



Verified Carbon Standard

MADAGASCAR IMPROVED COOKSTOVE PROJECT BY KCM-WOOD#CPA-W-030



Project title	Madagascar Improved Cook Stove Project by KCM-Wood#CPA-W-030
Project ID	2794 ¹
Monitoring period	21-April-2022 to 30-April-2024 (both dates included)
Crediting period	21-April-2022 to 20-April-2032 (both dates included)
Original date of issue	16-May-2024
Most recent date of issue	05-August-2025
Version	04
VCS Standard Version	VCS Standard version 4.7
Prepared by	Korea Carbon Management Ltd

¹ Here, VCS Project ID for the Grouped Project is considered as the ID assigned by VERRA for VCS2794 which corresponds to CDM CPA#30 which was the earliest inclusion under CDM and already listed in VCS. There are total of 10 instances, all the other 9 instances were also listed under VCS corresponds to CDM CPAs of the same PoA (ID 10443) but sequentially followed by the CPA 30 (i.e. VCS2794). Therefore, PP has decided to retain the project title and VCS ID of CPA30 (i.e. VCS2794) as the Project to be re-designated as "Grouped Project" in line with the VCS Standard 4.7 para 3.23.9 (2) where all other 9 projects to be the instances under this grouped project. Since all these projects (i.e. instances) are not newly submitted/listed projects under VCS, rather these are existing listed VCS projects, therefore, VCS 2794 is now regarded as the project ID for the "Grouped Project". The remaining 9 projects have been withdrawn from VCS to remove their independent identity under VERRA (reference: withdrawal request letter to VERRA dated 06-February-2025); whereas they remain the instances under this Grouped Project as demonstrated under the sections below.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

This is a community-based project activity that implemented energy efficient improved cooking practice at households to replace inefficient open firing practice at the baseline. This project is designed as Grouped Project activity of 10 different Instances which are registered 'Component Project Activity' (CPAs) of a "Programme Of Activities" (PoA) registered under 'Clean Development Mechanism' (CDM) of UNFCCC which is now applying for joint validation and verification practice of VERRA under VCS mechanism.

Project instances² 1 – 10 were registered as component under the PoA as below.

Title of the registered CDM PoA	: Madagascar Improved Cookstove Project by KCM
UNFCCC reference number	: 10443 ³
Coordinating/Managing entity (PP)	: Korea Carbon Management Ltd. (KCM)
Instance 1	CPA 31 (VCS 2795)
Instance 2	CPA 33 (VCS 2797)
Instance 3	CPA 35 (VCS 2799)
Instance 4	CPA 37 (VCS 2801)
Instance 5	CPA 39 (VCS 2803)
Instance 6	CPA 41 (VCS 2805)
Instance 7	CPA 30 (VCS 2794)
Instance 8	CPA 43 (VCS 2807)
Instance 9	CPA 32 (VCS 2796)
Instance 10	CPA 45 (VCS 2809)

The main objective of this grouped project activity is dissemination of the efficient improved cooking stove (ICS) woody biomass-based ICS to the rural household of Madagascar, which has resulted in reduced firewood consumption leading to climate change mitigation in a sustainable manner. Overall objectives are reduction of greenhouse gases, conservation of forests and woodlands as well as improved health conditions of ICS users due to improved indoor air quality.

The ICS promoted under this grouped project activity are of two types viz. (i) SoaRehitra portable ICS and (ii) Lamasinina fixed ICS made of clay liner baked to high standards and insulated with outer metal sheet, which are commonly available in Host Country. Lamasinina design is developed with a chimney for releasing the smoke outside, having two combustion chambers that specify this model. It's joined with a mortar of high quality, which holds together the clay liner and metal sheet. In particular, the design made have higher pressure than the atmosphere, hence raising the airflow rate in the improved cook stove tunnel, as it is heated at the bottom.

² Here instances are considered in sequential order based on their ICS distribution dates (even though the CPA IDs under CDM are in different sequence).

³ https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/KUFLHQD3N8E5W2BIMRAVTGJX014S76/view

This way, the top point of the improved cook stove experiences more pressure and heat. The details of the stove design and technicalities are discussed under the section 1.12 below.

The project activity targets households in rural communities with no previous ICS access. The geographical boundary of the Project Instances is within the national boundary of the host Country “Madagascar”. ICS are distributed free of cost to users. Korea Carbon Management Ltd. (KCM) financed the implementation of the Instances under the Grouped Project in full.

Each project activity instance is fully implemented with a total of 13,752 and 13,604 numbers of households for Portable ICS (SaoRehitra) and Fixed ICS (Lamasinina) respectively which were covered under this grouped project. However, one project instance includes only one type of ICS under the project which makes each instance homogeneous in terms of ICS types and beneficiaries. Each household received one ICS.

Instances	ICS Type	Implementation start date
Instance 1	Portable ICS (SaoRehitra)	21-April-2022
Instance 2	Portable ICS (SaoRehitra)	09-June-2022
Instance 3	Portable ICS (SaoRehitra)	30-June-2022
Instance 4	Portable ICS (SaoRehitra)	29-August-2022
Instance 5	Portable ICS (SaoRehitra)	14-November-2022
Instance 6	Portable ICS (SaoRehitra)	19-December-2022
Instance 7	Fixed ICS (Lamasinina)	14-February-2023
Instance 8	Portable ICS (SaoRehitra)	17-April-2023
Instance 9	Fixed ICS (Lamasinina)	30-June-2023
Instance 10	Portable ICS (SaoRehitra)	17-July-2023

The scenario existing prior to the implementation of the project is the actual baseline scenario which is equal to the existing common practice in the region i.e. in absence of the project activity the equivalent amount of thermal energy generated using firewood in three stone open fires to meet the cooking energy demand.

The annual average & total GHG emission reduction (ex-ante) from the grouped project activity over 10 years fixed crediting period are as below.

Instances	Annual Average emission reduction (tCO ₂ e) (ex-ante estimate)	Total emission reduction (tCO ₂ e) during the crediting period ⁴ (ex-ante estimate)
Instance 1	41,510	409,644
Instance 2	40,946	398,575
Instance 3	40,704	393,877
Instance 4	40,012	380,609
Instance 5	39,125	363,914
Instance 6	38,721	356,450
Instance 7	41,873	378,919
Instance 8	41,085	364,813
Instance 9	40,149	348,358
Instance 10	39,931	344,614
Total	404,056	3,739,774

⁴ The total ER calculated across the Crediting Period is different than manually estimated values for 10 years. This is because the total value across the crediting period will be based on the annualized value times the effective year fraction of crediting period applied. For example, the start date of the 10 instances are not same, they were implemented in different dates in year 2022 and 2023, whereas end date of the crediting period is limited to 29 February 2032 as per the para 3.9.7 of the VVS v4.7. Therefore, by the end of the crediting period, all instances are not availing full 10 years. Thus, these total values vary while deriving from the annually calculated ER values. The effective crediting period received by the entire grouped project is 9.87 year (demonstrated under the ER sheet).

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
CDM Validation & CPA (30, 31, 32, 33, 35, 37, 39, 41, 43, 45) Inclusion	20-December-2021	CDM	KBS Certification Services Pvt. Ltd	-
VCS Gap Validation (open for public comment)	22-June-2022 to 22-July-2022	VCS	LGAI Technological Center S.A. (Applus+ Certification).	-
VCS Verification I (Joint Validation & Verification)	21-April-2022 to 30-April-2024	VCS	LGAI Technological Center S.A. (Applus+ Certification)	2 years 00 Months 11 days

This is the joint validation and 1st verification under VCS. The current monitoring period is considered from 21-April-2022 to 30-April-2024 (includes both the dates) which is part of the fixed crediting period from 21-April-2022 to 29-February-2032' (includes both the dates) Instance wise total GHG emission reductions generated in this monitoring period are as below: (calculated value to be referred in the ER sheet).

Instances	MP: 21-April-2022 to 30-April-2024 Total emission reduction (tCO ₂ e) achieved
Instance 1	101,591
Instance 2	94,231
Instance 3	90,453
Instance 4	81,523
Instance 5	77,893
Instance 6	64,604
Instance 7	50,010
Instance 8	53,013
Instance 9	36,280
Instance 10	37,768
Total =	692,366

1.3 Sectoral Scope and Project Type

Sectoral scope⁵	03 - Energy demand
Project activity type	Type II - Energy efficiency projects with maximum output of 60 GWh (electrical) or 180 GWh (thermal) per year

1.4 Project Eligibility

1.4.1 General eligibility

The project activity involves replacement of traditional cooking practices by improved cook stoves. The improved cook stoves owing to its higher combustion efficiency of 32% to 33% (as per tested values of the ICS types) in comparison to the traditional three stone open firing cook stove results in energy efficiency improvement and maximum energy savings of 60 GWh per year.

As per calculation established during WBT tests, ICS model “Lamasinina” (2 pot fixed improved cookstove) which fires wood and having thermal efficiency of 33% (as per WBT results, however applied values are adjusted as per operational vintage of the ICS), can generate maximum 0.005748 GWth per year, which is much below the threshold as specified. Similarly, SoaRehitra (Single pot portable ICS) can generate maximum 0.005891 GWth per year which demonstrates thermal efficiency of 32.2 % (as per WBT results, however applied values are adjusted as per operational vintage of the ICS).

In this context, for project activities that improve thermal energy efficiency, the maximum energy saving of 60 GWh(e) per year is equivalent to 180 GWh(thermal) per year saving. Hence the project activity is eligible under Sectoral scope 3 i.e. energy demand under the scope of the VCS Program.

The project activity is a voluntary initiative of the project implementer and meets all the requirements of section 2.1.1 of VCS Standard 4.7.

S. No.	The scope of VCS Program	Project eligibility
1.	The seven Kyoto Protocol greenhouse gases.	The project activity includes reduction of Carbon Dioxide emissions which is one of the seven, Kyoto Protocol greenhouse gases included under the scope of VCS program
2.	Ozone-depleting substances (ODS).	The project activity does not involve use of Ozone Depleting Substances
3.	Project activities supported by a methodology approved under the VCS Program through the methodology approval process	This project activity is supported by AMS-II.G.- Energy efficiency measures in thermal applications of non-renewable biomass, which is approved ⁶ under the VCS Program through the methodology approval process.

⁵ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

⁶ In line with the exemption approval letter from VERRA, dated 06-February-2025, PP has retained the methodology AMS II.G (which was applied in the listing PD) however with required amendments as prescribed under the exemption.

4.	Project activities supported by a methodology approved under an approved GHG Program, unless explicitly excluded	As demonstrated above, this project activity is supported by a methodology approved under VCS Program.
5.	Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.	The project activity does not involve in Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program

The project activity meets all the requirements of different sections of VCS Standard 4.7 as follows:

Sections of VCS Standard	Section details	Justification
Table 1 of section 2.1.3	The VCS Program also excludes the project activities under the circumstances indicated in Table 1: Excluded Project Activities	The host country of the project is Madagascar, which is an LDC. Therefore, project activity does not fall under the excluded list of projects as prescribed under the table 1 of section 2.1.3. of the VCS Standard version 4.7. The Project activity reduces GHG emissions due to energy efficiency measures by introducing improved cookstoves. Therefore, project activity does not fall under the listed “excluded project activity” and also the project activity is a small-scale project activity.
section 3.23.9 (2)	For projects registered under the CDM: (2) Multiple CPAs registered under the CDM that have the same project proponent, the same project activity, and occur within 10 km of one another shall register under the VCS as a single project. Such projects shall complete a full VCS Project Description Template. A validation/verification body shall undertake a validation of the full project description	This project activity (here referring to all the instances which were listed under VERRA for public commenting as separate individual project) was open for public comment under VERRA from 22-June-2022 to 22-July-2022 with a project status as “under development”. At the time of pipeline listing, each CPA was developed as a separate project as per VCS standard v4.0. However, as per current applicable VERRA standard 4.7, PP has combined 10 CPAs registered under

		CDM PoA 10443 (viz. CPA #30, CPA #31, CPA #32, CPA #33, CPA #35, CPA #37, CPA #39, CPA #41, CPA #43, CPA #45) under one grouped project thus keeping in-line with the VCS guidelines (v4.7) for CPAs transitioning from CDM to VCS for the same PP.
Section A.2 under APPENDIX 2 Eligibility Conditions for Projects and CPAs Seeking VCS Registration	For a CPA that does not include afforestation and/or reforestation activities: 1) The CPA must be part of a Program of Activities (PoA) with an original program crediting period start date on or after 1 January 2016; or 2) Where the CPA is part of a Program of Activities (PoA) with an original program crediting period start date from 1 January 2013 to 31 December 2015 and where the CPA has an original crediting period start date from 1 January 2013 to 31 December 2015, the CPA must have issued credits during the period 1 January 2016 to 5 March 2021, or must have a status of “issuance requested” by 5 March 2021; or 3) Where the CPA is part of a PoA with an original program crediting period start date from 1 January 2013 to 31 December 2015 and where the CPA has an original crediting period start date on or after 1 January 2016, no prior credit issuance is required.	This grouped project activity is a part of Program of Activities (PoA): 10443 which has been registered under CDM on 07-September-2018. The first activity under the CDM PoA has begun reducing GHG emission from 09 October 2018, which is under the 1st CPA. For the 1st instance of the current grouped project activity (i.e. CPA 31), the date of first cook stove distribution under the program is 21-April-2022. Therefore, it can be concluded that the original program crediting period start date after 1 January 2016 Therefore, condition (1) is applicable.

Capacity Limits: No project activity instance shall exceed the applicable limit, which is 180 GWh_{th}/y. Expected annual energy saving for each instance is 0.0131 GW_{th} per year for ICS type “SoaRehitra” and 0.0132 GW_{th} per year for ICS type “Lamasinina” (calculation can be referred in ER sheet under “Ex-ante__Emission Reduction” sheet). Hence, for each activity instance (i.e. Instance with the total installed ICS) maximum energy savings is 179.84 GW_{th} and 179.85 GW_{th} for SoaRehitra and Lamasinana respectively which is less than threshold limit of 180 GWh (th) per year (calculation can be referred in the ER sheet). No project activity instance exceeds one percent of the capacity limit (i.e., 1.8 GW_{th}).

1.4.2 AFOLU project eligibility

This project is not an AFOLU project, hence this section is not applicable.

