of 19.72 million tonnes/yr is higher than the wood consumption figure represented in the secondary literature (Chapter 7, State of Forest Report 2011) the same is being conservatively considered.

[15] Details of category wise commercial wood consumption is presented in the fNRB estimation sheet.

[16] https://www.forests.tn.gov.in/app/webroot/img/Yield%20table%20for%20few%20tree%20species%20grown%20in%20farm%20settings.pdf

[17] Detailed Estimation included in the FNRB estimation sheet

[18] MAI value for forest areas because MAI value for other land areas is not available in a country while only the MAI value for forest areas exits

Parameters		Value	Unit
Recorded Forest Area[19]		9,468,900	ha
Reserved Forest [20]		6,188,600	ha
Protected Forest [21]		3,109,800	ha
% of Recorded Forest Area under Reserved Forest		65.36%	
% of Recorded Forest Area under Protected Forest		32.84%	
Extent of forest[22]	$F_{forest,i}$	6,477,200	ha
Area under open forest [23][24]		2,832,600	ha
Extent of Non-Accessible Forest[25]	$P_{forest,i}$	3,578,974	ha
Extent of other land	$F_{other,i}$	2,077,500	ha
Extent of non-accessible area	$P_{other,i}$	0	ha
Quantity of renewable biomass that is available on a sustainable basis in the applicable area in the relevant period (tonnes)	**RB**	**1,616,675**	tonnes

Regarding the Mean Annual Increment (MAI) of above-ground biomass, as per Table 5 of TOOL 30, the "Source of data" option (d) is utilized, i.e., "National studies or government data or official statistics." PP has also adhered to a QA/QC procedure in line with Table 5 of TOOL 30. A comparison of values with FAO and IPCC defaults was attempted, but the following observations were made:

The Global Forest Resources Assessment 2000 by FAO (Table 14[26]) lists only the percentage distribution of forest types by country and does not provide sufficient data for effective conclusions about MAI, making it unsuitable for comparison. The MAI values listed for above-ground biomass growth rates in the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[27] (Above-ground biomass growth rates for different ecological zones) pertain to the Asia region as a whole, rather than specifically to India. Hence, a direct comparison with Indian government data was not possible. Also, recently registered projects VCS 2983[28] and VCS 3151[29], utilized the same $MAI_{forest,i}$ value (i.e. 0.5 cubic meters per hectare per year).

Estimation of $F_{NRB,y}$

[19] https://fsi.nic.in/isfr-2021/chapter-1.pdf
[20] https://fsi.nic.in/isfr-2021/chapter-1.pdf
[21] https://fsi.nic.in/isfr-2021/chapter-1.pdf
[22] https://fsi.nic.in/isfr-2021/chapter-13.pdf
[23] https://fsi.nic.in/isfr-2021/chapter-13.pdf
[24] Although open forest area is classified under Recorded Forest of which 65.36% are reserve forest and 32.84% are protected forest but considering the canopy density of open forest between 10-40% it is considered that open forest is subjected to anthropogenic deforestation and therefore not considered as inaccessible
[25] https://fsi.nic.in/isfr-2021/chapter-13.pdf

[26] FAO Global Forest Resources Assessment 2000 by the FAO for "Distribution of total forest area by ecological zone" (Table 14)

27 https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch04_Forest%20Land.pdf
[28] https://registry.verra.org/app/projectDetail/VCS/2983
[29] https://registry.verra.org/app/projectDetail/VCS/3151

Total consumption of woody biomass in the applicable area in the relevant period (tonnes)	H	15.16	million tonnes
Quantity of renewable biomass that is available on a sustainable basis in the applicable area in the relevant period (tonnes)	RB	1.62	million tonnes
Quantity of non-renewable biomass consumed in the applicable area in the relevant period	NRB	13.54	million tonnes
Fraction of non-renewable biomass	**fNRB**	**89.34%**	

In accordance to Paragraph 6.b of Tool 30, the value of the estimated FNRB for the project area is required to be compared with the literature referred to in the Tool and is outlined as follows:

Comparison of the calculated value against scientific literature

Delineation of project boundary for fNRB estimation

Fraction of woody biomass that is established as non-renewable is estimated in accordance to the guidelines stipulated under Tool 30. The basis of estimation of the fraction of non-renewable biomass includes estimation of the proportion of the biomass consumed that have not been sustainably extracted/harvested. It's worthwhile to note that fuel wood consumption (Bošković, Chakravorty, Pelli, & Risch, January 2023) are the major drivers of deforestation in India and are result of unsustainable extraction/harvest. The consideration of the subnational/ state boundary for estimation of fNRB is based on the delineation of forest boundary by Government of India for the purpose of regulation and conservation of the forest. In addition, following justification are also outlined to establish the consideration of subnational boundary for estimation of fNRB.

1. The ecological conditions differ at the subnational level in India resulting in difference in the mean-annual increment/ growth of wood biomass within and outside forest area resulting in the difference of the sustainably extraction potential of woody biomass across a defined geography. This is also justified by the fact the availability of the land area under forest and for trees outside forest differs across state resulting in the difference of the sustainably extraction potential of woody biomass to cater the local demand of wood.
2. The "forest" although on Concurrent list of Indian Constitutions its delineation/ boundary is defined at a subnational level. As the regulatory provision of Forest Conservation Act 1980 and Forest Conservation Rules 2003 allowing wood harvest are supervised by the State Forest Department, it does not allow cross boundary wood extraction/harvest and therefore the state boundary is considered for estimation of the supply provision.
3. The regulatory provision as stipulated under "The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006" allows collection of NTFP including firewood for traditional forest dwellers only, thereby restricting the forest rights locally without provision of cross boundary collection.
4. Since most of the woody biomass used as fuel wood (mostly at the village and peri urban area) are collected locally therefore the state/subnational boundary is most appropriate for estimation of fuel wood demand and supply.

Also, as per para 6 b of tool 30, the selection of project area is allowed (the country/region or the project area (hereinafter referred as the applicable area)), thus consideration of state for calculation of fNRB is appropriate.

Comparison of the calculated value against scientific literature.

fNRB is estimated as ratio of the Quantity of non-renewable biomass (NRB) consumed in the applicable area and summation of the quantity of non-renewable biomass (NRB) and quantity of renewable biomass (RB). NRB as specified under the tool is estimated as difference of total consumption of woody biomass (H) and quantity of renewable biomass. In accordance to paragraph 6 of tool 30 the section below compares and analyse the calculated values against the values for fNRB reported in relevant scientific literature and justify the differences

1. Total Wood Consumption

a) The entire premise of fNRB centers around the unsustainable extraction and harvest of wood for both fuel and commercial applications. The relevant scientific literature (Bailis, Drigo, & Ghilardi, 2015), referenced in Tool 30, estimates fNRB, or rather NRB (as denoted in the report), based solely on wood fuel demand, with 2009 as the base year. According to Equation 3 of Tool 30, the total wood demand encompasses the average consumption of wood fuel per household, encompassing fuel wood and charcoal, along with commercial woody biomass consumption for energy and non-energy applications. This differs from the literature, which considers only the demand for wood fuel. Since the estimate of fNRB is directly linked to the quantity of wood consumed, this exclusive focus on wood fuel may potentially result in a lower fNRB value in the literature compared to the estimates made for the purpose of GHG emission avoidance. For instance, let us take the state of Madhya Pradesh (MP) as an example. The table below provides data on wood consumption in MP based on secondary sources.