1.4.3 Transfer project eligibility

Program of Activities (PoA), 10443, has been registered under CDM on 07-September-2018. The first activity under the CDM PoA has begun reducing GHG emission from 09 October 2018, which is under the 1st CPA. For the 1st instance of the current grouped project activity (i.e. CPA 31), the date of first cook stove distribution under the program is 21-April-2022. Therefore, it can be concluded that the original program crediting period start date after 1-January-2016.

Therefore, the original program crediting period start date on or after 1-January-2016. Thus, keeping in-line with the VCS guidelines as per Section A.2 under APPENDIX 2 (Eligibility Conditions for Projects and CPAs Seeking VCS Registration) for CPAs transitioning from CDM to VCS.

This project activity registered under CDM as a part of the CDM-PoA; however, verification has not been conducted under CDM. The monitoring period from “21-April-2022 to 30-April-2024” has been considered under VCS 1st verification, under VCS. Hence, there is no double accounting⁷ of emission reductions for the current monitoring period

1.5 Project Design

- ☐ Single location or installation
- ☐ Multiple locations or project activity instances (but not a grouped project)
- ☒ Grouped project

Grouped Project Design

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

Sl. No.	Criterion	Compliance Requirement	Method of Evaluation
1	Methodology: Meet the applicability conditions set out in the methodology applied to the project	The project activity instance shall use VCS approved methodology- AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass, Version 09.0 and shall meet	New project activity instances (Energy-efficient Cookstoves) meet the applicability conditions set out in Section 3.2 of this VCS-PD.

⁷ An official declaration has been submitted to VVB confirming the same.

		the applicability conditions set out in the methodology.	
2	Technology: Use the technologies and measures specified in the project description	The project instance shall implement energy-efficient cookstoves namely “Lamasinina”/ “SoaRehitra”. Only energy- efficient cookstoves are to be adopted in the project by replacing traditional cookstoves in the household.	Only energy-efficient cookstoves have been implemented in the project by replacing traditional cookstoves in households of Madagascar which is established through Thermal Efficiency test report/ manufacturer 's specification for minimum efficiency criteria in the first year of stove installation.
3	Baseline Scenario: Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	All new project activity instances will be installed within Madagascar only and the baseline scenario is the thermal energy generated using firewood in three stone open fires (low efficiency) to meet the cooking energy demand by the target population.	Baseline scenario can be confirmed in Section 3.4 of this VCS-PD. Baseline scenario and geographical boundary can be confirmed from registration records of individual ICS which contains geographical location, address as well as confirmation by end user (stove owner) stating that they were using traditional three stone fire or pot support before the installation of project stove.
4	Additionality: Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	Each project activity instance shall demonstrate its compliance with- 1.Regulatory Surplus: The project should not be 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.	1. There is no law, statute or government programme or policy in Madagascar mandating the project activity nor is there any systematically enforced law, statute or other regulatory framework for such projects.

		2. Positive List: The inclusion of new project activity instances shall have to comply with positive list that is the ICS are installed/ distributed at zero cost to end user and the project activity instance has no other source of revenue but GHG credits.	2. Self-Declaration/individual ICS registration documents/ Copy of Consent Letter/ record of consent signed by end user mentioning that end users were not charged for the ICS.
5	Occur within one of the designated geographic areas specified in the project description	All new project activity instances will be installed within Madagascar only.	Project Activity Instance Database containing location details of each household to which cookstoves are distributed.
6	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.	Conformance with complete set of eligibility criteria for the inclusion of new project activity instances.	Conformance with complete set of eligibility criteria for the inclusion of new project activity instances.
7	Ownership: 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	The ownership can further referred from the contractual agreement between Project Participant with each beneficiaries by virtue of which the end user will confirm use of cook stove as well as transfer the Carbon Credit right to the Project Participant	The ownership can further be referred from the contractual agreement between Project Participant with each beneficiary by virtue of which the end user will confirm use of cook stove as well as transfer the Carbon Credit right to the Project Participant
8	Start Date	The start date of project activity instance shall be same as or later than the grouped project start date.	Project Activity Instance Database containing date of installation of each ICS.
9	Crediting period	Only be eligible for crediting from the later of start date of the project activity instance or the start of the verification period in which they were added to the grouped project,	The start date of the instance will be the date, the stove began generating GHG emission reductions or removals. The end of the crediting period of instance will be the end date of project

		through to the end of the total project crediting period.	crediting period as mentioned in section 1.10 of this VCS-PD.
10	Not be or have been enrolled in another VCS project.	The project is not part of any other VCS project	Declaration/ Undertaking from the project proponent to confirm the same
11	Adhere to the clustering and capacity limit requirements for multiple project activity instances	1) Each project activity instance that exceeds one percent of the capacity limit shall be identified.	1. Project Activity Instance ER Spreadsheet containing estimation of annual energy saving from each project activity instance (i.e., each project ICS).
		2) Such instances shall be divided into clusters, whereby each cluster is comprised any system of such 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.	2. No project activity instance shall exceed the applicable limit, which is 180 GWh _{th} /y. Expected annual energy saving for each instance is 0.0132 GW _{th} per year for ICS type “Lamasinina” and 0.0131 GW _{th} per year for ICS type SoaRehitra. Hence, for each activity instance maximum energy savings is 179.84 GW _{th} and 179.85 GW _{th} for SoaRehitra and Lamasinana respectively which is less than threshold limit of 180 GWh(th) per year. No project activity instance exceeds one percent of the capacity limit (i.e., 1.8 GWh _{th}). Therefore, the project activity instances under this grouped project shall not be assigned to clusters.
		3) 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.	3. Not Applicable, as described above.

1.6 Project Proponent

Organization name	Korea Carbon Management Ltd.
Contact person	Mr. Thomas Winklehner
Title	Chief Executive Officer
Address	9F, N'deavor Tower, 45, Seocho-dearo 74-gil, Seocho-gu, Seoul, 06626, Republic of Korea
Telephone	+82 2 3487 6050
Email	info@korea-carbon.com

1.7 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the project	Not Applicable
Contact person	Not Applicable
Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.8 Ownership

As per VCS Program Definitions version 4.4, the project ownership is the legal right to control and operate the project activities.

The project ownership is with “Korea Carbon Management Ltd.” (also referred to as KCM). The ownership can further be referred from the contractual agreement between Project Participant with each beneficiary by virtue of which the end user will confirm use of cook stove as well as transfer the CER right to the Project Participant.

This is in line with the clause 5 of section 3.7.1 of VCS standard version 4.7.

1.9 Project Start Date

Project start date	21-April-2022
Justification	The project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or carbon dioxide removals. (Since this is a grouped project activity with 10 instances, hence the date of installation of first ICS under this grouped project activity has been considered as the start date of the project activity, which is 21-April-2022).

1.10 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	21-April-2022 to 29-February-2032 ⁸

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

Indicate the estimated annual GHG emission reductions/removals (ERRs) of the project:

☐ < 300,000 tCO₂e/year (project)

☒ ≥ 300,000 tCO₂e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO ₂ e)
21-April-2022 to 31-December-2022 ⁹	105,470
01-January-2023 to 31-December-2023	395,895
01-January-2024 to 31-December-2024	463,970
01-January-2025 to 31-December-2025	462,702
01-January-2026 to 31-December-2026	462,702
01-January-2027 to 31-December-2027	462,702
01-January-2028 to 31-December-2028	463,970
01-January-2029 to 31-December-2029	462,702
01-January-2030 to 31-December-2030	462,702

⁸ The end date of crediting period is considered as 29th February 2032 which is the end date of the fixed crediting period under CDM. Here, the start date of CP is revised in line with the start date of the group project instance. Therefore, in line with the section 3.9.7 of the VCS Standard v4.7 the end date of the crediting period for the grouped project is limited to that of the CDM CP of the earliest of the instances included under this grouped project, which is 29 February 2032.

⁹ This table is shown for ER estimates at grouped project level including all 10 instances for their annual ER within the crediting period. However, the start date of the 1st project activity instance under this grouped project is 21-April-2022. Other 9 project activity instances are having different start date but limited the crediting period at 29-February-2032. Thus, this table represents annualized GHG emission reductions of the Grouped Project (i.e. for all 10 Instances respective to their tenure within the crediting period); and average value of ER across the CP is calculated using the 'average function' on the annual ERs; for more details calculation can be referred under the ER sheet

01-January-2031 to 31-December-2031	462,702
01-January-2032 to 29-February-2032	76,061
Total estimated ERRs during the fixed crediting period	4,281,577
Total number of years	10
Average annual ERRs	389,234

1.12 Description of the Project Activity

As described under the section 1.1. above, the scenario existing prior to the implementation of the project is the actual baseline scenario which is equal to the existing common practice in the region i.e. in absence of the project activity the equivalent amount of thermal energy generated using firewood in three stone open fires to meet the cooking energy demand.

The project promotes energy efficient improved cooking stove (ICS) which directly reduces fuelwood consumption, which are non-renewable biomass having higher emission factor. As an associated benefit, the project directly helps reducing the rate of deforestation in the host country where the use of fuelwood is significant of the total energy used by households comes from forests.

Technology:

The group project instances are promoting two types of ICS, (i) SoaRehitra portable ICS and (ii) Lamasinina fixed ICS. However, one particular instance includes only one type of ICS under the project. SoaRehitra (Portable ICS) has been implemented under the instances viz. 1, 2, 3, 4, 5, 6, 8 & 10 and Lamasinina Fixed ICS has been implemented under the instances 7 and 9.

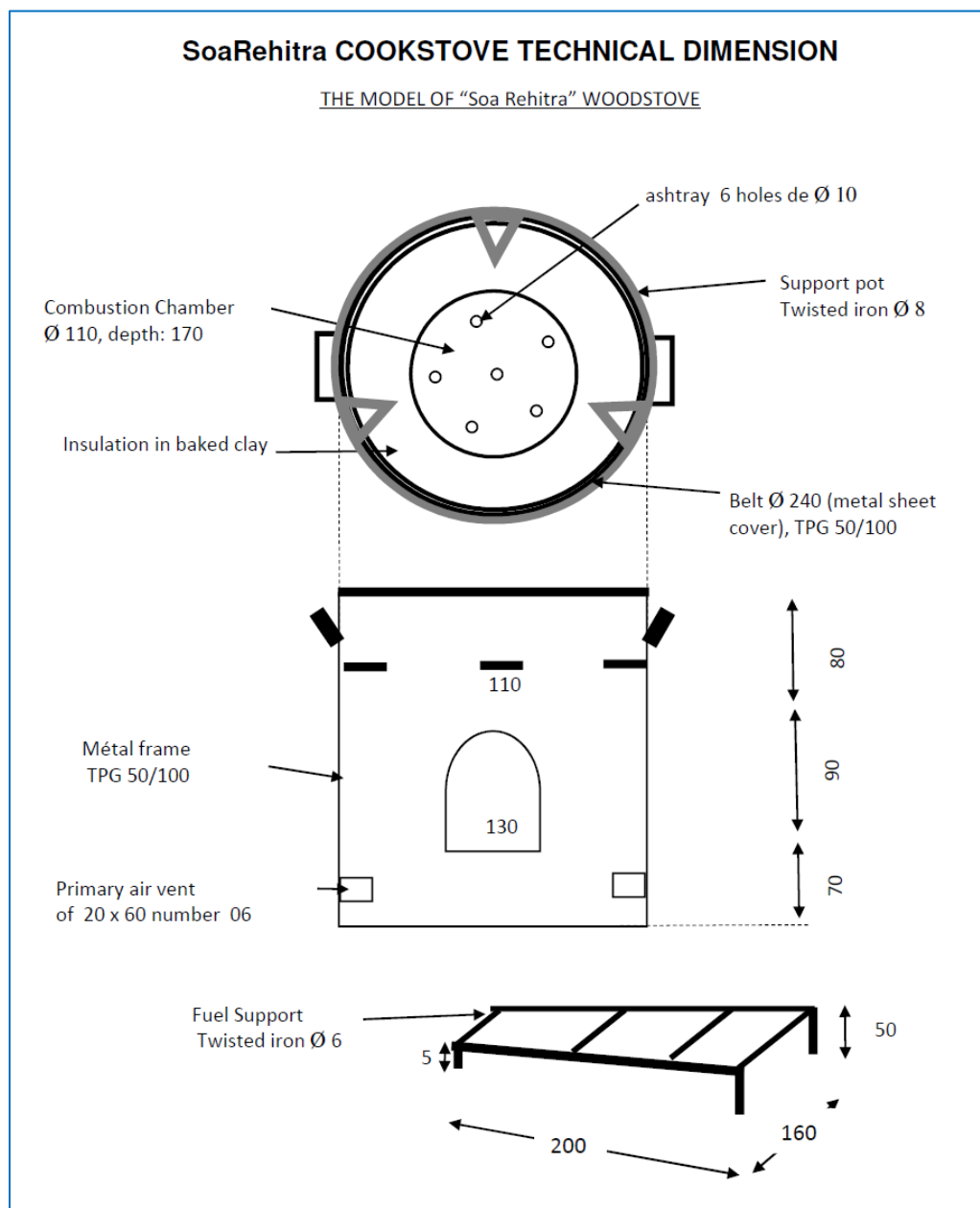
1. SoaRehitra portable ICS

SoaRehitra portable ICS technology is a single pot improved cookstove made of clay liner baked to high standards and insulated with outer metal sheet, which are commonly available in Host Country. It's joined with a mortar of high quality, which holds together the clay liner and metal sheet. In particular, the design made have higher pressure than the atmosphere, hence raising the airflow rate in the improved cook stove tunnel, as it is heated at the bottom. This way, the top point of the improved cook stove experiences more pressure and heat.

As per water boiling test conducted by National Agency i.e. National Industrial and Technical Research Center the SoaRehitra stove is projected to have a lifespan of at least 5.5 years and thermal efficiency of 32.2% (as per WBT results, however applied values are adjusted as per operational vintage of the ICS).

SoaRehitra stoves is being manufactured by trained artisans and the processes is managed by representative who have experience in working with clay and manufacturing different types of cook stoves. It is anticipated that the stove manufacturing process creates significant employment to the artisan and increase income, which has been realized during the monitoring periods.

The SoaRehitra stove allows for significant savings of firewood compared to traditional stoves and is especially suitable for the cooking habits of the people in the target region. Its design ensures efficient combustion of fuel and cleaner fire and therefore uses considerably less fuel as compare to traditional stoves. This means speedy cooking, time and fuel savings, cleaner pans, kitchen walls and indoor atmosphere.