Consumer type	Quantity	Cumulative Consumption	Percentage of total consumption
Domestic	13.67 million tonnes	13.67 million Tonnes[30]	83%
Commercial Wood Consumption	1.494 million tonnes	1.78 million Tonnes[31]	10%

Based on the example from Madhya Pradesh provided above, it is evident that approximately 10% of wood consumption has not been accounted for in the scientific literature (Bailis, Drigo, & Ghilardi, 2015). This omission has resulted in a lower calculated value for fNRB.

b) The total consumption of woody biomass, for example, in the state of Madhya Pradesh, is conservatively derived from a report published by MoEFCC (Ministry of Environment, Forest and Climate Change, Government of India) in 2011 (MoEFCC, 2011). This data is more recent compared to that utilized in the referenced literature (which was based on 2009 data extracted from wood fuel demand available from national and sub-national studies, supplemented by data from the Food and Agriculture Organization (FAO), International Energy Agency (IEA), and United Nations (UN)). Given that the publication of wood demand by MoEFCC aligns with the provisions outlined in Data/Parameter table 1 of Tool 30, it is considered appropriate to incorporate this information.

c) Furthermore, a cross-verification process was conducted to assess the wood fuel demand, which accounts for 83% of the cumulative wood demand, in the state of Madhya Pradesh. This was done using an alternative approach as specified in Equation 3 of Tool 30. The estimated value of fuel wood demand[32] provided by MoEFCC for the state of Madhya Pradesh was found to be more conservative and was therefore utilized in the estimation of the total consumption of woody biomass.

Parameters	Value	Unit	Source	
Total Population	72,626,809	Nos.	Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	52,557,404	Nos.	Census 2011	https://censusindia.gov.in/census.website/data/census-tables

[30] https://fsi.nic.in/cover_2011/chapter7.pdf

[31] https://fsi.nic.in/cover_2011/chapter7.pdf

[32] Against wood fuel demand specified in the MoEFCC report

Parameters	Value	Unit	Source	
Total Household	15,093,256	Nos.	Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	11,080,278	Nos.	Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	4.74	Nos.	Calculated	
Rural Household using firewood	93.8%	Percentage	NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12	https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf
Default per capita firewood usage	0.4	ton/ capita	Tools for f_{NRB} calculation	
Default per capita firewood usage	0.4	ton/ capita	Tools for f_{NRB} calculation	
Rural Household firewood usage	1.897	tonne/ annum		
Total Firewood usage (rural)	19.72	million tonnes		
Total Firewood usage	**19.72**	**million tonnes**		

Therefore, from the above information, it can be deduced that the wood consumption considered for the estimation of fNRB is more recent, conservative, and authenticated, as it is published by the Government of India's authorized agency.

2. **Renewable Biomass**

According to Paragraph 19 and Equation 4 of Tool 30, renewable biomass (RB) available in the applicable area is estimated as a factor of the annual increment of woody biomass in both forest and non-forest areas. The renewable biomass component, as estimated under the project activity, takes into account plantation across both forested and non-forested areas, as published by MoEFCC in 2021, and the mean annual increment of different Indian forest types published at the national level. In contrast, the renewable biomass component estimated in the referenced literature is based on satellite images of specific locations during 2009.

The quantity of renewable biomass available in a particular geography is influenced by deforestation. The status of deforestation in India, as outlined below through a review of secondary literature, contradicts the literature referenced (Bailis, Drigo, & Ghilardi, 2015), which emphasizes afforestation efforts in state forests in India.

According to Global Forest Watch[33], India lost 393 thousand hectares of humid primary forest during 2002-2022, accounting for 18% of its total tree cover loss in the same period. This is equivalent to a decrease in the total area of humid primary forest in India by 3.9%. The year-wise deforestation is illustrated in the figure below.

[33] https://www.globalforestwatch.org/dashboards/country/IND/?category=undefined

This deforestation also encompasses the loss of 2.19 million hectares of tree cover, equivalent to a 5.6% decrease in tree cover since 2000. The deforestation in the country is further confirmed by a report published by "Down to Earth"[34], which outlines a deforestation of 668,400 hectares between 2015 and 2020, making India the second-highest country in terms of deforestation after Brazil[35]. This level of deforestation is significantly higher when compared to the loss of 384,000 hectares of forests between 1990 and 2000.

3. Difference in AGB

In the referred literature, Above Ground Biomass (AGB) is the pivotal component for estimating Renewable Biomass. It is crucial to highlight the disparity between the statistics presented in the referred literature and the nationally published data:

Referred Literature	India State of forest Report 2021[36]
15067 million tones	2319 million tonnes

As Renewable Biomass (RB) is inversely proportional to the estimate of fraction of Non-Renewable Biomass (fNRB), a higher RB value results in a lower fNRB, as illustrated in the referred literature.

4. Approach for Estimating fNRB

According to the referred literature, recent maps of land cover and ecological zones undergo an assignment of an Above Ground Biomass (AGB) stock. This process utilizes three distinct sources:

i. AGB distribution maps
ii. Geo-referenced field plots
iii. Forest inventories from known locations for specific forest types, where AGB distribution is derived from different datasets.

To account for discrepancies in the datasets, components of woody biomass that are not typically used for wood fuels, such as twigs, leaves, and stumps, are subtracted. This action aids in constructing a map of "Dendro-energy" biomass (DEB) stock. The supply of wood fuel is then estimated based on the "mean annual increment" (MAI) of DEB. This estimation is modelled through a functional relationship established from approximately 2,800 spatially explicit field observations of MAI and corresponding AGB. Changes in land cover are accommodated by estimating the amount of DEB produced through deforestation and afforestation processes. This estimation is based on data from the Food and Agriculture Organization (FAO) and utilizes information from Forest Monitoring for Action (FORMA).

[34] https://www.downtoearth.org.in/news/wildlife-biodiversity/india-lost-668-400-ha-forests-in-5-years-2nd-highest-globally-report-88337

[35] https://indiacsr.in/india-has-lost-around-668400-hectares-of-forestry-to-deforestation-2nd-highest-in-the-world/

[36] Referrer: "Bibliography"

While this approach has undergone peer review, it deviates from the guidelines outlined in paragraph 19, which provides the methodology for estimating the quantity of renewable biomass.

Comparison of Calculated fNRB Values with values published in different registries

In addition to the preceding explanation, it is worth noting that there are references available for calculated fNRB values. For example, the fNRB value calculated for Myanmar came into effect on the CDM website on 23 December 2020[37] and will remain valid until 25th December 2025. This fNRB value has been calculated in accordance with TOOL 30 standard. It is discernible that the actual fNRB value (61.5%) exhibit a significant variance, notably higher, from the one (9.8%) presented in the reference literature (Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015)). The carbon footprint of traditional wood fuels. Nature Climate Change, 5(3), pp. 266–272)[38], as mentioned in paragraph 6. (b) (i) of TOOL 30.

Country	Calculated f_{NRB} Values following TOOL 30 CDM registry	f_{NRB} Value from Literature[39]
Myanmar[40]	61.5%	9.8%

Furthermore, there are additional references available for fNRB values documented in other reputable registries, which demonstrate that the actual fNRB values exhibit a significant variance, notably higher, from those presented in the reference literature (Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015)), as mentioned in paragraph 6. (b) (i) of TOOL 30.

Country	Calculated f_{NRB} Values available in GS registry[41]	f_{NRB} Value from Literature[42]
Bolivia	82.59%	32.5%
Colombia	83.08%	34.6%
Guatemala	62.74%	34.9%

All these disparities are noteworthy and strongly suggest the incomparability of the values mentioned in the reference literature (Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015)) with the values calculated by the project activity in line with TOOL 30.

Comparison of the calculated fNRB value with other projects registered under VERRA

Given the absence of other publicly available literature outlining the value of fNRB for the state of Madhya Pradesh, India, a comparison has been made with the fNRB values under which ICS projects are registered with VERRA in the table below.

PROJECT ID	VCS 2942	VCS 2944	VCS 2473	VCS 2754	VCS 2533
f_{NRB} for Madhya Pradesh	89.2%	89.2%	93.1%	92.87%	90.10%

The comparison of the fNRB for the current project with other registered project activities clearly shows that the value of 89.2% is more conservative. This is evidenced by its consideration by PP for the recently registered projects VCS 2942 & VCS 2944. Therefore, in line with a conservative approach, a value of 89.2% for fNRB has been chosen for this project activity instead of the calculated value of 89.34%, which was determined by PP while addressing the PRR comments.

[37] https://cdm.unfccc.int/methodologies/standard_base/2015/sb160.html

[38] https://www.nature.com/articles/nclimate2491

[39] https://www.nature.com/articles/nclimate2491

[40] https://cdm.unfccc.int/methodologies/standard_base/2015/sb122.html

[41] https://www.goldstandard.org/sites/default/files/documents/fnrb_assessment_final_clean.docx

[42] https://www.nature.com/articles/nclimate2491

Conclusion

In summary, the preceding rationale firmly establishes the credibility of the fNRB estimate, harmonizing seamlessly with the principles elucidated in Tool 30. Our methodology rigorously adheres to the guidance provided in paragraph 10 of Tool 30, emphasizing the imperative use of the most recent historical data for ex ante fNRB computations. Moreover, the observed variance in fNRB values between reputable registries and those outlined in the reference literature (Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015)) renders direct comparisons untenable.

Upon comparison with other registered project activities, our current project's fNRB appears notably conservative. The unregulated and unmonitored collection of biomass by households leads to a discernible decline in the overall carbon pool. This decline is primarily attributed to the absence of effective management and oversight in the collection process, culminating in a gradual reduction of both biomass and carbon stocks over time. In the absence of adequate measures to facilitate tree regrowth, this practice introduces a perturbation to the carbon balance within the environment. Consequently, if a localized assessment of the fraction of non-renewable biomass could have been conducted, it would suggest that this value may potentially approach 100%, further emphasizing the substantial impact of this practice on the carbon ecosystem.

Determination of emission reductions by ICS of year1 during year y

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

Where:

$NCV_{wood\ fuel}$ = 0.0156 TJ/tonne

$f_{NRB,y}$ = 89.20%

$EF_{wf,CO2} + EF_{wf,non\ CO2}$ = 112 + 26.23 = 138.23 tCO_2/TJ

$B_{ysaivngs,i,j}$ = 3.4764

$N_{y,i,y}$ = 44,648

1st year estimation (y=1)

$ER_{y,i,j}$ = 3.4764 X 0.0156 X 89.20% X 138.23 X 44,648 X 0.95

$ER_{y,i,j}$= 283,623tCO_2

Year	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
1	3.48	0.0156	89.20%	138.23	44,648	283,623
2	3.43	0.0156	89.20%	138.23	42,415	265,632
3	3.38	0.0156	89.20%	138.23	40,183	248,084
4	3.33	0.0156	89.20%	138.23	37,950	230,960
5	3.28	0.0156	89.20%	138.23	35,718	214,266
6	3.24	0.0156	89.20%	138.23	33,486	197,990
7	3.19	0.0156	89.20%	138.23	31,253	182,120

The above ER estimation for project activity instances is with consideration of 44,648 ICS quantity and is presented 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)
5-December-2022-31-December-2022	20,980	0	0	20,980
01-January-2023-31-December-2023	282,292	0	0	282,292
01-January-2024-31-December-2024	264,334	0	0	264,334
01-January-2025-31-December-2025	246,818	0	0	246,818
01-January-2026-31-December-2026	229,725	0	0	229,725
01-January-2027-31-December-2027	213,062	0	0	213,062
01-January-2028-31-December-2028	196,816	0	0	196,816
01-January-2029-04-December-2029	168,648	0	0	168,648
Total		0	0	1,622,675
Total number of crediting years				7
Average annual ERs				231,810

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass that can be established as non-renewable biomass
Source of data	Estimated in accordance to methods stipulated under Tool 30: Calculation of the fraction of non-renewable Biomass Version 04.0.
Value applied	For Madhya Pradesh –89.20% (calculated as per meth tool)
Justification of choice of data or description of	This parameter is determined ex-ante based on the calculation approach recommended under Tool 30 version 4.0.

measurement methods and procedures applied	As per of methodological tool, the value is calculated as per the following Equation $f_{NRB,y}$ = NRB/(NRB+DRB)
Purpose of Data	Calculation of emission reductions
Comments	Input value used for estimation of wood usage and quantity of renewable biomass that is obtained from State of Forest report (Forest Survey of India Ministry of Environment, Forest & Climate Change, GoI,) If the future project activity instances are expanded in other parts of India, then this parameter value will be calculated during future project activity instances inclusion.

Data / Parameter	$NCV_{wood\ fuel}$
Data unit	TJ/tonne
Description	The net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	Methodology default (2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction)
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	Methodology default based on IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	The parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{wf,CO2}$
Data unit	tCO_2/TJ
Description	CO_2 emission factor for the use of wood fuel in the baseline scenario
Source of data	Methodology default (2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion)
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	Methodology default based on IPCC default value
Purpose of Data	Calculation of emission reductions

Comments	The parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{wf,non\ CO2}$
Data unit	tCO_2/TJ
Description	Non-CO_2 emission factor for the use of wood fuel in the baseline scenario
Source of data	Methodology default (2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion)
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	Methodology default based on IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	The parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$\eta_{old,i,j}$
Data unit	Fraction
Description	The 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 the baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney. During the beneficiary selection, and handover of ICS at free of cost it is verified on whether the baseline device was 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. Since the ICS is only hand overed to beneficiary/households using three stone cookstoves the default value of 0.1 is considered for Efficiency of the baseline cookstove.
Purpose of Data	Calculation of emission reductions
Comments	The parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	η_p
Data unit	Percentage
Description	The efficiency of the project stove at the start of the project activity.

Source of data	Manufacturer's specification
Value applied	36.42%
Justification of choice of data or description of measurement methods and procedures applied	The ICS is also tested at IIT Delhi as per BIS protocol and the tested efficiency is assed to be 36.42%
Purpose of Data	Calculation of $\eta_{new,y,i,j}$
Comments	This efficiency is for the cook stove model considered for project activity instances implemented. If the manufacturer changes the cook stove model, the respective model efficiency will be considered for ER calculations for new project activity instances.