Improved SoaRehitra stove has nominal power of around 5kW and delivers the same energy output as thermal energy supplied in the baseline scenario with traditional stone fire. As per the research from Aprovecho Research Centre, a three stone stove (open fire) has an output of 7.5kW a 5L Portable rocket stove with skirt (improved cook stove) has an output of 5.0kW, which is well below the threshold. Energy flows from conventional woody biomass to households are therefore maintained, but the same amount of energy as used in the baseline

scenario is gained from a relatively smaller amount of biomass. The baseline scenario is equal to the current practice i.e. in absence of the proposed project activity the equivalent amount of thermal energy generated using firewood to meet cooking energy demand.



2. "Lamasinina" fixed cookstove

The Lamasinina fireplace is a prototype designed from brick. With a form of a locomotive, the improved stove have chimney. This chimney is used to evacuate the smoke outside. The existence of the two combustion chambers specifies this model. Users can leather two meals at a time, with a single firewood entry.

For the Lamasinina prototype, the design is done on site. The workers install the improved stoves directly in the kitchen of the beneficiaries. In this case, the size and orientation of the improved fireplace is based on the opening of the window, the layout of the kitchen and the circulation of the area in the room. Yet there are certain dimensions that deserve to be respected.

As per water boiling test conducted by National Agency i.e. National Industrial and Technical Research Center the doubkle stove is projected to have a lifespan of 15 years and thermal efficiency of 33%. This ICS type is designed to have a chimney, ashtray also in baked clay and has 6 ϕ 1-cm-diameter hole. 1 entry of primary air routes have a dimension of 12cm x 12cm. The loading of fuels and secondary air inlet door has a size of 16 cm x 14 cm. (attached photos for reference).

Lamasinina fixed stoves are being manufactured by trained artisans and the processes is managed by representatives who have experience in working with clay and bricks or in manufacturing different types of cook stoves. It is anticipated that the stove manufacturing process creates significant employment to the artisan and increase income, while this stove allows for significant savings of firewood compared to traditional stoves and is especially suitable for the cooking habits of the people in the target region. Its design ensures efficient combustion of fuel and cleaner fire and therefore uses considerably less fuel as compare to traditional stoves. This means speedy cooking, time and fuel savings, cleaner pans, kitchen walls and indoor atmosphere. These benefits have been realized during the monitoring periods.

Figs: The representative design and the dimensions of the Lamasinina Fixed Cook stove as demonstrated under the project description, being promoted under this CPA. Also, the actual photo of Lamasinina is presented below for representative purposes.

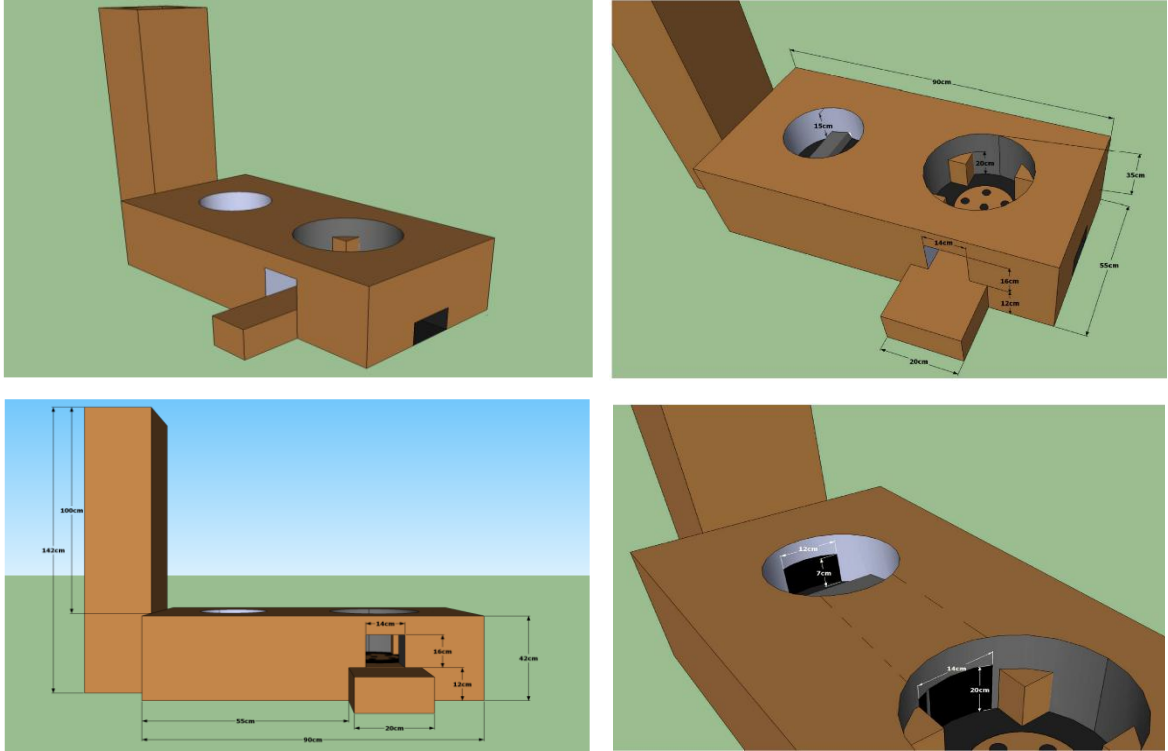




Fig: Actual Photo after construction



Fig: Actual Photos during operation phase.

1.13 Project Location

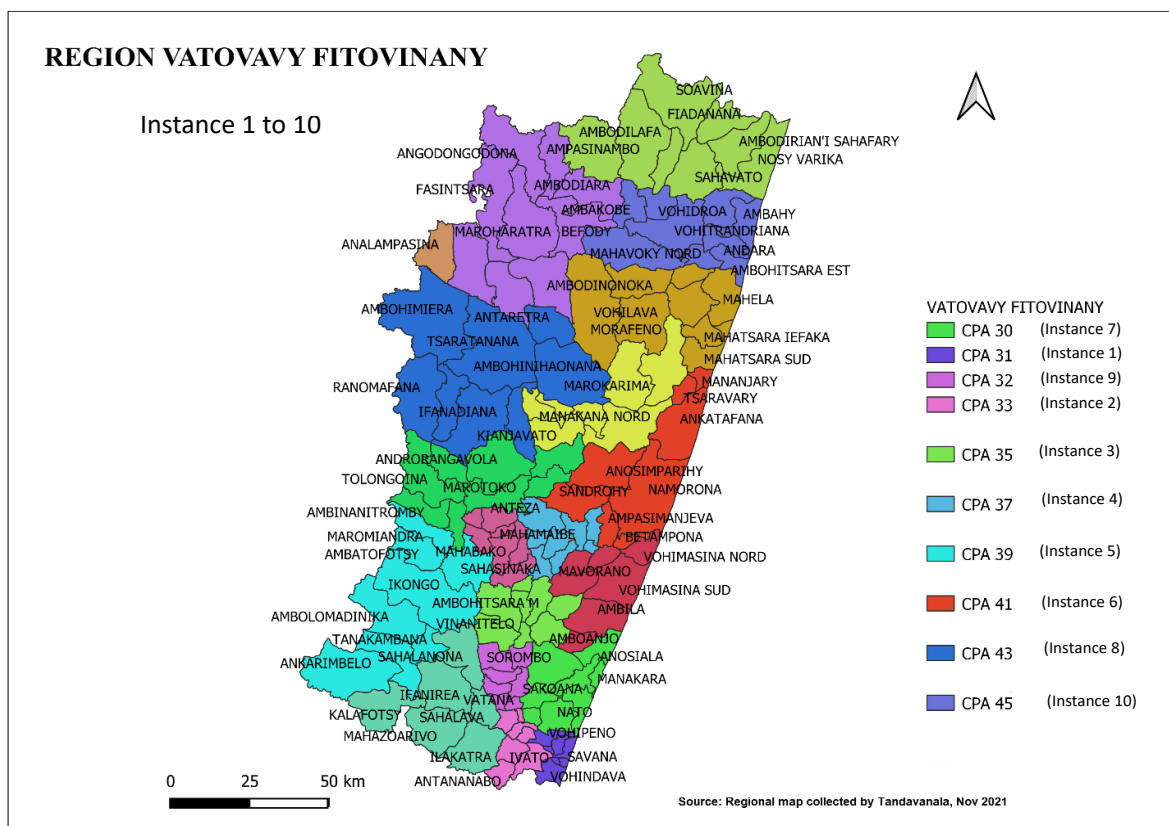
The project activity under this grouped project has been implemented in households across several villages under different commune and fokontany across the districts Vohipeno and Manakara Atsimo, Mananjary, Ikongo, Ifanadiana and Nosy Varika under the region of Vatovavy Fitovinany, of Madagascar. The exact list of beneficiaries, respective villages, districts etc. recorded in the ICS distribution database, which is available for verification and cross check during the site visit.

The coordinates of the Region are mentioned below for reference:

Latitude: -22° 24' 59.99" S and Longitude: 47° 51' 59.99" E (Vatovavy Fitovinany)

Instances	Region	District
Instance 1 (CPA 31)	Vatovavy Fitovinany	Vohipeno
Instance 2 (CPA 33)		Vohipeno
Instance 3 (CPA 35)		Manakara Atsimo
Instance 4 (CPA 37)		Manakara Atsimo
Instance 5 (CPA 39)		Ikongo
Instance 6 (CPA 41)		Mananjary and Mankara Atsimo
Instance 7 (CPA 30)		Vohipeno and Manakara Atsimo
Instance 8 (CPA 43)		Mananjary and Ifanadiana
Instance 9 (CPA 32)		Manakara Atsimo
Instance 10 (CPA 45)		Mananjary and Nosy Varika

The locations are indicated in geographical maps below for better presentation:



1.14 Conditions Prior to Project Initiation

The scenario existing prior to the project initiation and implementation is the actual baseline scenario which is equal to the existing common practice in the region i.e. in absence of the project activity the equivalent amount of thermal energy generated using firewood in three stone open fires to meet the cooking energy demand.

Also, refer section 3.4 of this VCS joint PD and MR.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activities under the grouped project are voluntarily coordinated action by Korea Carbon Management Ltd. There is no mandatory law or requirement in Madagascar to foster the dissemination of improved cook stoves.

Further to mention that in terms of local laws, statutes and regulatory frameworks etc. specific to the project type, there is no specific laws/policies available for cook stove projects or any domestic household energy related projects. However, current set of existing policies, law, frameworks etc. are pertaining to the Electricity Access and Poverty Reduction Strategy under an action plan (MAP). The same can be referred in the link below:

https://energypedia.info/wiki/Madagascar_Energy_Situation#Energy_Demand_and_Supply_in_the_Household_Sector

Here, some sections of the “Poverty Reduction Strategy” under “Policy Framework” section can be interpreted to have correlation with the goals/objectives of project type similar to cook stove program. For example: Madagascar Action Plan 2007-2011 (MAP)¹⁰ includes eight commitments under the policy framework. The commitment #4, #6 & #7 can be referenced to demonstrate correlation with the project activity. A brief description is included below:

- (a) Under the commitment 7, the challenge 2 “Reduce the natural resource degradation process” highlights that wood consumption is still a challenge and goal is to conserve forest resources. Also, as a part of strategies, it is encouraged to promote reforestation and restore degraded habitats, to promote private sector financing to assist in environmental management etc.

Since the project activity will help conserving forest resources, reduce the rate of deforestation and also has facilitated private sector finance to assist the overall environmental management, hence these goal and strategies are aligned.

- (b) Under the commitment 6 & 7, the various challenges are oriented towards income generation and improvement job and vocational training etc. Since the project activity has created local jobs and business avenues through promotion of local cook stove manufacturing unit, local employment in distribution and monitoring etc., hence the project is aligned with the overall objectives and goals of such commitments.

Additionally, this is to further confirm that other local/national level laws and policy requirement pertaining to environmental & social impacts etc. are also not applicable for cook stove projects. It can be verified from the decree on the “Compatibility of Investments and Environment” (Decree 99.954 dated 15 December 1999) amended by Decree No 2004-167 of 03 February 2004 on the compatibility of investments with the environment (MECIE)” released by Ministry of

¹⁰ https://www.afdb.org/sites/default/files/documents/projects-and-operations/2007-2012_-_madagascar_-_poverty_reduction_strategy_papers.pdf

Environment, Madagascar. It determines which type of projects must execute an EIA and the necessary procedures. According to this decree the cook stove project does not fall into category mandated for conducting Environmental Impact Assessment.

Thus, it can be concluded that there is no applicable local or regional law and regulatory framework in the host country with relation to cook stove projects. However, some national level goals and strategies are common which will be anyhow promoted through the cook stove program across the operational lifetime.

Therefore, identification & demonstration of compliance of the project with any such law, statute, regulations etc. is not anticipated. Further, the project has been already approved by Designated National Authority (DNA) of Madagascar via authorization letter dated 17-October-2018, which also confirms the project is a voluntary initiative, is not under any mandatory/compliance scheme of the host country.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☒ Yes ☐ No

The Instances under this grouped project activity are the registered Component Projects under a Program of Activity under CDM, as follows:

Title	:	Madagascar Improved Cookstove Project by KCM
UNFCCC reference number	:	10443

Is the project active under the other program?

☐ Yes ☒ No¹¹

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

¹¹ Attested declaration of PP submitted to the VVB

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

The project activity and the GHG emission reductions are not included in any emission trading program or any other mechanism that includes GHG allowance trading.

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

The project activity has been registered as a CPA under a CDM-PoA (Ref. 10443) and GHG emission reductions and removals generated by the project will not be used for any compliance under any programs or mechanisms, except CDM. The project activity has already received the 'Letter of Approval' (LoA) from Host Country Designated National Authority (DNA).

The project activity under VCS shall not claim emission reductions for the same period that has been/will be covered under CDM as a part of the registered PoA. Thus, there will not be any possibility of double accounting⁵ of emission reductions.

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

The project activity includes distribution of energy efficient cookstoves which are locally manufactured. This includes some goods & services from manufacturers, suppliers, implementers etc. (i.e. third parties). However, there are no specific or identified/measured/disclosed Scope-3 inventory emissions in the supply chains of the manufacturing unit. Hence there is no potential risk of any double accounting or claiming of such scope-3 emissions across the projects. These can be further referred from the statements¹² submitted by the manufacturing entity involved in the project.