Data / Parameter	DF_n
Data unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstove per year of operation (fraction).
Source of data	As per methodology, the default value of 0.99 efficiency loss per year
Value applied	0.99
Justification of choice of data or description of measurement methods and procedures applied	The methodology default factor is used.
Purpose of Data	Calculation of $\eta_{new,y,i,j}$
Comments	The parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	Life Span
Data unit	Years
Description	Operating lifetime of project device for projects opting Equation 5 for determining project stove efficiency
Source of data	Manufacturer's specification
Value applied	7
Justification of choice of data or description of measurement methods and procedures applied	The operating lifetime is considered based on manufacturer specification.
Purpose of Data	Calculation of $\eta_{new,y,i,j}$
Comments	The parameter is fixed ex-ante for the entire crediting period

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

Data unit	Fraction
Description	Efficiency of the improved cook stove type *i* and batch *j* determined as per equation 5 of methodology during year *y*
Source of data	Calculated as per equation 5 of methodology during year y
Value applied	For ex-ante calculation, the value below is applied

Year (y)	$\eta_{new,y,i,j}$
1	34.23%
2	33.89%
3	33.55%
4	33.22%
5	32.89%
6	32.56%
7	32.23%

Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante. The average lifetime of cook stove is 7 years, but it may expect that cook stove will be in operation beyond 7 years also with proper repair and maintenance of cook stoves. This should be checked during survey. After 7 years of lifetime, a report from Maintenance Company will be provided to confirm the extended life of cook stove. The project will claim credits beyond 7 years only for balanced year till cook stove is replaced by new cook stoves.
Purpose of Data	Used for calculation of quantify of woody biomass saved *and estimation of emission reduction*
Comments	Calculation to be performed using equation below: $\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94$ Monitoring frequency is at the start of project activity instance (The project opts to determine the efficiency using the equation 5 given by methodology, therefore it is not required to monitor this parameter via Sampling survey.) However the grouped project activity provides the option to use of different model of cook stove for new future project activity instances to be included, hence this parameter value may vary based on different model of future instances. Default value of 0.99 efficiency loss per year can be considered In case of ICS model changes for new project activity instances, the efficiency of new ICS model should be determined during verification and same will be considered for that project activity instance.

6.2 Data and Parameters Monitored

Data / Parameter	$N_{y,j,j}$
Data unit	Number
Description	Number of project devices of type I and batch j operating during year y
Source of data	Monitoring (Sample survey)
Description of measurement methods and procedures applied	Measured based on a representative sample. In accordance to section 8.4 of the methodology, since the population size is more than 1000 therefore the sample size of 100 population/beneficiary is opted for.
Frequency of monitoring/recording	At least once every two years
Value applied	44,648
Monitoring equipment	Sample survey (Sample survey was carried out using structured questionnaire)
QA/QC procedures applied	125 samples were selected using random sample selection procedure, considering 20% non-response.
Purpose of data	Calculation of emission reductions
Calculation method	The proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	PP has distributed one ICS per household and the same is followed for each project activity instance.

Data / Parameter	$B_{y=1,new,I,j,survey}$
Data unit	Tonnes
Description	Annual quantity of woody biomass used by the project device (improved cook stoves) in tonnes per device of type i and batch j,
Source of data	Monitoring survey
Description of measurement methods and procedures applied	The value of By=1,new,I,j,survey is determined in the first year of the implementation of the project through a sample survey. The sample size was selected in line with the 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 surveys .
Frequency of monitoring/recording	Determined in the first year of project implementation

Value applied	3.93 kg/device/day or equal to 1.4345 tonnes/device/year.
Monitoring equipment	Weighing Scale
QA/QC procedures applied	Calibrated weighing scale are used for the purpose of measurement.
Purpose of data	Calculation of emission reductions
Calculation method	This is monitored value
Comments	The monitored value will be archived for the duration of the CP and 2 years post the last verification/issuance .

6.3 Monitoring Plan

Monitoring Plan

The monitoring plan includes key strategy to ensure high quality, unbiased, and reliable information regarding the performance of the project in terms of implementation and outcomes, for the purposes of calculating Verified Carbon Units (VCUs) in accordance to the applied methodology VMR0006 version 1.1 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity. The key elements are the following:

- Finalising and updating of beneficiary database
- Assessment of the monitoring parameters
- Sample plan for the monitoring survey
- Data quality, consistency and duplication checks
- Monitoring reporting
- Internal Audit and spot checking of ICS

Parameters to be monitored

Monitoring under the project activity include:

1. Assessment of number of project device (ICS) operating during a particular monitoring period based on representative sample, where sample size is determined in accordance to option (b) of section 8.4 of the methodology. Since option (b) of section 8.4 of the methodology is considered compliance with 90/10 confidence precision is not obligatory.
2. Assessment of the quantity of biomass (firewood) used by project devices measured across a representative sample, where sample size is determined in accordance to option (b) of section 8.4 of the methodology. Since option (b) of section 8.4 of the methodology is considered compliance with 90/10 confidence precision is not obligatory.

The entire responsibility of planning of the monitoring survey including deciding the sample size and identifying samples, rests on the PP.

Parameters to be monitored	Approach	Sampling parameters	Parameter type	Monitoring frequency	Outcome
$N_{y,j,j}$ Number of project devices of type i and batch j operating during year y	1. Visual inspection of the premises to see if ICS is operational and in use. 2. Interview with the end user to verify that ICS is still in use	The proportion of ICS is still in operation.	Proportion	Biennially (at least once in two years)	Yes/ No

$B_{y=1,new,l,j,survey}$ Quantity of woody biomass used by project devices in tonnes per device of type i. and batch j	1. Interview with the end user 2. Monitoring of daily consumption of biomass (firewood) in ICS	Daily consumption of woody biomass per ICS	Mean value	In the first year of project implementation	Daily consumption of firewood

Target Population
The target population includes beneficiary households provided with the ICS under the project activity. For the purpose of the project activity the target population is 44,648 numbers of households.

Sampling Method
The project involves the distribution of ICS throughout the project area thereby replacing traditional cooking devices. The population is homogeneous in nature i.e., common technology with similar operating characteristics and dispersed in the same state and country. Since the characteristics of the population (for example quantity of biomass consumed) are more or less similar, therefore, a simple random sampling technique will be used to calculate the biomass consumption amongst the samples. Samples will be drawn by using the random number generator.

Sample Size
A simplified approach will be used for determining the minimum sample size for parameters listed under Section 8.4 Option (b) of the methodology in which case it is not requisite for the sample size to meet confidence/precision requirements.

The project proponent has chosen to use the same sample to monitor both parameters. According to the Standard for sampling and surveys for VCS project activities and programme of activities, if there is more than one parameter to be estimated, then a sample size calculation should be done for each of them. Then either the largest number for the sample size is chosen as a sampling effort with one common survey, or separate sampling efforts and surveys are undertaken for each parameter. Therefore, the project proponent will sample a combination of two parameters i.e. $N_{y,j,j}$ and $B_{y=1,new,l,j,survey}$ in the same sample.

Oversampling is strongly encouraged, not only to compensate for any attrition, outliers, or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved, and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, Project proponent shall determine the appropriate non-responses rate based on previous experience.

Sampling Frame
The sampling frames shall be defined below. Overall, ICS will have the same group of end users which is household users, thus it is expected that the geographical locations do not influence the parameter of interest. Therefore, all monitoring parameters can be assumed to be highly homogeneous for each ICS model regardless of how the end user group and distribution/installation location are defined.

Field Measurement:
The table below summarizes field measurement data requirements:
Parameter 1: Number of project devices of type i and batch j operating during year y

Parameter	Timing (indicative)	Frequency as required by the methodology	Methods to be applied
$N_{y,j,j}$	Monitoring will likely occur every 12 to 24 months	Biennially	The survey involves visual inspection of the beneficiary households to assess if ICS is operational and in use. An interview with the end user will also be conducted to verify that ICS is still in use. Based on the response received from the end user, the value of the parameter will be calculated.

Parameter 2: $B_{y=1,new,l,j,survey}$ **Quantity of woody biomass used by project devices in tonnes per device of type i. and batch j**

Parameter	Timing (indicative)	Frequency as required by the methodology	Methods to be applied
$B_{y=1,new,l,j,survey}$	Monitoring will occur within the first year after installation	The first year of installation	Interview with the end user for determining the average quantity of firewood used in the project stove per week/day. Measurement campaigns for estimation of consumption of wood in project households. (Wood fuel quantity)

This survey involves interviews with the end user and estimating the daily consumption of woody biomass of ICS (Weekly/Daily consumption of woody biomass).

As a part of the monitoring campaign the monitoring team will visit the randomly selected household and ask each household about their daily consumption of wood for the project stove. A bundle of the said quantity of wood will be made from the Woodstock available with the user and then weighed using a weighing scale. The weight of wood used in survey households will be noted down similarly and then averaged for the final value of the parameter.

Soft copies of the surveys will be kept, and the database will have a backup. The original survey questionnaires filled by the survey team and signed by the users will be stored in the project office. A backup of the survey results will also be stored on an electric medium. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of credits for the project activity, whichever is later.

Quality Assurance/Quality Control in Monitoring

The project proponent will consider the non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to each parameter will depend on the cost of each data collection approach and the logistics required. The project proponent will determine the most effective measure for each parameter from the following list:

- Oversampling: Randomly draw a sample more than the calculated number (say 25%) and collect data for each parameter
- Buffer Group: Randomly draw additional samples (say 25%) and collect data from only minimum numbers of ICS as per sample size calculation. If this would not result in the required sample size data would be collected from the additional ICS that were selected in the sample.

The monitoring plan has the following procedures in place to ensure good-quality data. The project proponent will ensure that field personnel have reviewed, understand, and agreed to follow the

monitoring plan procedures, including provisions for maximizing response rates and documenting out-of-population cases, refusals, and other sources of non-response. A quality control and assurance strategy will be documented.

Quality control and assurance strategies include addressing non-sampling errors, such as non-response or bias from the interviewer. The project proponent or a competent third party designated by the project proponent with the proper skills will train the monitoring personnel on how to properly survey households to prevent bias from the interviewer. In the case a household refuses to participate, another household will be chosen at random. To reduce interviewer bias, a good questionnaire design and well-tested questionnaires will be used. The surveyor at the site will get training from EKI for the monitoring survey, which includes interviewing the beneficiaries and weighing the wood to use with weighing equipment. Additionally, give weighing machine calibration instructions.

The sample data for the mean value parameter is continuous and therefore the presence of outliers is possible. To identify and address outliers for the parameter, outliers will be defined as those data points with values greater than three standard deviations from the mean of the sample. Data points identified as outliers will be examined further to correct for possible transcription and data entry errors but will be omitted from the analysis if no such administrative errors exist.

Data collection and management methods

The methods for Distribution, Monitoring, and reporting data and parameters are described below.

1. Each distributed ICS is equipped with a label stating the unique serial number which is used for references and monitoring. The unique serial numbers provide the basis for monitoring activities and prevent instances of double counting.
2. The ICS is transported by the distributing entity around the Project site. Users receive the ICS through distributing entities. The ICS data management and collection procedure uses a safe, data storage system.

Monitoring questionnaires

The distributing entities record each sample ICS user's contact information and pertinent data on standardized monitoring questionnaires concerning the corresponding serial number of the ICS that was distributed.

For the first monitoring survey, the interviewer filled out the monitoring questionnaire manually. Further, for consecutive monitoring surveys, EKI will plan to collect the survey data using an app-based electronic device (e.g., mobile phone) at each sample household. Data recorded through a manual process will be recorded and transferred into the electronic database.

Stoves Users will be requested to provide the required information to the interviewer. Users can share their background information in several ways, including by speaking directly with designated focal points who may reside in their communities. This includes:

- Stove Serial No. /Unique ID, Date of ICS Receipt/onset of usage, Address, Beneficiary Name, etc.
- Improved Cookstove Specific Information such as the functioning of ICS, benefits observed from the use of improved cook stoves
- Traditional Cookstove Specific uses information
- Other Cooking fuel-specific information – LPG, Kerosene, etc.
- Fuel use pattern of your household – Purpose of fuel use
- Fuel Details – Quantity, sources, Cost, Quantity, Problem in collecting fuel, etc.

Analysis

The project proponent will manage a project database that includes the following data that can be directly attributable within the project, thereby allowing unambiguous determination of the emission reductions attributable to each project:

- A list of households participating in the project, including name, community/location, distribution/installation date, and unique serial number;
- Where replacements are made, assurance that the efficiency of the new ICS is similar to the specified.

Data obtained from the samples will be used to estimate proportions and mean values for the parameters described above. The values will then be factored into the emissions reduction calculations and result in the request for the issuance of VCUs. The parameters are applied for emission reduction calculations. The stoves that are not in use will be excluded from emissions reduction calculations and will not be counted towards the total number of ICS in operation during the monitoring period.

Implementation

The project participant followed the simple random sampling approach and the minimum sample size was determined as per the following guidelines:

- Project target population < 300: Minimum sample size 30
- Project target population 300 – 1000: Minimum sample size 10% of group size
- Project target population > 1000: Minimum sample size 100

The simplified approach was used to determine the minimum sample size for parameters to be monitored so that for the sample compliance with 90/10 confidence precision is not obligatory.

As per the requirement of applied VCS methodology VMR0006, a minimum sample size of 100 is required to be surveyed for the project population greater than 1000. However, to get more accurate and reliable results, the project proponent selected 120 samples for Madhya Pradesh to conduct the 1st monitoring survey.

Sampling for emission reduction calculation and elaboration of the monitoring report occurred at the end of the monitoring period. This sampling was conducted by trained personnel from the project proponent. The credentials and/or training materials for the sampling personnel will be provided to the VVB at verification. The maximum length of one monitoring period will be two years (duration, not calendar years), with an option for annual or biennial monitoring. However, the project proponent will plan to conduct the monitoring survey annually, The project proponent is responsible for managing household data collection and entry into the project database. Field personnel received training on how to properly deal with surveying techniques and reduce errors and checked that there is no conflict of interest among those involved in data collection and analysis. The project proponent will record the start and end dates of each monitoring period and calculate the emission reductions attributable to each monitoring period.

The operation team of project proponent selected the survey samples randomly using excel/online software. To get more reliable results, the project proponent has selected 125 samples for Madhya Pradesh) instead of considering the minimum sample size of 100. Furthermore, 25% of oversamples were selected considering non-response.

The training to understand the survey process, for awareness of the questions to be asked, and for the measurement of fuelwood consumption on the project stove, was conducted for the survey team before starting the monitoring survey. The survey team visited the sample households in person and collected the required information as per the questionnaire with the person using the cookstove. For the assessment of fuelwood consumption on the project cookstove, the surveyor asked to end user to make a bundle of fuelwood required in a day for the project stove and then weighed the same using the weighing scale. The survey team was equipped with a pre-calibrated weighing scale for weighing the fuelwood

Survey results- Current Monitoring Plan:

The following parameters were obtained through sampling:

1. $N_{y,i,j}$: Number of stoves in operation
2. $B_{y=1,new,i,j,survey}$: Quantity of woody biomass used by improved cookstoves

125 samples were selected (considering 25% non-response) from Madhya Pradesh for all monitoring parameters by section 8.4 option (b) of the applied methodology VMR0006. The survey team has surveyed 107 samples each on the ground from the 125 selected samples. The objective was to obtain reliable and unbiased estimates of the monitoring parameters.

A single homogeneous population was considered for both parameters.

The following table summarizes the sample sizes and results for the first monitoring period .