¹² Copies of the declarations/statement received from ICS manufacturer and local implementing partner submitted to VVB.

1.18 Sustainable Development Contributions

1.18.1 Sustainable Development Contributions Activity Description

This grouped project is community-based activity that implemented energy efficient improved cooking practice at rural households of Madagascar to replace inefficient open firing practice at the baseline. The project contributes to sustainable development in a number of ways:

Environmental Sustainability

- The programme will lead to the reduction in GHG emission due to reduction in use of non-renewable biomass, thus assisting in conserving existing forest stock and the protection of natural forest eco-systems and wildlife habitats.
- The reduction in biomass/charcoal consumption for cooking through efficient use leads to improved ecological balance.
- The protection of standing forests will ensure the maintenance of watersheds that regulate water table levels and prevent flash flooding

Social Sustainability

- Reduction in the drudgery of women attributable to a reduction in the amount of time spent collecting fuelwood and cooking. Hence, women save their time spent on laborious and unpaid work which can be utilized in a more effective manner by engaging in income-generating activities. This can help in improving the overall socio-economic status of the family as well as the overall well-being of the women.
- Adoption of energy-efficient cookstoves will lead to a reduction in the amount of air emissions released during cooking thereby decreasing the levels of indoor air pollution within the households of beneficiaries. This will lead to a reduction in exposure to harmful air pollutants, hence improving the overall health status of beneficiaries.
- The programme will contribute to the preservation of wood resources so as to avoid intercommunal and/or inter-ethnic conflict over resources.
- The stove provides a safer method for combusting biomass for cooking, helping to reduce burn injuries, especially for children, in the family home.

Economic Sustainability

- The fabrication, operation and repair and maintenance of ICS's are expected to provide employment to the local people throughout its lifetime. This will lead to improvement of the overall economic status of local inhabitants of the country.
- The time saved for collecting fuelwood and cooking meals can be utilized in a productive manner by engaging in income-generating activities which is sure to improve the overall economic status of the household.
- The costs incurred in the purchase of firewood will be reduced through increased efficiency of the ICS thus leading to lesser firewood consumption that leads to fuel economy improvement for households.

The project leads to the achievement of the following SDGs

Estimated Project Contribution	Monitoring approach
Strengthen financial conditions of local people: People associated with this project are at shared responsibility level. The project contributes to generation of employment in various functions of the project activity since the beginning. This includes both admin, skilled and unskilled workers. Financial benefits (i.e. gain in their household incomes) due to saving in fuel cost as well as provision for new income opportunities due to saving in cooking time with project ICS.	Net Benefit = Employment (Project) - Employment (Baseline) Employment Baseline = 0, in absence of project activity no employment opportunities would have been created. Employment (Project) = Employment generation in project scenario
Decrease in Mortality rate and ambient air pollution: Due to clean and energy efficient cooking device implemented, it released less smoke hence reduces the fine particulate matter (PM2.5) emitted during the cooking practice; thereby improving overall health outcomes attributed to household and ambient air pollution and reducing burdens of airborne diseases.	This claim is supported by the “Madagascar Death Rate 1950-2023” statistics which published¹³: (a) The death rate (%) reported in the country during 2020 to 2023 is 5.906 to 5.571, (b) The death rate (%) reported in 2015 was 6.587, in 2010 is 7.523 and further compared to year 2000 that reports 10.591, This value is further on higher side as we view historic trend, Hence, this claim can be further justified with the basis of national statistics. Nevertheless, such effects are better visible/realizable in long run.

¹³ <https://www.macrotrends.net/countries/MDG/madagascar/death-rate>

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all: Regular/periodic Trainings on ICS & cook practice imparted to the beneficiaries. Contributed to community-level exposure and awareness of climate change, sustainable development, health, and nutrition well-being, through informal training on these topics related to and the operation of the improved cookstoves Such trainings help bringing both qualitative employment for staff as well as helps gaining continuous and lifelong learning opportunities for all.	Net Benefit = Training (Project) - Training (Baseline) Training (Project) = Trainings provided in project scenario Training (Baseline) = Trainings provided in baseline. A value of 0 shall be considered as in absence of project activity, these trainings would not have been undertaken by PP.
Proportion of time spent on unpaid domestic and care work, by sex, age, and location: Due to the project activity, each and every woman in the household experiencing reduction in drudgery, specifically for women and children, as time saved through reduction of time spent collecting fuelwood and cooking time due to efficient ICS technology.	Net Benefit = Time Spent (Baseline) - Time spent (Project) Time Spent (Baseline): Average time spent in fuel collection and cooking in baseline scenario. Determined once prior to or concurrent with first verification Time spent (Project): Average time spent in fuelwood collection and cooking in project scenario Source: SDG Sampling Survey & Focus Group Discussion Reports
Proportion of population with primary reliance on clean fuels and technology: Contribute to increasing access to clean cooking device for 13,752/13,604 households [equivalent to 13,752/13,604 (depending on instance) kitchen] which reduces the consumption of non-renewable biomass in the region.	Net Benefit = ICS (Project) × N_y ICS (Project): Number of ICS installed representing access to clean technology in project scenario N_y: Proportion of operational stoves Source: ICS distribution records and ex-post monitoring surveys conducted to determine proportion of operational stoves

fatal and non-fatal occupational injuries: Contribute to Zero occupational injuries, zero mortality during the monitoring period.	Net Benefit = Occupational Injuries (Baseline) – Occupational Injuries (Project) Source: The contribution is supported from the monthly record statement related to health & safety and occupational hazards.
Reduction in emissions as compared to baseline scenario (open fire): Project contributes to emission reduction from the replacement of baseline cooking practice/stoves with an energy efficient ICS called “SoaRehitra” or “Lamasinina”.	$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil\ fuel}$ Source-VCS Joint Project Description & Monitoring Report for the corresponding period of VCS Project
Reduction in deforestation rate owing to the consumption of woody biomass from forests surrounding the communities and reducing pressure on forest reserves.	$B_{y,savings,i,j} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,i,j}} \right)$ Source-VCS Joint Project Description & Monitoring Report for the corresponding period of VCS Project

1.18.2 Sustainable Development Contributions Activity Monitoring

Each project activity instance is fully implemented with a total of 13,752 and 13,604 numbers of households for Portable ICS (SaoRehitra) and Fixed ICS (Lamasinina) respectively which were covered under this grouped project. Sustainable Development Contributions (SDGs) which are addressed by the project has been provided in the below table:

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	1.1	User defined indicator under SDG 1.1: Strengthen financial conditions of local people to reduce risk of low income vulnerability against the poverty line, according to national definitions	Implemented activities to increase	Contribution type A: direct local employment 477¹⁴ dedicated people are locally employed across the instances, i.e. at the group project level and more than 272 people are associated with this group project at shared responsibility level. Instance wise employment details are referred in the signed employment report. Whereas overall employment achieved across various functionalities at programme level is 749. Thus, current project contribution claimed for this project is 477 people, which were locally employed in various functions of the project activity since the beginning. This includes both admin, skilled and unskilled workers.	Overall contribution under Type A: direct employment of 477 resources. Overall contribution under B: Total contribution at instance level accounted to 13,752 and 13,604 households/beneficiaries respective to the ICS type SoaRehitra & Lamasinina respectively. These households received gain in their household incomes due to saving in fuel cost as well as provision for new income opportunities due to saving in cooking time with project ICS. The benefits or the contribution can be referred from the SDG survey report conducted by the local team. Additionally, there were focus group discussions (FGDs)¹⁵ at project levels which also confirms the same. However, this attribute (SDG indicator) will be a continuous process across the lifetime of the project which will ensure more number of positive impacts in coming time.

¹⁴ To be referred from the Employment records and summary report (confidential)

¹⁵ Focus Group Discussion (FGD) records were submitted to VVB for reference.

			Contribution type B: financial benefits (i.e. gain in their household incomes) due to saving in fuel cost as well as provision for new income opportunities due to saving in cooking time with project ICS. 13,752 (SaoRehitra) and 13,604 (Lamasinina households received financial benefits (i.e. gain in their household incomes) due to saving in fuel cost as well as provision for new income opportunities due to saving in cooking time with project ICS. The benefits or the contribution can be referred from the SDG survey report conducted in 2021. The measured outcomes can be statistically reported as follows: (a) 98% of the surveyed population confirmed that financial gain & improvement in livelihood for households (via saving in fuel cost and saving in cooking time leading to more earning opportunities) is more than 75% as compared to baseline conditions. (b) 2% of the population also reported the same benefits as more than 50% as compared to baseline conditions.	
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2)	3,9	3.9.1 Mortality rate attributed to household and ambient air pollution.	Implemented activities to decrease	Positive impacts created to 13,752/ 13,604 households (depending on instance level) included under the project activity. Due to clean and energy efficient cooking device implemented at project level, it released less smoke hence reduces the fine particulate matter (PM2.5) emitted during the cooking practice; thereby improving overall health outcomes attributed to household and ambient air pollution and reducing burdens of airborne diseases. This directly impacts on health of the households, especially because all Malagasy kitchens are in-house, and cooking is always done inside the house. Thus, this health benefits resulted from reduction in PM2.5, can be directly attributed to mortality rate, which is also evident from the computation method published¹⁶ under this indicator 3.9.1 This claim is further supported by the “Madagascar Death Rate 1950-2023” statistics which published¹⁷: (c) The death rate (%) reported in the country during 2020 to 2023 is 5.906 to 5.571, (d) The death rate (%) reported in 2015 was 6.587, in 2010 is 7.523 and further compared to year 2000 that reports 10.591, This value is further on higher side as we view historic trend, Hence, this claim can be further justified with the basis of national statistics. Nevertheless, such effects are better visible/realizable in long run.	Same as current project contributions. Overall attributes: reduce the fine particulate matter (PM2.5) emitted during cooking thereby improving overall health outcomes and reducing burdens of disease.
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¹⁶ https://data.unicef.org/sdgs/goal-3-good-health-wellbeing/#tab-mnch_airpol_mr-16

¹⁷ <https://www.macrotrends.net/countries/MDG/madagascar/death-rate>

3)	4.0	Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.	Implemented activities to increase	Current contribution is accounted as: At community level: <table><tr><th rowspan="2">Instances</th><th colspan="3">Number of Trainings</th></tr><tr><th>Year 2022</th><th>Year 2023</th><th>Year 2024</th></tr><tr><td>Instance 1</td><td>1</td><td>2</td><td>1</td></tr><tr><td>Instance 2</td><td>1</td><td>2</td><td>1</td></tr><tr><td>Instance 3</td><td>0</td><td>3</td><td>1</td></tr><tr><td>Instance 4</td><td>0</td><td>2</td><td>1</td></tr><tr><td>Instance 5</td><td>0</td><td>0</td><td>3</td></tr><tr><td>Instance 6</td><td>0</td><td>3</td><td>1</td></tr><tr><td>Instance 7</td><td>0</td><td>2</td><td>1</td></tr><tr><td>Instance 8</td><td>0</td><td>2</td><td>1</td></tr><tr><td>Instance 9</td><td>0</td><td>1</td><td>2</td></tr><tr><td>Instance 10</td><td>0</td><td>1</td><td>1</td></tr></table> Regular/periodic Trainings on ICS & cook practice imparted to the beneficiaries. Contributed to community-level exposure and awareness of climate change, sustainable development, health, and nutrition well-being, through informal training on these topics related to and the operation of the improved cookstoves. At team level: <table><tr><th rowspan="2">Instances</th><th colspan="3">Number of Trainings</th></tr><tr><th>Year 2022</th><th>Year 2023</th><th>Year 2024</th></tr><tr><td>Instance 1</td><td>1</td><td>3</td><td>3</td></tr><tr><td>Instance 2</td><td>1</td><td>2</td><td>2</td></tr><tr><td>Instance 3</td><td>1</td><td>4</td><td>3</td></tr><tr><td>Instance 4</td><td>1</td><td>1</td><td>0</td></tr><tr><td>Instance 5</td><td>0</td><td>2</td><td>0</td></tr><tr><td>Instance 6</td><td>0</td><td>2</td><td>2</td></tr><tr><td>Instance 7</td><td>0</td><td>0</td><td>2</td></tr><tr><td>Instance 8</td><td>0</td><td>1</td><td>2</td></tr><tr><td>Instance 9</td><td>0</td><td>0</td><td>2</td></tr><tr><td>Instance 10</td><td>0</td><td>1</td><td>2</td></tr></table>	Instances	Number of Trainings			Year 2022	Year 2023	Year 2024	Instance 1	1	2	1	Instance 2	1	2	1	Instance 3	0	3	1	Instance 4	0	2	1	Instance 5	0	0	3	Instance 6	0	3	1	Instance 7	0	2	1	Instance 8	0	2	1	Instance 9	0	1	2	Instance 10	0	1	1	Instances	Number of Trainings			Year 2022	Year 2023	Year 2024	Instance 1	1	3	3	Instance 2	1	2	2	Instance 3	1	4	3	Instance 4	1	1	0	Instance 5	0	2	0	Instance 6	0	2	2	Instance 7	0	0	2	Instance 8	0	1	2	Instance 9	0	0	2	Instance 10	0	1	2	Same as current project contributions. Overall attributes: 33 trainings. Contribute to community-level exposure and awareness of climate change, sustainable development, health, and nutrition well-being, through informal training on these topics and the improved cookstove. The staff training includes both technical and managerial based learnings.
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				Such trainings help bringing both qualitative employment for staff as well as helps gaining continuous and lifelong learning opportunities for all.	
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	At least 13,752/ 13,604 (depending on instance) women were positively impacted at the project level. Due to the project activity, each and every woman in the household experiencing reduction in drudgery, specifically for women and children, as time saved through reduction of time spent collecting fuelwood and cooking time due to efficient ICS technology. The measured outcomes (as can be referred from the SDG Reports (i.e. SDG Sampling Survey & Focus Group Discussion Reports)) can be statistically reported as follows: (a) 98% of the surveyed population confirmed that they achieved more than 75% improvement compared to baseline scenario in their livelihood. And the key indicators reported are direct savings in fuel cost, saving in wood collection time and overall cooking time, etc. which led to more earning opportunities for households). (b) Similarly, the remaining 2% of the population also reported the same benefits in the range of 50% improvement as compared to baseline conditions. Thus, it is evident that a signification portion of time spent earlier on unpaid domestic work (e.g. cooking, drudgery etc.) is now reduced with the ICS and directly impacts on overall livelihood.	Total contributions are equal to 13,752 / 13,604 (depending on instance) women which are part of the project since beginning. Overall attributes¹⁸: Here, the value reported is conservative as only one woman per household is considered to have this positive impact. However, in practical more than one person per family is getting positively impacted due to reduced drudgery, specifically for women and children, as time saved through reduction of time spent collecting fuelwood and cooking time

¹⁸ In order to establish and count such claim/contributions PP has conducted a detailed SDG related survey previously for the other operational CPAs of the program. This survey covered 90 households as survey samples and results were documented both in survey forms and in the form of an official report. This document is referred as supporting for such contributions claimed under the project. Similarly, Focus Group Discussions (FGDs) were conducted at project instance level and overall outcomes are positive that refers to the SDGs. Such impacts are applicable and being achieved under all CPAs being implemented by PP. Additionally, there are FGDs conducted during 2022, 2023 and also in 2024 which are specific to these 10 instances of this grouped project.