Monitored Parameter	Sample size	Response	Survey Result
Number of stoves in operation ($N_{y,i,j}$)	125	107	100%
Quantity of woody biomass used by improved cookstoves ($B_{y=1,new,i,j,survey}$)	125	107	3.93 Kg/day/stove

Although 100% of the stoves were found to be operating during the 1st monitoring survey, since some users may go out for a few days during the year, for a family function or some festival, EKI has decided to consider a 5% reduction in the number of stoves in operation for current monitoring period.

Appropriate record-keeping procedures have been implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding project, preventing any occurrences of double counting. An internal review of the project database was conducted to determine the current status of each device — the duration of previous monitoring periods, the households delivering monitoring data, and current verification activities.

Assessment for Leakage

The methodology provides a net-to-gross adjustment factor of 0.95 to account for leakages, hence the surveys are not required to determine leakage.

The other source of leakage occurs if equipment currently being utilized is transferred from outside the boundary to the project activity. All ICSs in the project are newly manufactured/assembled or newly installed, thus no leakage is applicable.

Monitoring and Reporting

The project proponent will assess all monitoring data and produce a monitoring record for the VVB to verify the corresponding to the preceding monitoring period. This record will present the data relating to the survey results conducted for the respective monitoring period.

The purpose of the monitoring plan is to ensure successful monitoring of the emission reductions of the proposed project during its crediting period. The overall monitoring will be managed by the project implementer EKI Energy Services Ltd. (EKIESL)

Activities and performance related to emissions reduction are monitored by EKIESL. The PP proposed the following roles and responsibilities for data monitoring, collection, data archiving, and calibration of equipment for these project activity instances.

The monitoring activities will involve data collection during distribution as well as usage information post-distribution. The data collected during distribution also involves information about the stove, the end user, and the location to enable one to uniquely identify each ICS unit and avoid double counting.

Repair and Maintenance

EKIESL/its representative will establish a service center at the project location where end users can repair the cookstoves and can use them further. The repair and maintenance will be carried out by manufacturer/ distributor of ICS as per the manufacturer's recommendation. This will ensure that the cookstove will operate for a longer period.

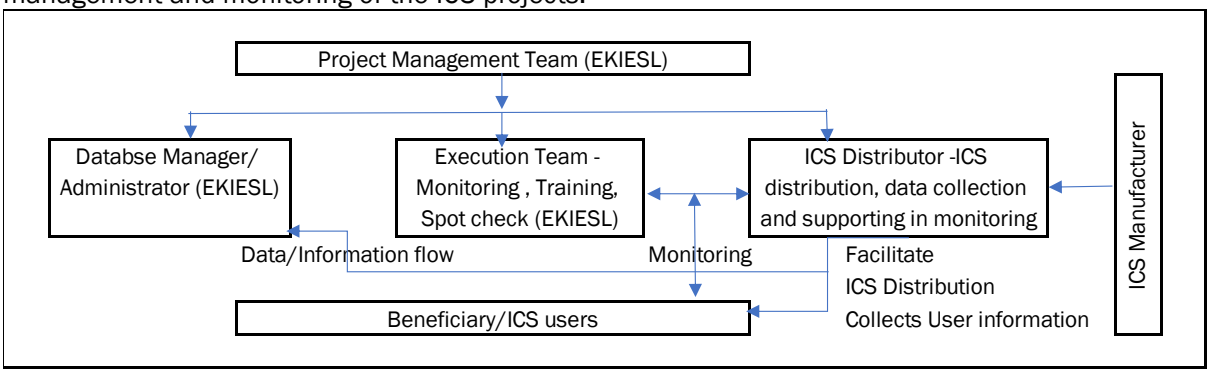
In case, the end user experiences any issues with the ICS, he or she can call the service center with the help of the customer service number available on the box ICS, to report the issues. After receiving a complaint, the maintenance team will take the necessary action immediately to resolve the issue.

Replacement

After 7 years of lifetime, a report from the manufacturer/maintenance agency will be provided to confirm the extended life of the cookstove. The project will claim credits beyond 7 years only for a balanced year till the cookstove is replaced by new cookstoves. The cook stove may also be replaced during its lifetime in case if the devices become non-operational and the devices can't be repaired.

Organisation structure

The organization structures involved in monitoring of the project activity include dedicated team for management and monitoring of the ICS projects:



Roles and responsibilities

EKIESL/its representative will distribute the stoves, as well as carry out the monitoring activities that occur during the distribution of stoves. EKIESL or through their associates will ensure that the distributor is trained on how to capture the end-user data. The project activity implementer is fully responsible to ensure the correct distribution process and data gathering is followed. The following information will be recorded at the time of distribution of ICS to the user:

- Name of the User
- Total Family Members
- Location/Address
- Installation Date
- Unique ID

EKIESL team will also plan to visit the site regularly to ensure proper use of stoves, take feedback and make the end user aware of their health and environmental sustainability as well as the benefits of saving time and money with the use of ICS. The team will also check the grievances of the local stakeholders from the project activity and will try to resolve those issues on the ground.

Once ICS is distributed, monitoring activities will involve selecting a sample of the stove from the distribution record and visiting the premises where these stoves are located to monitor key parameters pertinent to ER Calculation. The individuals carrying out the monitoring activities will follow instructions provided during training, to check and record the following key parameters:

- Check if project stoves are operational and in use
- Check if there is any ongoing use of replaced stoves.

Check biomass consumption of new cookstove Data collecting & handling are conducted in a transparent way to secure the high quality of recording and storing of data. Data collected and monitored are stored electronically in a secure and retrievable manner for at least two years after the end of the project

crediting period. Uncertainty related to data handling (if any) would be rectified, if necessary, by revising monitoring procedures. The changes would be approved by a verifier (e.g., VVB)

The roles and responsibilities of different participators are proposed to be as follows:

Entity/Person	Roles & Responsibilities
EKIESL Team including Project Management Team, Execution Team and Database manger/ administrator	Project Management Team is overall in charge of the project implementation and monitoring. The key responsibility includes VCS documentation development Communicate with VERRA for all VCS related matters Communicate with VVBs for validation & verification Identify local partners for local representation and support Identity suitable ICS manufacturers Design the distribution plan for on-ground implementation of ICS Design the monitoring system (including data collection in an electronic database) Database Manager/Administrator Managing user's database including updating of the database as an when required. Project Execution Team reporting to the project management team will be responsible for Training and development of local resources (as may be required) Regular Monitoring and quality assurance of data including undertaking of users interview, interviews and check the operational status of Cookstoves (ICS) in association with the ICS distributor. Monitor & supervise on-ground distribution, etc. Annual Review meeting with Local Teams and other associated entities to ensure continuous improvements in the project activity
Distributor / Operational Team (Local Representative)	To support & assist EKIESL in achieving the stated goal of the project activity Assist and facilitate EKIESL in baseline data collection, efficiency testing, data of biomass consumption for new ICS through sampling survey, etc. To be the local representative and communicate, act, and engage in implementation activities of project activity To identify and deploy suitable local teams and resources for ICS distribution, data collection, regular spot-checks at households, etc. Assist and facilitate EKIESL during the training of the Operational Team and capacity building across the end users. To bridge any gap between end users of ICS and EKIESL to ensure the smooth operation of the program to achieve the overall objective of the project activity ICS Distributor(s)–who will be responsible for deploying the ICS at the household and registering the end user in the digital tool. They will also be responsible for giving demonstrations of ICS use, discussing with the end users on its benefits, and educating them on the continued use of ICS and discontinuation of the use of conventional/traditional open firing practice. ISC distributor will also conduct periodic check at households to gather feedback, address any technical concerns, collect necessary data, and transmit the information. ICS distributor will be responsible for preventive repair/maintenance, in case of critical breakdown will coordinate with EKIESL and manufacturer for maintenance.

Entity/Person	Roles & Responsibilities
ICS Manufacturer or Supplier	To design and develop ICS as per the required standard To provide technical parameters and manufacturer's efficiency etc. at the time of supply To educate and train the EKIESL team on the installation (delivery), uses, handling, etc. of the ICS in households.

Competencies of personnel carrying out the monitoring activity

The person responsible for carrying out monitoring activities should be graduate and has received training on ICS basics.

Emergency Preparedness

If any ICS Unit becomes faulty/damaged/non-functional, or households decides to discontinue with the existing ICS due to behavioral issue with the households, the related information collected by the distribution team/ project execution team will be automatically communicated to the database administrator and project management team. There is a dynamic database maintained for all the ICS and information relating to non-functioning or ICS damage will be updated in the database as and when it occurs. The database will be updated over the period of non-operational days on i.e., the gap between the date of damage of ICS and date of damage rectification/ICS replacement.

Internal Audit

Project Participant has constituted the team for internal audit as a part of quality control and quality assurance mechanism towards ensuring data completeness in conformance with monitoring and reporting guidelines as well as maintenance of data to avoid any risk of error in estimation of emission reduction.

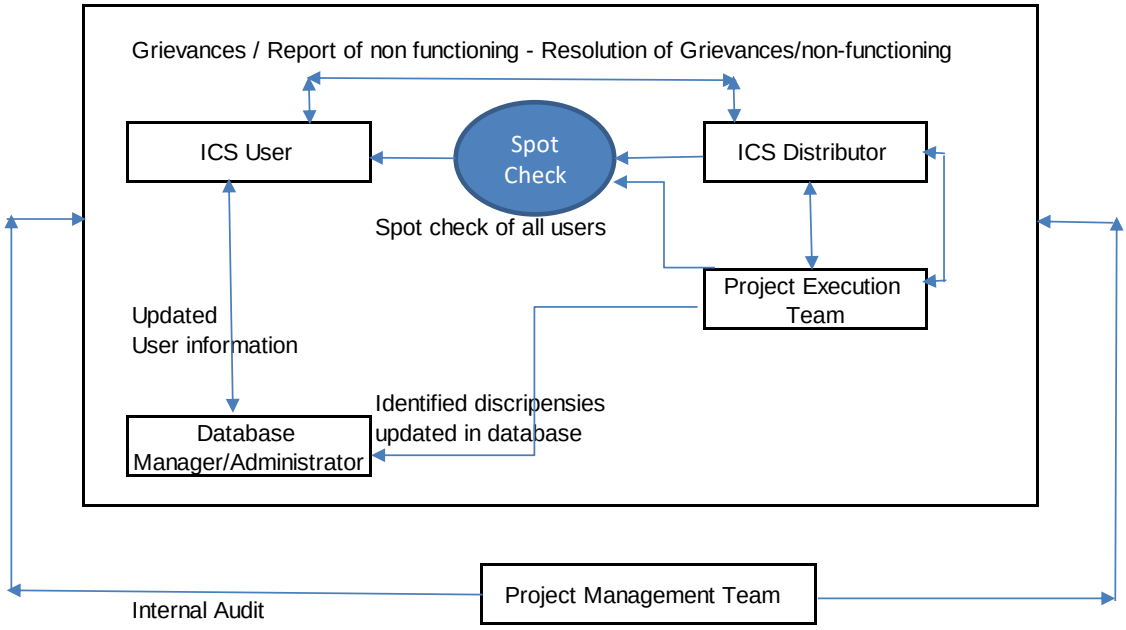
Internal audit will be carried out by the project management team and will include

1. Review of user database and cross check of user information for checking of duplications and erroneous data entry (review of data transfer between beneficiary database and end user agreement). Any duplicate information if investigated, checked for the errors, will get corrected or excluded from the database if it is a true duplicate entry.
2. Cross verification of the information obtained as part of sample survey to identify outliers /erroneous data if any. Random review of data transfer between survey schedule/ structured questionnaire and monitoring excel spreadsheet (used for emission reduction estimation)
3. Assessment of the report of spot check of every ICS to be carried out by the ICS distributor and/or project execution team of EKIESL once in every 6 months throughout the project lifetime to ensure proper function of ICS and reporting of noncompliance. The spot check will review the level of user's satisfaction/ grievance, training and sensitization carried out, scheduled/ un-scheduled maintenance, change of address, transition of households to LPG/ traditional ICS. Such events/incidents related to non-usage of ICS and any other observed inconsistencies will be updated in the database. In case ICS are found to be no longer in use due to any of the aforesaid reason the beneficiary will be excluded from ER calculation and beneficiary database.
4. Cross check of improved cookstoves usage through various means of contacting the beneficiaries in addition to periodic survey /spot check
5. Review of the report of periodic repair/maintenance of ICS.
6. Review of grievance received and its redressal including the period of grievance redressal

7. Internal audit of the record of training undertaken

This internal audit to be conducted at periodic interval (minimum once a year) which will identify discrepancies/ nonconformities if any and if identified, will be included in the audit findings and appropriate measures are/will be undertaken immediately. Report on internal audits done, discrepancies/ nonconformities identified and corrective action taken is maintained and kept for external auditing

Internal audit and Spot check



7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 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
Value applied:	See nested table below
Comments	The proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value. The survey will be conducted at least once every two years basis after the implementation of the project activity instance.

Number of ICS distributed	The proportion of ICS operational (based on sample survey)	Number of ICS operational during the monitoring period
44,648	100%	44,648

Data / Parameter	$B_{y=1,new,i,j,survey}$
Data unit	Tonnes
Description	Annual quantity of firewood 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
Value applied:	For Madhya Pradesh – 3.93 kg/device/day or equal to 1.4345 tonnes/device/year. Estimated based on the survey result
Comments	The survey was conducted to determine this value in the first year of project implementation.

7.2 Baseline Emissions

The methodology does not account for baseline emissions separately but instead quantifies emission reductions as a function of reduction of non-renewable biomass consumption in efficient project stoves as compared to baseline stoves. Please refer to Section 7.5 below for estimation of emission reduction.

7.3 Project Emissions

The methodology does not account for project emissions separately but instead quantifies emission reductions as a function of reduction of non-renewable biomass consumption in efficient project stoves as compared to baseline stoves. Please refer to Section 7.5 below for estimation of emission reduction.

7.4 Leakage

In accordance to the methodology a default value of 0.95 is considered.