5)	7.1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Implemented activities to increase	13,752/ 13,604 households [equivalent to 13,752/13,604 (depending on instance) kitchens] received access to clean technology of “SoaRehitra” and “Lamasinina” which are the energy efficient cooking devices that reduce the consumption of non-renewable biomass in the region.	Same as current project contributions. Overall attributes: Increase access to clean cooking technology with ICS installations in 13,752/ 13,604 (depending on instance) Madagascar households which are covered under the project lifecycle.
6)	8.8	8.8.1 fatal and non-fatal occupational injuries per 100,000 workers, by sex and migrant status	Implemented activities to decrease	1) Zero occupational injuries, zero mortality during the monitoring period. The contribution is supported from the monthly record statement related to health & safety and occupational hazards. 2) Additionally, regular trainings are imparted (as reported under the SDG #4 above). This also ensures that there is adequate awareness to achieve such health safety requirements. Conducted regular training programs (#15+) at the ICS manufacturing sites and also regular trainings at household level and at team/staff level during the reporting period to ensure occupational health and safety practices for workers and users etc.	Overall Contribution: Zero fatal & non-fatal occupational injuries reported so far across the project lifetime. Total contribution achieved over the project lifetime is equal to the contributions monitored and reported as on 30-April-2024 which are supported by monthly monitoring records (confirming zero occupational injuries and zero fatality) and conducted to ensure such safe operations. Such monitoring, training, awareness etc. are managed via local implementing partner in Madagascar.

7)	13.0 13.1	13.0 Reduction in emissions as compared to baseline scenario (open fire) 13.1 strengthen resilience and adaptive capacity to climate related hazards and natural disasters.	Implemented activities to increase	13.0: Achieved reduction of tCO ₂ e emissions during the current monitoring period as below. <table><tr><th>Instances</th><th>MP: 21-April-2022 to 30-April-2024 Total emission reduction (tCO₂e)</th></tr><tr><td>Instance 1</td><td>101,591</td></tr><tr><td>Instance 2</td><td>94,231</td></tr><tr><td>Instance 3</td><td>90,453</td></tr><tr><td>Instance 4</td><td>81,523</td></tr><tr><td>Instance 5</td><td>77,893</td></tr><tr><td>Instance 6</td><td>64,604</td></tr><tr><td>Instance 7</td><td>50,010</td></tr><tr><td>Instance 8</td><td>53,013</td></tr><tr><td>Instance 9</td><td>36,280</td></tr><tr><td>Instance 10</td><td>37,768</td></tr></table> 13.1: All the beneficiaries of the households (equals to 13,752/13,604) is receiving resilience building capacity towards climate change and related hazards. In this regard, Training Framework ⁴⁹ of Tandavanala is referred which specifically prescribes outcomes of trainings correlated with adaptive capacity measures. In this regard methods, guidelines and standard referred towards Training, Resilience and Adaptive Capacity are as follows: (a) Andragogy Method (internal reference) (b) ILO Guidelines (external reference) (c) IPCC, Fourth Assessment Report, Section 6.6.4 Adaptive capacity (d) Adaptive capacity index (2010) - ClimAfrica WP4	Instances	MP: 21-April-2022 to 30-April-2024 Total emission reduction (tCO ₂ e)	Instance 1	101,591	Instance 2	94,231	Instance 3	90,453	Instance 4	81,523	Instance 5	77,893	Instance 6	64,604	Instance 7	50,010	Instance 8	53,013	Instance 9	36,280	Instance 10	37,768	Overall contribution over the lifetime of the grouped project is expected to be more than 42,81,577 tCO ₂ e reduction. However, the same will be achieved over the upcoming monitoring periods of the project. This is the first monitoring period under VCS for the project activity and hence the total contribution achieved over the current monitoring period under this grouped project is limited to 692,366 tCO ₂ e Overall attributes claimed: Thus, the project contributes to emission reduction from the replacement of baseline cooking practice/stoves with an energy efficient ICS called “SoaRehitra” or “Lamasinina”. The claim of total ER achieved across the lifetime so far is limited to current monitoring period only, which is equal to 692,366 tCO ₂ e Also, the resilience development practices will be a continuous process across the lifetime of the project.
Instances	MP: 21-April-2022 to 30-April-2024 Total emission reduction (tCO ₂ e)																										
Instance 1	101,591																										
Instance 2	94,231																										
Instance 3	90,453																										
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Instance 7	50,010																										
Instance 8	53,013																										
Instance 9	36,280																										
Instance 10	37,768																										

				Also, to substantiate the adaptive capacity, following adaptive measure has been considered for reference: (i) Reduction in fuelwood at households which is an indicator for resilience against deforestation. This can be linked with the target of “100% operation of ICS at households”; and (ii) it has been achieved through regular training and spot checks at project level, which are as per training framework. The sampling survey and spot check monitoring practices ensured that 100% ICS are operational across the project.	
8)	15.1 15.3	15.1.1 Forest area as a proportion of total land area 15.3.1 Proportion of land that is degraded over total land area.	Implemented activities to increase (15.1) Implemented activities to decrease (15.3)	Considered equivalent to the f_{NRB} value, which is 96.6%. Rational: The project impact is continuous and contribution achieved at the project level is equivalent to the land area which may produce the equivalent volume of firewood that is now saved at project level.	Same as current project contributions. It will be a continuous process and impact shall be achieved & realized over the lifetime of the project. Overall attributes: Reduction in deforestation rate owing to the consumption of woody biomass from forests surrounding the communities and reducing pressure on forest reserves.

¹⁹ The copy of the Training Framework and Andragogy Method report submitted for reference.

1.19 Additional Information Relevant to the Project

Leakage Management

Not applicable as the project applies a net-to-gross adjustment factor²⁰ 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.

²⁰ The procedures from the AMS-II.G. must be applied to leakage adjustment factor.” AMS-II.G. v09.0 included adjustment factor of 0.95 to account for leakages.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The stakeholder's identification starts by listing all the people or groups who might have an influence over or be impacted by the project. The local village committees and village officials were considered as the key informants and focus groups who know best about the local residents 1) Local residents around project area 2) Traditional stove users 3) Users of an ICS 4) Field assistants 5) A charcoal stove user 6) NGO representatives
Legal or customary tenure/access rights	ICS is a completely voluntary activity and households in participating villages are free to choose whether they take part or not. This is a free cookstove distribution project. So, not applicable
Stakeholder diversity and changes over time	The project activity targets households in rural communities with no previous ICS access. ICS are distributed free of cost to users. The project activity is fully implemented with a total of 13,752 numbers of households which were covered under this project. Each household received one ICS. Therefore, there is no changes in the beneficiaries over time.
Expected changes in well-being	1. Direct local employment 2. financial benefits (i.e. gain in their household incomes) due to saving in fuel cost as well as provision for new income opportunities due to saving in cooking time with project ICS. 3. reduce the fine particulate matter (PM2.5) emitted during cooking thereby improving overall health

	outcomes and reducing burdens of disease and attributed to low mortality rate in long run - Due to the project activity, each and every woman in the household experiencing reduction in drudgery, specifically for women and children, as time saved through reduction of time spent collecting fuelwood and cooking time due to efficient ICS technology - The project contributes to emission reduction from the replacement of baseline cooking practice/stoves with an energy efficient ICS called "SoaRehitra". - Reduction in deforestation rate owing to the consumption of woody biomass from forests surrounding the communities and reducing pressure on forest reserves.
Location of stakeholders	The project activity targets households in rural communities with no previous ICS access. ICS are distributed free of cost to users. The project activity is fully implemented with a total of 13,752 / 13,604 (depending on instance) numbers of households for each instance which were covered under this grouped project. Each household received one ICS.
Location of resources	The project activity includes portable cookstoves which are locally manufactured. This includes some goods & services from manufacturers, suppliers, implementers etc. The project activity targets households in rural communities with no previous ICS access. ICS are distributed free of cost to users. The project activity is fully implemented with a total of 13,752/ 13,604 numbers of households which were covered under this project. Each household received one ICS.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	13-June-2018
Stakeholder engagement process	A local stakeholder consultation was conducted on 13-June-2018 at Sofia Hotel, Town of Fianarantsoa from 9.00 AM to 11.00 AM. Stakeholders belonging to different groups had been invited to comment on the PoA by press release published on 05/06/2018 in newspaper and stakeholder also informed by the physical meeting. 28 people, representatives of the following groups, took part:

	• Traditional stove users • Users of an ICS • Field assistants • A charcoal stove user • NGO representatives The stakeholder consultation was conducted at PoA level, since the technology and its impacts will be similar in the entire PoA. The representative of PP has explained in detail about technology (ICS) to be employed by this Programme and associated benefits.
Consultation outcome	In summary, the project aroused a keen interest among the participants, who considered it very important for the positive effects it would bring to rural communities Participants commented and asked questions about the structure of the PoA, the role of carbon credits in funding and about several features of the Improved Cookstove which was presented as ICS to be used in the first CPA, such as asking for lifetime and suggesting regular maintenance. It was also asked about whether ICS can be operated with charcoal, suggesting using charcoal where woody biomass is difficult to procure especially in urban areas. Moreover, participants asked what impacts the PoA would have on the local level, particularly regarding job creation. Apart from these direct questions, participants evaluated possible social and environmental impacts of the PoA. Further a thorough discussion with stakeholders present was done on various impacts and sustainability of PoA, based on discussion it was concluded that PoA is highly sustainable and will lead to positive development in host country.
Ongoing communication	In order to have a ongoing communication and consultation between the PP and stakeholder groups, PP take regular feedback and inputs from stakeholders via local team of Tandavanala and adapt management accordingly. The PP has also placed a grievance register onsite, wherein, the stakeholders can put down his/her feedback and the same if found genuine will be addressed. However, there was no grievance related input has been reported within this monitoring period. Therefore, no action was required to undertake

Stakeholder input	Consultations with local stakeholders are essential steps in implementing a project. Different stakeholders participated in interactive training and demonstration sessions led by the project proponent and implementation partners. These sessions gave the participants details on the benefits of improved cookstoves, the advantages for the environment and human health, how to use ICS, and maintenance. PP welcomed any inquiries/ input about stoves from the stakeholders throughout the consultation. All the stakeholders' input recorded in the registered book. Details pertaining to the Local Stakeholder's Consultation will be provided to the VVB during the verification process.
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2.1.3 Free Prior and Informed Consent

Obtaining consent	FPIC does not apply to the project activities since they do not infringe on or otherwise concern land rights. In addition, ICS is a completely voluntary activity and households in participating villages are free to choose whether they take part or not.
Outcome of FPIC	Not Applicable

2.1.4 Grievance Redress Procedure

Development process	Beneficiaries and stakeholders have PP's contact information and the understanding that they should contact the organization with any problems, questions, or grievances. Each beneficiary receives business card with the office phone number and location. The PP has also placed a grievance register onsite, wherein, the stakeholders can put down his/her feedback and the same if found genuine will be addressed.
Grievance redress procedure	There was some positive remark/ comment received during the current monitoring period which can be verified from the onsite register. There was no negative remark or any form of grievance related input has been reported within this monitoring period.

Grievances received	Resolution and outcome
There was no grievance related input has been reported within this monitoring period	Not Applicable

2.1.5 Public Comments

Comments received	Actions taken
Any cost associated with cookstove for beneficiaries?	Free distribution of ICS by Korea Carbon Management
Who is providing fund for the project?	This Project will get register under VERRA-VCS Framework for carbon financing to source the fund under this project.
For how many person's food can get cooked at once with this cookstove?	4 to 5 people food can get easily cooked at once with the help of this cookstove
What are the benefits of the Cookstoves?	The cookstove will produce very less smoke which will further reduce the impact of several diseases. This will also reduce the quantity of biomass wood usage and the impact of overall global warming. The project will create direct employment for the local people.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

PP is well experienced in project design or implementation of similar project activities and engaging communities.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure taken
Natural and human-induced risks to stakeholders' wellbeing	"No identified" risk	ICS is a completely voluntary activity and households in participating villages are free to choose whether they take part or not.
Risks to stakeholder participation	"No identified" risk	ICS is a completely voluntary activity and households in participating villages are

		free to choose whether they take part or not.
Working conditions	"No risk identified"	There will be reduction of the workload as a result of reduced time for collecting the firewood, which can be used more productively for other income generating activities.
Safety of women and girls	"No identified" risk	The project leads to prevention of fire hazards in the household kitchen and the improved cooking stove technology is environmentally safe.
Safety of minority and marginalized groups, including children	"No identified" risk	The project leads to prevention of fire hazards in the household kitchen and the improved cooking stove technology is environmentally safe.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	"No identified" risk	Project improved health conditions of ICS users due to improved indoor air quality (reduction in Indoor Air Pollution from wood smoke)

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified ²¹	Mitigation or preventative measure(s) taken ²²
Discrimination	"No risk identified"	PP believes that discrimination in all its forms (gender, race, religion, sexual orientation, or other habits) have no place within the company
Sexual harassment	"No risk identified"	PP believes that sexual harassment and assault have no place within the company
Equal pay for equal work	"No risk identified"	PP believes that equal pay for equal work in all its forms (gender, race, religion, sexual orientation, or other habits).

²¹ The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

²² PP has already implemented policies at group and program level to monitor and prevent any such issues related to Human rights and beyond etc. Those policy details are submitted to VVB for reference.