7.5 Net GHG Emission Reductions and Removals

PP has calculated the emission reduction for each ICS installed under the project activity separately.
In this section example of ER calculation of one ICS (stove serial number GHG-22/L2/0584330) is provided:

Date of installation: 05-December-2022
Location: Madhya Pradesh
For the year 2022, vintage for the stove: Vintage 1
No. of days for vintage: 147 (05-December-2022 to 30-April-2023)
Year fraction: 147/365 = 0.403

Determination of efficiency of ICS during 1st Year

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

Where

η_p = 36.42%

DF_n = 0.99

$\eta_{new,y,i,j}$ = 36.42% X (0.99)1$^{(1-1)}$ X 0.94

$\eta_{new,y,i,j}$ = 34.23%

Determination of the quantity of firewood that is saved in tonnes per ICS during 1st year

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

$B_{y=1,w,i,j,survey}$ = 1.4345 tonnes/device/year

$B_{y,savings,i,j}$ = 1.4345 X [(0.3423/0.1) -1]

= 3.4764 tonnes/device/year

Period	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
05-December-2022 to 30-April-2023	1.4345	34.23%	0.1	3.4764

Determination of emission reductions for a sample ICS (with installation date 05-Dec-2022)

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

Where,

$NCV_{wood\ fuel}$ = 0.0156 TJ/tonne

$f_{NRB,y}$ = 89.20%

$EF_{wf,CO2} + EF_{wf,non\ CO2}$ = 112 + 26.23 = 138.23 tCO_2/TJ

Year fraction = 0.074

$ER_{y,i,j}$ = 3.4764X 0.0156 X 89.20% x 138.23 X 1 X 0.95 X 0.074

$ER_{y,i,j}$= 0.4708 tCO_2

Proportion of ICS in Operation	100%
Actual drop of ICS	0%
Number of ICS in operation	44,648

Although 100% of the stoves were found to be operating during the 1st monitoring survey, since some users may go out for a few days during the year, for a family function or some festival, the project proponent has decided to consider a 5% reduction in the period for which the ICS is in operation for current monitoring period thereby resulting in 5% reduction from the estimated emission reduction.

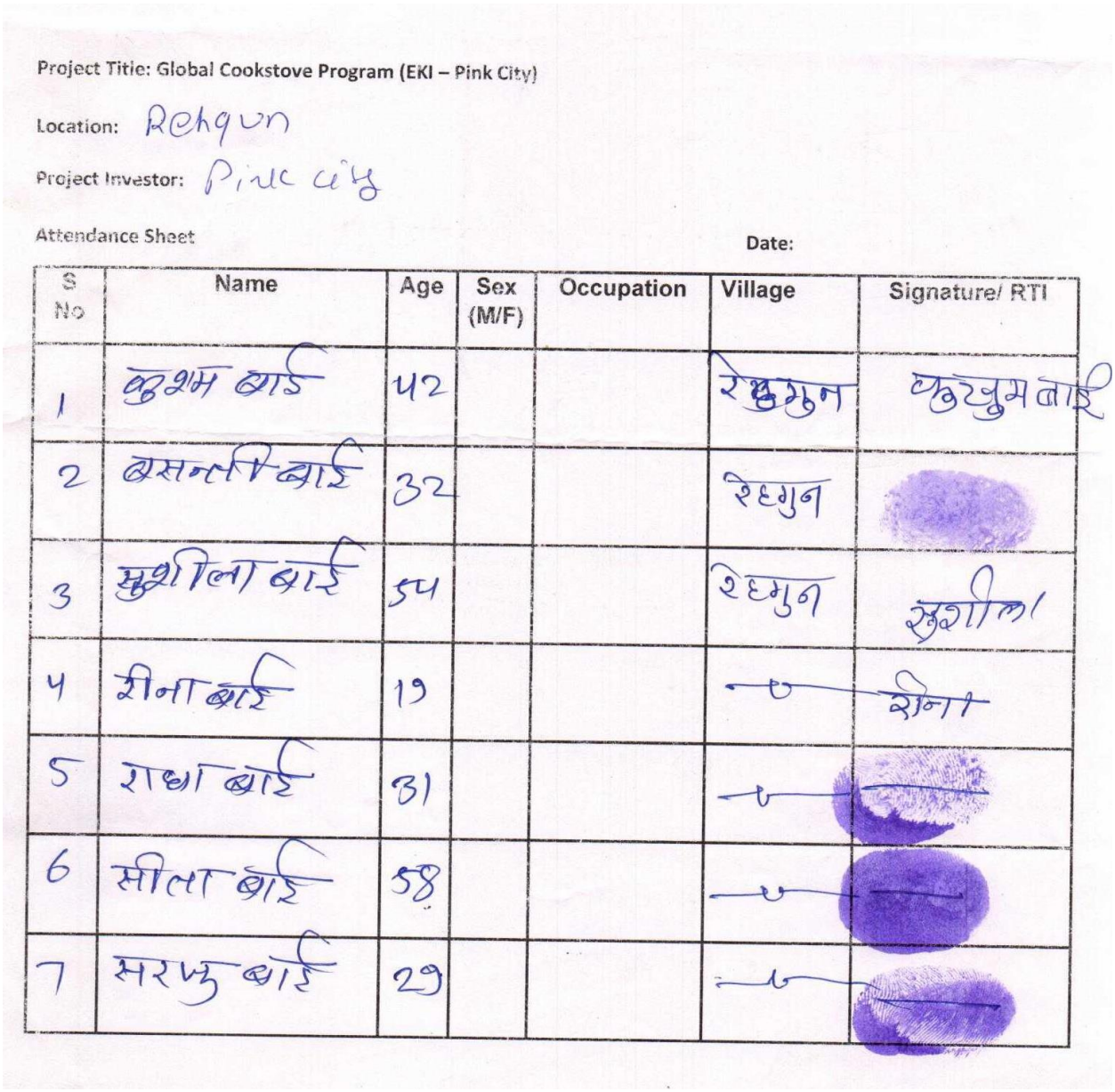
The total emission reductions for all the project activity instances are as below **Year**	**Baseline emissions or removals (tCO_2e)**	**Project emissions or removals (tCO_2e)**	**Leakage emissions (tCO_2e)**	**Net GHG emission reductions or removals (tCO_2e)**
05-December-2022 to 31-December - 2022	2,606	-	-	2,606
01-January-2023 to 30-April-2023	65,871	-	-	65,871

Total	68,477	-	-	68,477

Estimated ex-ante GHG emission reductions and removals and the achieved emission reductions and removals for this monitoring period

Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
05-December-2022 to 31-December - 2022	20,980	2,606	-87.58%	All the project ICS were not installed/ commissioned on one date i.e. on the first date of crediting period hence the emission reduction achieved during the monitoring period is lower than the emission reduction estimated ex-ante for the same period.
01-January-2023 to 30-April-2023	93,246	65,871	-29.36%	Moreover, Project proponent has considered 5% reduction in the number of stoves in operation for current monitoring period
Total	114,226	68,477	-40.05%	As given above.

APPENDIX I: STAKEHOLDERS' ATTENDANCE



Project Title: Global Cookstove Program (EKI – Pink City)

Location: Rehgun

Project Investor: Pink city

Attendance Sheet

Date:

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
1	कुशम बाई	42			रेहगुन	कुशुम बाई
2	बसन्ती बाई	32			रेहगुन	
3	सुशीला बाई	54			रेहगुन	सुशीला
4	रीना बाई	19			~~~	रीना
5	राधा बाई	31			~~~	
6	सीता बाई	58			~~~	
7	सरजु बाई	29			~~~	

8	सोनाबाई	30			~~~	सोना
9	कलाबाई	44			~~~	कला
10	जीवीबाई	29			~~~	जीवी

(11) शिवानी अलावे 24 F Farmer घर शिवानी

(12) रायसिंग गिरवाल 60 M Farmer घर रायसिंग

(13) शंकर अमेसरी 42 M Farmer घर शंकर

(14) सुखराम गिरवाय 42 M Farmer घर सुखराम

(15) राधेश्याम गिरवाल 45 M Farmer घर राधेश्याम

प्र. सांत्रय
ग्रा.पं.रेहगुन सज.

ग्राम पंचायत,रेहगुन (सज.)
जनपद पंचायत,बड़वानी