Gender equity in labor and work	"No risk identified"	PP supports diversity, inclusion, and equity with attention to vulnerable populations, including women and female children. PP prohibits any form of discrimination, harassment, or assault, all being grounds for dismissal of employment, termination of the contract, an immediate discreet investigation of the reported incident, and where warranted, reports to the applicable authorities
Forced labor	"No risk identified"	PP abides by the labour laws in the countries where it operates and contract individuals, the project proponent, and implementing partners welcome any beneficiary who requests project services and is committed to the stated terms and conditions of project participation. The project does not use forced labor
Child labor	"No risk identified"	PP abides by the labour laws in the countries where it operates and contract individuals, the project proponent, and implementing partners welcome any beneficiary who requests project services and is committed to the stated terms and conditions of project participation. The project does not use child labor
Human trafficking	"No risk identified"	PP abides by the labour laws in the countries where it operates and contract individuals, the project proponent, and implementing partners welcome any beneficiary who requests project services and is committed to the stated terms and conditions of project participation. The project does not use victims of human trafficking

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	Not required As per the Core Labour Conventions of the International Labour Organisation (ILO), PP, respects, and works with the elimination of all forms of forced or compulsory labour, the effective abolition of child labour, minimum age

	convention, the right to organize, and the elimination of discrimination in respect of paid positions and occupation. Due care was taken to abide with above throughout the monitoring period and no complaint was received in connection with dereliction of rights of the staff working for the PP in the said project
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2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
"No risk identified"	This project directly empower households to access clean and modern energy in addition to several other socio-economic challenges facing the indigenous communities in the Madagascar.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
"No risk identified"	The grouped project activity do not infringe on or otherwise concern land rights.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	The project activity does not infringe on or otherwise concern land rights, Project activity does not have any impact on property rights. Therefore, this table is not applicable for this project activity.
Summary of the benefit sharing plan	NA
Approval and dissemination of benefit sharing plan	NA
Benefit sharing during the monitoring period	NA.

2.4 Ecosystem Health

	Risks identified		Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	"No identified"	risk	Contribute an estimated reduction in removal of woody biomass from forests surrounding the communities thereby leading to an increase in above-ground biomass in these forests.
Soil degradation and soil erosion	"No identified"	risk	The project distributes ICS free of cost. It has no effect on soil degradation and soil erosion.
Water consumption and stress	"No identified"	risk	-

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
N/A	N/A	N/A	N/A

2.4.3 Ecosystem conversion

Not Applicable. The project activity is related to energy efficiency

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	AMS-II.G. ²³	Energy efficiency measures in thermal applications of non-renewable biomass	09.0
Tool	CDM TOOL30 ²⁴	Calculation of the fraction of non-renewable biomass”	04
Tool	TOOL33 ²⁵	Default values for common parameters	2.0

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
AMS-II.G.	The aggregate energy savings of a single project activity (instance) shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	Applicable Energy savings per improved stove (account 100% usage): 1) SoaRehitra ICS : 0.01307773 GWhth/year Hence, for 13,752 household maximum energy saving 179.84 GWhth per annum 2) Lamasinina ICS: 0.013220539 GWhth/year Hence, for 13,604 household maximum energy saving 179.85 GWhth per annum Therefore, energy saving is less than 180 GWh(th) per year for both types of ICS.
	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or	Proof that non-renewable biomass has been used in the project region i.e. in host country Madagascar since 31 December 1989 is available through widespread documentation

²³ <https://cdm.unfccc.int/UserManagement/FileStorage/F3IST0ABY87UK5DVNJ69XW4MR2OLZP>

²⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf>

²⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-33-v2.0.pdf>

referring to published literature, official reports or statistics	of more biomass being consumed than is sustainably harvested, and is specifically outlined in an information note for the CDM which estimates fraction of non-renewable biomass for Least Developed Countries²⁶. More specifically a survey report by WWF in Madagascar reveals that the 92% of total energy used by Malagasy households is met by wood biomass comes from forests²⁷. Fuel wood and charcoal are the main sources of energy in both rural and urban areas. Wood Energy is mainly used as fuel for cooking at household. The FAO survey reveals that between 1990 and 2010, Madagascar lost an average of 56,950 hectares per year. In total, between 1990 and 2010, Madagascar lost 8.3% of its forest cover, or around 1,139,000 hectares²⁸. The recent survey shows the deforestation rate is further increasing. Deforestation continues to rise in Madagascar with a forest loss rate of 1.5% per year from 2010 to 2013 (ONE, 2015). According to the National forest cover study, carried out by the National Office of Environment, Madagascar record a forest decline of 45000 ha on average for the year from 2010 to 2013, but currently it has increased to 135000 ha by 2015 (ONE, 2015). The above clearly shows that deforestation is evident and its happening since 1989 and trend is further increasing and above is mainly to meet woody biomass as fuel for meeting thermal energy requirement for cooking at households.
For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.	Not Applicable.

²⁶ CDM SSC WG 35th Meeting Report, Annex 20

²⁷ WWF, Diagnostic du secteur énergie à Madagascar, Report, September, 2012

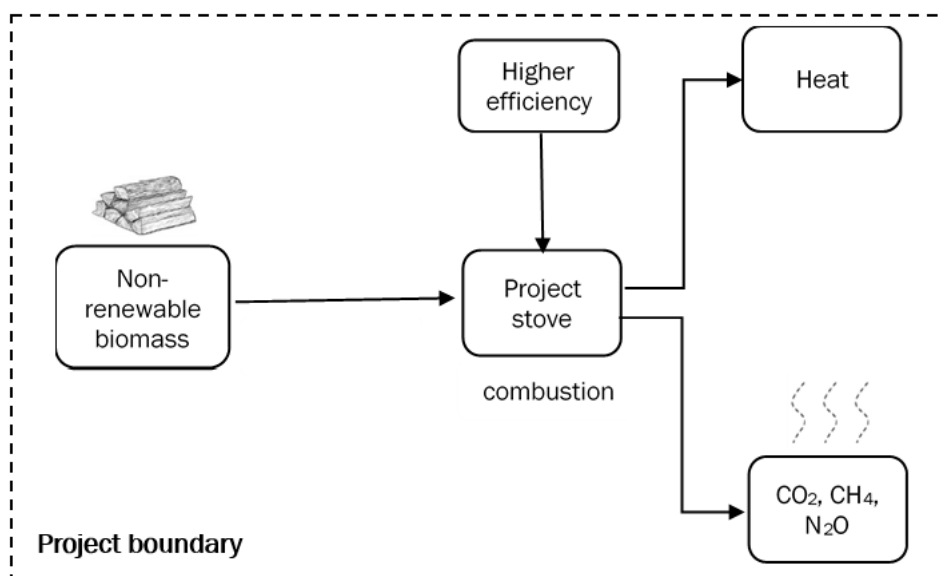
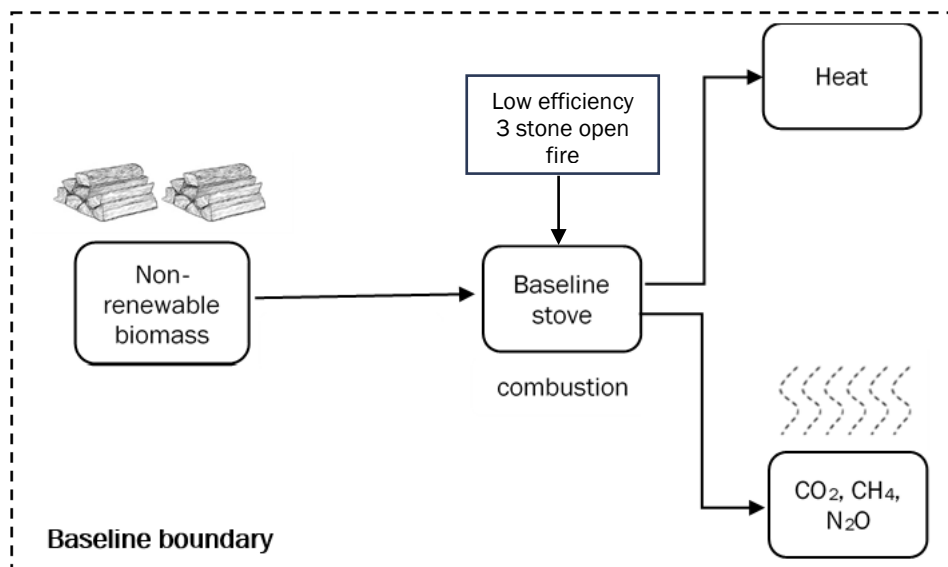
²⁸ <http://rainforests.mongabay.com/deforestation/2000/Madagascar.htm>

		If the project device requires a specific fuel for this device (e.g. briquettes, pellets, woodchips), the consumption of the fuel should be monitored during the crediting period.	There is no change in fuel type used than baseline scenario, the project activity is improvement in energy efficiency of the appliance.
Tool 30 version 04.0: Calculation of the fraction of non- renewable biomass		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	The project location is Madagascar. This tool is used to calculate the fNRB values for the same. The fNRB value would be used for determining the project emission reductions.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Major Source
		CH ₄	Yes	Major Source
		N ₂ O	Yes	Major Source
		Other	No	No other source identified
Project	Emission from use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Major Source
		CH ₄	Yes	Major Source
		N ₂ O	Yes	Major Source
		Other	No	No other source identified

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



3.4 Baseline Scenario

As defined in the methodology, 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 the project cookstoves in absence of project activity. The baseline cookstoves are three-stone fires or conventional systems lacking improved combustion air supply mechanism and flue gas ventilation system i.e., traditional stoves.

In this regard, the project refers to the detailed baseline study which was conducted prior to the validation of the instances under CDM and open firing of fuelwood (i.e. conventional inefficient cooking practice) was established as the baseline scenario. The project cookstoves were implemented to these target population to replace the same baseline practice. The project is

continuously operational with the same target population without any change in project design and technology, fuel type, cooking habits etc.

The baseline survey assessment was conducted as a primary study, and results were derived based on real time data collected during the sampling survey. The sampling survey and the study report conducted by CEDII (Regional Center of Documentation and Information, in Madagascar) which is a credible third-party institute. The survey data confirmed the use of non-renewable woody biomass as the only fuel in the region and also estimated the annual quantity of woody biomass used at baseline with three-stone or open firing arrangements to generate useful thermal energy for cooking.

Thus, the baseline scenario is established via third party sampling survey report as follows:

Baseline cooking practice : traditional open firing (i.e. inefficient cooking practice)

Baseline fuel type : non-renewable woody biomass (i.e. fuelwood) – only fuel type

3.5 The baseline study report is submitted for further verification and results are demonstrated under the section 6 below.Additionality

The methodology uses Tool 21: Demonstration of additionality of small-scale project activities, version 13.1.

3.5.1 Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country

☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes

☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes

☐ No

There is no law, statute or government programme or policy in Madagascar mandating the project activity nor is there any systematically enforced law, statute or other regulatory framework for such projects.

3.5.2 Additionality Methods

Under this grouped project, the additionality of the project activity is demonstrated using Tool 21 - “Demonstration of additionality of small-scale project activities” (Version 13.1).

The proposed programme will distribute the ICS free of cost to users i.e. households; hence there is no financial return from the programme other than revenue from sale of VCUs. As each ICS has costs associated with the purchase and distribution of the ICSs, this programme will not occur in absence of the VCU revenue. The action is not financially viable without the support of revenues from the sale of CERs. Currently, no similar technology penetration is there in Host Country. As the end-user doesn't benefit from a direct financial return and procuring ICSs requires capital,

which is a barrier to rural consumers due to difficulties in accessing capital, a wide dissemination of ICSs in the Host Country is unlikely. The actions under the grouped project will alleviate these barriers by promoting free distribution of ICSs to end-users.

According to paragraph 11 of Tool 21 “Demonstration of additionality of small-scale project activities” (Version 13.1) Documentation of barriers, as per paragraph 10 above, is not required for the positive list of technologies and project activity types that are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds.

3.6 Methodology Deviations

The project did not apply any methodology deviations.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

Under this grouped project activity, the distribution of improved cookstoves has been started from 21-April-2022. Till the end of first monitoring period i.e. on 30-April-2024, 137,224 improved cookstoves has been distributed to the households across Madagascar under the 10 different instances, as mentioned below. Each Household received one ICS under this grouped project.

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

This is a grouped project activity and total 10 instances are covered under this grouped project, which are included as per their respective start date (i.e. date of commissioning) as follows:

Instances	CPA Reference	VCS Ref. ID (Listing status)	ICS type	Total number of ICS distributed	Date of commissioning
Instance 1	CPA 31	2795	SoaRehitra	13752	21-Apr-2022
Instance 2	CPA 33	2797	SoaRehitra	13752	09-Jun-2022
Instance 3	CPA 35	2799	SoaRehitra	13752	30-Jun-2022
Instance 4	CPA 37	2801	SoaRehitra	13752	29-Aug-2022
Instance 5	CPA 39	2803	SoaRehitra	13752	14-Nov-2022
Instance 6	CPA 41	2805	SoaRehitra	13752	19-Dec-2022
Instance 7	CPA 30	2794	Lamasinina	13604	14-Feb-2023
Instance 8	CPA 43	2807	SoaRehitra	13752	17-Apr-2023
Instance 9	CPA 32	2796	Lamasinina	13604	30-Jun-2023
Instance 10	CPA 45	2809	SoaRehitra	13752	17-Jul-2023

As demonstrated under the previous sections of this report, the above 10 instances included under this grouped project are the 10 registered CDM CPAs which are also the individual VCS project activities already listed under VERRA for gap validation. However, the transition from individual VCS projects (i.e. VCS listed status) to a Grouped Project (i.e. the current status) was required as per VCS Standard v4.7 para 3.23.9 (2) because of the conditions that all these projects are owned by the same Project Proponent and project boundaries intersect within 10 km radius. Under CDM PoA, these project instances were numbered in between CPA #30 to #45 wherein sequentially the CPA #30 (i.e. VCS ID 2794) was listed first in VCS pipeline which is also the first CPA registered out of these 10 CPAs under the CDM PoA. Therefore, PP has considered to retain the VCS ID 2794 (i.e. CPA #30) and its project title as the main project to be re-designated as “Grouped Project” in line with the VCS Standard 4.7 para 3.23.9 (2) where all other 9 projects considered as individual instances under this grouped project. Whereas, the nomination of instances (i.e. Instance #1 to 10) has been done as per the definition & eligibility of group project instance as per VCS standard.

5 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The applied methodology does not account for baseline emissions separately, but instead quantifies net emission reductions achieved by the project. Please refer to Section 5.4.

5.2 Project Emissions

As AMS.II.G. does not account for project emissions separately but instead quantifies net emission reductions achieved by the project. Please refer to Section 5.4.

5.3 Leakage Emissions

As per the applied methodology, the adjustment factor of 0.95 in order to account for leakage and included in the estimation of net emission reductions. Refer to Section 5.4.

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

According to paragraph 17 of methodology AMS-II.G., version 09.0, emission reductions would be calculated as

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

Where:

i = Indices for the situation where more than one type of project device is introduced to replace the pre-project devices

j = Indices for the situation where there is more than one batch of project device

ER_y = Emission reductions during year y in t CO₂e

$ER_{y,i,j}$ = Emission reductions by project device of type i and batch j during year y in t CO₂e

LE_y = Leakage emissions in the year y

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil\ fuel} \quad \text{Equation (2)}$$

$B_{y,savings,i,j}$	Quantity of woody biomass that is saved in tonnes per cookstove device of type i and batch j during year y
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y
μ_y	Adjustment to account for any continued use of pre-project devices during the year y
$f_{NRB,y}$	Fraction of woody biomass that can be established as non-renewable biomass (%)
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (TJ/tonne)
$EF_{projected_fossil\ fuel}$	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers.
U_d	Uncertainty deduction for fnrb (%)

$N_{y,i,j}$ is monitored directly, for $NCV_{biomass}$ and $EF_{projected_fossilfuel}$, the indicated default values are used, and LE_y is set to zero, since leakage is considered by multiplying $B_{old,i,j}$ with net to gross adjustment factor of 0.95. μ_y will be monitored.

$B_{y,savings,i,j}$ must be determined by applying the procedures and requirements of AMS-II.G. Therefore, The quantity of woody biomass saved due to implementation of improved cookstoves to be estimated using equation below (Equation 6 of AMS-II.G.)

$$B_{y,savings,i,j} = B_{old,i,j} \times \left(1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}} \right) \quad \text{Equation 6}$$

$\eta_{old,i,j}$	Efficiency of the old devices being replaced by project devices of type i and batch j (fraction)
$\eta_{new,i,j}$	Efficiency of the project device i and batch j (fraction)
B_{old}	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate thermal energy equivalent to that provided by the project device type i and batch j (tonnes/year)

Where the project households continue to use baseline cookstoves along with improved cookstoves, B_{old} shall be adjusted ex-post based on the percentage of project households found to continue such practice according to Equation 6. For such cases, the quantity of woody biomass saved due to implementation of improved cook stoves shall be calculated using an adjusted value to account for ex-post use of baseline stoves in addition to improved cookstove.

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y) \quad \text{Equation (6)}$$

$B_{old,adjusted}$	Adjusted B_{old} to account the ex-post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device).
μ_y	Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves

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

Description		SoaRehitra Portable ICS	Lamasinina Fixed ICS
$N_{o,i,j}$	Number of project devices of type i and batch j commissioned	13,752	13,604
-	Life Span (years)	5.5	15
$\eta_{new,i,j}$	Efficiency of the project device ²⁹ i and batch j	32.2%	33%
$\eta_{old,i,j}$	Efficiency of the old devices being replaced by project devices of type I and batch j	10%	10%
μ_y	Adjustment to account for any continued use of pre-project devices during the year y	0.96	0.96
$n_{y,i,j}$	Proportion of commissioned project devices of type i and batch j ($N_{o,i,j}$) that remain operating in year y	0.9	0.9
$B_{old,i}$	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate thermal energy equivalent to that provided by the project device type i and batch j	4.390	4.390
$B_{y,savings,i,j} = (B_{old,i}) * (1 - (\eta_{old,i,j} / \eta_{new,i,j}))$	Quantity of woody biomass that is saved per project device i and batch j in year y	3.03	3.06
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	0.9660	0.9660
$NCV_{biomass}$	Net Calorific Value of biomass	0.0156	0.0156
$EF_{projected_fossil\ fuel}$	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers	= 112+9.46 = 121.46	= 112+9.46 = 121.46
Adj_{LE}	Adjustment factor to account for leakage related to the non-renewable woody biomass saved by the project activity	0.95	0.95
U_d	f_{NRB} adjustment factor	0.26	0.26
E_y	Emission reductions in year y	46,270	46,272

²⁹ The reported efficiencies are as per WBT report during the CPA inclusion stage under CDM. However, project applies conservative efficiency values based on WBT conducted on first operational batch of similar ICS, followed by annual discounting for loss of efficiency as per methodological provision.

Following table includes the reference calculation for Instance 1:

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCUs (tCO ₂ e)	Estimated removal VCUs (tCO ₂ e)	Estimated total VCUs (tCO ₂ e)
21-April-2022 to 31-December-2022	32,325	0	0	32,325	0	32,325
01-January-2023 to 31-December-2023	46,270	0	0	46,270	0	46,270
01-January-2024 to 31-December-2024	46,397	0	0	46,397	0	46,397
01-January-2025 to 31-December-2025	46,270	0	0	46,270	0	46,270
01-January-2026 to 31-December-2026	46,270	0	0	46,270	0	46,270
01-January-2027 to 31-December-2027	46,270	0	0	46,270	0	46,270
01-January-2028 to 31-December-2028	46,397	0	0	46,397	0	46,397
01-January-2029 to 31-December-2029	46,270	0	0	46,270	0	46,270
01-January-2030 to 31-December-2030	46,270	0	0	46,270	0	46,270
01-January-2031 to 31-December-2031	46,270	0	0	46,270	0	46,270
01-January-2032 to 29-February-2032	7,606	0	0	7,606	0	7,606
Total	456,614	0	0	456,614	0	456,614

Please note that the above table contains the estimated GHG reductions w.r.t to the parameters for 1st instance, for the purpose of ex-ante demonstration. The start date of the 1st project activity instance under this grouped project is 21-April-2022. Other 9 project activity instances are having different start date. Hence, for each instance separate calculations shall be performed and then calendar year wise the values will be summed up to release ERs for this group project activity. Please refer ER sheet for the detail calculation of all 10 instances.

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Sub national survey report conducted by "The Regional Center of Documentation and Information (CEDII)"
Value applied:	$= 0.966 \cdot (1 - 0.26)^{30}$ $= 0.714$
Justification of choice of data or description of measurement methods and procedures applied:	The f_{NRB} calculation has been referred in line with the para 51(a) of the methodology AMS-II.G which prescribes that "conduct local studies to determine the local f_{NRB} value (sub national values) as per the methodological tool "Calculation of fraction of non-renewable biomass". Thus, the value has been established from sub national survey report conducted for the project region and this value will be fixed ex-ante. The f_{NRB} value has been calculated using the equation 1, 3, 5 & 6 of the methodological tool 30: "calculation of fraction of non- renewable biomass" Version 01 (version applied in the PoA-CPA registered PD). The calculation of the f_{NRB} value has been submitted in an excel sheet. The survey had been conducted and values & calculations are reported by an independent third party (CEDII) which was further approved by the host country DNA. The supporting documents are submitted to VVB.
Purpose of Data	Calculation of emission reductions
Comments	The value is fixed ex-ante. The f_{NRB} adjustment factor is applied to calculate f_{NRB} value as per exemption received from VERRA.

Data / Parameter	$\eta_{old,i,j}$
Data unit	Fraction
Description	Efficiency of pre-project device
Source of data	Default value (AMS-II.G)
Value applied:	0.1
Justification of choice of data or description of	A default value of 0.1 must be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.

³⁰ f_{NRB} has been discounted as per the provision of the exemption request approval from VERRA on dated 06 February 2025.

measurement methods and procedures applied	
Purpose of Data	Calculation of emission reductions
Comments	No comments

Data / Parameter	B_{old,i,j}
Data unit	tonne/year
Description	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j
Source of data	Survey Report conducted by CEDII (Regional Center of Documentation and Information)
Value applied	4.39
Justification of choice of data or description of measurement methods and procedures applied	The annual quantity of wood that would have been consumed in absence of the project activity will be calculated as below: $B_{old,i,j} = B_{old,HH} / N_{d,HH}$ Where, $B_{old,HH}$ was determined through survey at the time of validation and $N_{d,HH}$ is a monitoring parameter
Purpose of Data	Calculation of Baseline Emissions
Comments	PP plans distribution of only one ICS per households hence $B_{old,i,j}$ equals $B_{old,HH}$

Data / Parameter	<i>EF_{projected_fossil fuel}</i>
Data unit	tCO ₂ /TJ
Description	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion
Value applied:	121.46 ³¹
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	No comments

³¹ Emission Factor has been updated as per exemption request approval from VERRA on dated 06 February 2025.

Data / Parameter	AD_{jLE}
Data unit	Fraction
Description	Adjustment factor to account for leakage related to the non-renewable woody biomass saved by the project activity
Source of data	Default value
Value applied:	0.95
Justification of choice of data or description of measurement methods and procedures applied	AMS-II.G; Version 09.0
Purpose of Data	Calculation of emission reductions
Comments	No comments

Data / Parameter	μ_d
Data unit	%
Description	Adjustment factor for f _{NRB} (Uncertainty deduction)
Source of data	VMR0006; Version 1.2
Value applied:	26%
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of emission reductions
Comments	No comments

Data / Parameter	NCV_{biomass}
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	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	IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	No comments

Data / Parameter	Life span
Data unit	Number of years
Description	The operating lifetime of the project device
Source of data	Lab test report by National Agency
Value applied	SoaRehitra: 5.5 Lamasinina Fixed ICS: 15
Justification of choice of data or description of measurement methods and procedures applied	The value is taken from third party certified test reports conducted for ICS performed by experienced professional under “THE NATIONAL INDUSTRIAL AND TECHNOLOGICAL RESEARCH CENTER” (under Ministry of Higher Education and Scientific Research, Madagascar).
Purpose of Data	For calculation of baseline emission
Comments	The value is fixed ex-ante

6.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,j}$
Data unit	Number
Description	Number of project devices of type i and batch j operating during year y
Source of data	Stove distribution database and survey records
Description of measurement methods and procedures applied	The total number of appliances by type and age deployed during period y is tracked in the Project Database of the project, which is updated regularly. All appliances distributed will be recorded for installation date and recipient /location. The distribution date for each appliance listed in the Project Database. Sampling Frame: Project Database as defined by distribution date, appliance type, serial number, and end-user information. Sample Size and Desired Precision: it refers to the PoA-DD, Part II, Section I.7.2. Sample Method: it refers to the PoA-DD, Part II, Section I.7.2. The number of stoves still operating will be determined based on representative sampling. The total number of operational stoves shall be calculated as the fraction of stoves of type i and age a found operational in the sampling survey multiplied by total number of stoves of type i and age a in the project database.
Frequency of monitoring/recording	At least once every two years
Value applied:	SoaRehitra portable ICS: $13,752 \times 0.9 = 12,376.8$

	Lamasinina Fixed ICS: $13,604 \times 0.9 = 12,243.6$
Monitoring equipment	Sampling survey
QA/QC procedures applied	PP maintains a distribution record to calculate this parameter. The PP supervises the activities of project implementer (when not the PP itself), and provides training, guidelines and templates to facilitate accurate testing and record keeping. In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves of type i and age a.
Purpose of data	Calculation of baseline emission
Calculation method	As per sampling method
Comments	All data sources are maintained as transparent and verifiable. It is assumed ex-ante that there is only one project stove being used per household for calculating $B_{old,i,j}$ therefore, ex-post sampling based monitoring shall also include assessment of presence of multiple operational project stoves in a sampled household. The number of project stoves in the shall be adjusted accordingly to claim emissions reduction only for one operational project stove per household to ensure equivalence with the baseline established.

Data / Parameter	$n_{y,i,j}$
Data unit	Fraction
Description	Proportion of commissioned project devices of type i and batch j that remain operating in year y (fraction)
Source of data	Sample survey
Description of measurement methods and procedures applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence/precision levels. Separate samples shall be taken for each batch
Frequency of monitoring/recording	At least once every two years
Value applied:	0.9
Monitoring equipment	Sampling survey (Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No))
QA/QC procedures applied	-
Purpose of data	Calculation of emission reduction

Calculation method	-
Comments	-

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Stove distribution database and Sample Survey Records
Description of measurement methods and procedures applied	As per sampling method A sampling monitoring survey has been conducted on calculated sample size as per the sample plan and in line with the provision given under the methodology AMS-II.G to record usages consumption level in lieu of continued baseline stoves. The option 2 of the methodology has been referred while conducting the sampling survey as baseline devices are three stone fire across all the households. As per the methodological requirements, the survey was designed to capture the cooking habits and stove usage of households for the identified samples, including quantification of use of baseline devices. Thus, number of meals cooked with project ICS, fulfilment of cooking needs, etc. were captured and also in case of samples where baseline stoves were identified their usages detail were recorded. Since this parameter is a proportion (i.e., fractional value), the sampling result has been expressed as a proportional value. Thus, the Fractional value derived based on sampling survey has been considered as "μ" and the value has been used for required adjustment to account number of baseline stoves still operating. Please refer to the sampling survey sheets for the results derived from the survey and also the ER sheet for application of the values.
Frequency of monitoring/recording	At least once every two years
Value applied:	For ex-ante calculation, the value is assumed as 0.96
Monitoring equipment	Not Applicable
QA/QC procedures applied	In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves of type i
Purpose of data	To calculate baseline emission
Calculation method	As per sampling method
Comments	The record to be kept for crediting period + 2 years The value monitored under sampling survey can be referred in the sampling survey data sheet.

Data / Parameter	$\eta_{\text{new},i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	WBT conducted by a third party on operational ICS post commissioning and during distribution, for each ICS type (Refer to 'additional comments' section for more details)
Description of measurement methods and procedures to be applied	Water Boiling Test (WBT) on randomly selected Households from the database, selected as per sampling size calculation. Such WBT is conducted after commissioning/distribution of ICS, in order to estimate the operational efficiency of ICS for the 1st year of operation. The value has been considered as ex-ante fixed for same ICS type for the year 1. Thereafter, the yearly loss in efficiency of ICS is calculated as per para 37 of the methodology, AMS-II.G. Version-09.0 and respective vintage wise efficiencies have been determined.
Frequency of monitoring/recording	(i) Recorded at the time of commissioning/distribution (ii) Adjusted for the loss of efficiency per annum as per para 37 of AMS- II.G. version—09.0.
Value monitored	SoaRehitra ICS: 32.2% Lamasinina Fixed ICS :33%
Monitoring equipment	Based on WBT conducted by third party agency, equipment used are thermometer, weighing scales, moisture content meters etc. as listed in the third-party report.
QA/QC procedures to be applied	The value is used from the third-party report, hence not required.
Purpose of the data	Calculation of baseline emission
Calculation method	Water Boiling Test (WBT) on randomly selected Households from the database, selected as per sampling size calculation. Such WBT is conducted after commissioning/distribution of ICS, for each ICS type, in order to estimate the operational efficiency of ICS for the 1st year of operation. The value has been considered as ex-ante fixed for same ICS type for the year 1.
Comments	If any sample stove is found to be operating below the 20% efficiency, the proportionate number of stoves of that type included in the CPA will be considered to be non-operational and not accounted for ER calculation.

Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant opted to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data	Stove distribution database
Description of measurement methods and procedures to be applied	For each batch the date of distribution of first and last ICS will be recorded and the last date shall be used as date of commissioning for that batch. The ICS under the program is continuously being manufactured, uniquely numbered and continuously distributed; hence each ICS under the CPAs are being continuously recorded in the database and total number of ICS distributed in a particular month is considered as a batch for the purpose of emission reduction calculation. More details are provided under “Additional comments” and batch wise commissioning dates are included under the ER sheet.
Frequency of monitoring/recording	Recorded at the time of commissioning/distribution of first ICS of the batch
Value monitored	To be referred from the ER calculation sheet
Monitoring equipment	NA
QA/QC procedures to be applied	NA
Purpose of the data	To establish the Start Date for ER accounting
Calculation method	As per sampling method
Comments	The record to be kept for crediting period + 2 years. In order to be conservative in emission reduction calculation, PP has considered the last date of distribution of a particular month as the date of complete commissioning of the stove batch distributed for that particular month (here a batch is referred to as total numbers of stoves distributed in a particular month).

	Therefore, start date of accounting of emission reductions for stoves distributed in a particular month has been considered as the next day of the last date of stove distribution for that month. Whereas, for the purpose of identification of ICS numbers vintage-wise, the year fraction for each ICS has been calculated from the date of its distribution. Therefore, this is a conservative approach both for the purpose of ER calculation and calculation of yearly efficiency as per para 37 of the methodology AMS-II.G. The details related to date of accounting of stoves are of provided in the ER calculation sheet.
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Data / Parameter	$N_{d,HH}$
Data unit	Number
Description	Number of project devices distributed per household
Source of data	Stove distribution database
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	-
Value applied:	1
Monitoring equipment	Recorded at the time of commissioning/distribution of project devices and it can be crosschecked with user details having number of ICS.
QA/QC procedures applied	-
Purpose of data	Calculation of emission reduction
Calculation method	-
Comments	-

6.3 Monitoring Plan

As per the provision of the registered PoA (#10443), the sampling is considered at PoA level for all the CPAs to be covered under a particular Monitoring Period, hence a PoA level sampling is generally conducted by PP. However, this project is currently a Grouped Project activity under VCS with independent VCS listed projects are the Instances to this Grouped Project. Therefore, the sampling monitoring approach has been adopted at Group level covering all the 10 Instances.

As per the provision of the Sampling Guidelines (more details given under this section below), a detailed sampling survey has been conducted during the month of May 2024. This sampling survey is applicable to the current monitoring period and the same sampling survey³² has been referred for this project activity for the purpose of all the monitoring parameters attributed to the Sampling Monitoring plan. However, overall consideration of the monitoring plan is demonstrated below for reporting purposes.

A. Approach:

The monitoring plan is designed to monitor the parameters listed in Section 4.2 “Data & parameters monitored” above, which are required for calculation of the actual GHG emission reduction achieved by the Instance using ex post sampling survey. The sampling approach is considered at group level, but sampling frame is designed separately for the two ICS types included under the instances. Under each sampling frame, the share of operating stoves (i.e. for N_y) and the continued use of pre-project devices (i.e. for μ_y) will be determined based on sampling procedures as outlined below. The PP will be responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

No monitoring for leakage through competitive uses of biomass is required, as the parameter $B_{old,i,j}$ is multiplied by 95% to account for leakage.

The detailed sampling plan is the following:

B. Sampling design:

The design of the sampling plan includes the following aspects:

- Total population of ICS under the grouped project (i.e. across 10 instances)
- Segregation of the ICS types (i.e. SoaRehitra Portable & Lamasinina fixed) under two sampling frames.
- Calculation of minimum required sample size for each frame with Simple Random Sampling approach.

A representative sampling will be undertaken as part of the Sampling Plan at group level where beneficiaries from all instances of the group shall be considered in the population size. However, there are two types of ICS included under the group, viz. SoaRehitra & Lamasinina (ICS type

³² biennial sampling survey approach is followed and results from the latest sampling survey (i.e. survey conducted during May 2024, as per 95/10 level) applied under the current MP. For further reference, footnote #6 of 'Sampling Standard' can be considered which refers to "General guidelines for SSC CDM methodologies" and its respective para 26, 27 & footnote #4 prescribes that the survey results may be used for the period 12 months after the survey date, on top of using the results for the period prior to the survey date, resulting in up to 24 months period to which the survey results may be applied to, irrespective of when the monitoring reports are uploaded.

respective to the instance can be referred from the previous section 1.1), therefore sampling plan has been simplified under two sampling frames (further describe in the section below) to categorize population for each ICS type in two separate frames. However, as all the beneficiaries of the instances are homogenous in terms of their baseline and current cooking practices, household type, etc. Hence, “Simple Random Sampling” has been considered in line with the requirements of the “*Sampling and surveys for CDM project activities and programme of activities*”, version 04.

- (i) **Objective and Reliability Requirements:** The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the monitoring period. As per Sampling Standard, parameter values shall be estimated by sampling in accordance with the requirements in the applied CDM methodologies separately and independently for each of the Instances included in the Group except when a single sampling plan covering a group of instances is undertaken applying 95/10 confidence/precision for the sample size calculation. Thus, sampling plan is designed as per 95/10 c/p consideration to determine sample size and reliability has been checked under the same c/p level. This is consistent with the approach in the approved methodology to aim at higher confidence/precision when the sampling/survey effort is undertaken less frequently.

In cases where survey results indicate that 95/10 precision are not achieved, the lower bound of the 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 95/10 precision). Thus the grouped project activity has been treated as single sampling plan with 95/10 confidence/precision has been considered for a biennial³³ sampling.

Monitored Parameter:

$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y
$\mu_{y,i}$	Adjustment to account for any continued use of pre-pre-project devices during the year y

- ii) **Target Populations:**

The target population for the proportion of ICS still in operation ($N_{y,i,j}$) of this grouped project are all households which are included into the ICS database of each project instance which are using fuel wood for cooking in the project ICS.

The target population for pre-project appliances ($\mu_{y,i,j}$) is the set of old stoves or cooking method/practice which are found to be still in use under project instances.

- iii) **Sampling Frame (or Sampling units):**

³³ biennial sampling survey approach is followed and results from the latest sampling survey (i.e. survey conducted during May 2024 as per 95/10 level) applied under the current MP. For further reference, footnote #6 of 'Sampling Standard' can be considered which refers to "General guidelines for SSC CDM methodologies" and its respective para 26, 27 & footnote #4 prescribes that the survey results may be used for the period 12 months after the survey date, on top of using the results for the period prior to the survey date, resulting in up to 24 months period to which the survey results may be applied to, irrespective of when the monitoring reports are uploaded.

As described under the sections above, the sampling plan is considered at group project level which includes 10 project instances. Though the population is homogenous in nature, but there are two ICS types deployed across the instances viz. SoaRehitra and Lamasinina. However, under each instance there is only single ICS type and implemented homogeneously, thus a single sampling plan with two separate sampling frames are considered to achieve a simplified and well defined sampling approach and to understand the minimum required sample size etc., Each frame is applicable for both the parameters:

- (i) proportion of ICS in operation ($N_{y,ij}$)
- (ii) Adjustment to account for any continued use of pre-project devices during the year ($\mu_{y,ij}$)

The sample frames refer to all the information sources on the Database. There are two primary mechanisms for data collection viz: the Registration Process for newly distributed/installed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the programme. The detailed information collected from Registration Process is used to populate the stoves Database and the Monitoring Survey follows “*Sampling and Surveys for CDM Project Activities and Programme of Activities*”, version 04.

All monitoring requirements of the applied methodology AMS-II.G. must be followed. Therefore, in line with methodology AMS-II.G version 09.0, as installing data logger is not practical and if any use of pre project device can be monitored in a common survey with other monitoring parameters; therefore, a random sub- sample within the common survey can be taken to determine continued use of old cookstoves and its proportional usage by including suitable questionnaire.

There will be two situations:

- 1) project ICS are completely discarded
- 2) the old stoves (or baseline cooking practice) used along with project ICS.

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

However, for second case, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75. Where a more precise data is available i.e. the thermal capacity of the project and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used.

iv) **Sampling Method**

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

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

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

$\mu_{y,i,j}$: Pre project device (i.e. old or baseline cooking practices) only is in use then fraction to be used to calculate total number, however if pre project device is used along with project ICS, proportion of usage of each will be determined by cooking habits (i.e. number of times the devices are being used in a given duration) evaluated by survey questionnaire during the monitoring period.

Using the formulas in the section “Sample Size” below, the PP will calculate minimum samples size using the two sampling frames and then randomly sample the required number of ICS from each sampling frame. It means that randomly selected samples in each frame are representative of their entire population, hence results are also applicable across the populations in each frame. Since there is only single sampling plan adopted at grouped level, hence total sample size at group level is the sum of the sample sizes calculated under each frame (more details given below).

For a homogenous and equitable distribution of the required samples from each instance, the total sample size at grouped level is equally distributed across the 10 instances (i.e. it means equal proportion of samples from each instance is considered for survey and this approach leads to equal chance for each beneficiary getting selected under the sampling).

v) **Sample size:**

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision for biennial and 90/10 confidence/precision for annual sampling.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, a 95 percent confidence level, and a 10 percent margin of error, random samples will be selected from the Primary Sampling Unit. There are two parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($N_{y,i,j}$), and the continued use of old stoves, ($\mu_{y,i,j}$).

In line with AMS-II.G version 09.0, both the parameters can be sampled in a single survey with a random sample of households using the above described confidence/precision levels depending

on annual or biennial monitoring frequency. Since both the parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ requires results and application in proportion/percentage, therefore sample size consideration is prescribed as 'proportion value parameter' for sampling.

As per registered sampling plan, in line with Guidelines for Sampling and surveys for CDM project activities and programmes of activities, version 04.0 Appendix 1 paragraph 5, there are different ways available to obtain the estimates of the parameter of interest:

- (a) Refer to the result of previous studies and use these results;
- (b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates;
- (c) Use best guesses based on the researcher's own experiences.

PP has access to previous studies of sampling as there were sampling surveys conducted at PoA level. However, for the current grouped project, being the joint validation & verification, PP has decided to conduct a primary sampling survey at Group level by adopting a minimum required sample number as described above.

For the following monitoring periods, the estimates shall be adjusted taken into account the results of the previous monitoring period(s) or the result from recent sample survey, which is conducted after the previous monitoring periods. Since the current monitoring period falls under the applicability period of the biennial sampling conducted previously and also during May 2024; hence here both the options (a) and (b) can be referred.

Thus, continuing with the new sampling survey for applying into the current monitoring period. both the sampling parameters considered based on 'proportion value', hence to estimate the sample size for parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ the following equation is used:

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

Where:

n = Sample size

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

p = Expected proportion

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

A specific number of ICS are distributed under each project instance and under each instance only a specific ICS type is distributed, as given below. Hence, population size, N in the above equation will be the total of households/ICS under each frame.

Sampling Frame	Instances	ICS Type	Total ICS in each instance	Total population in each frame
Frame 1	Instance 1	SaoRehitra portable	13,752	110,016
	Instance 2	SaoRehitra portable	13,752	
	Instance 3	SaoRehitra portable	13,752	
	Instance 4	SaoRehitra portable	13,752	
	Instance 5	SaoRehitra portable	13,752	
	Instance 6	SaoRehitra portable	13,752	
	Instance 8	SaoRehitra portable	13,752	
	Instance 10	SaoRehitra portable	13,752	
Frame 2	Instance 7	Lamasinina fixed	13,604	27,208
	Instance 9	Lamasinina fixed	13,604	

Thus, the required assumptions are made to exemplify the sample size calculation for parameters: $N_{y,i,j}$ and $\mu_{y,i,j}$. It is expected at least 90% of ICS will be operational, hence the expected proportion p for $N_{y,i,j}$ is taken as 0.9.

Sample size calculation:

The calculation of the required sample size for both the parameters in the first monitoring period is illustrated below considering a 95/10 level of confidence and precision (i.e. for biennial monitoring). In all cases a conservative approach is taken, however if for any parameter the required 95/10 confidence/precision is not met then the PP will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds. Thus, oversampling can also be considered by PP while calculating the sample size.

Alternatively, as per the provision of Sampling Standard the lower bound or the upper bound (whichever is conservative) of the 90 per cent or 95 per cent confidence interval of the parameter value may be chosen.

For both the Parameter $N_{y,i,j}$ and $\mu_{y,i,j}$: based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated as:

For Sampling Frame 1 (i.e. instances with SoaRehitra ICS):

$$n \geq \frac{1.96^2 \times 110,016 \times 0.9 (1 - 0.9)}{(110,016 - 1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times 0.9 (1 - 0.9)}$$

Which comes out to be $n \geq 42.67$

$$n = 43$$

[However, as per the sampling requirements, in case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion and $n=43$ is higher than 30 ICS, which is appropriate]

Screenshot from the Sampling survey sheet, given below for reference:

Calculation of Sample Sizes in Simple Random Sampling for Parameter N , and μ		
A. For sampling frame with SR-ICS:		
Definition	Value	Justification
The population size N is	1,10,016	Total number of population as per the stove distribution database, under each CPA
The expected proportion p for n_{y_i} is	0.9	Even if 100% of ICS installed still in operation as per a preliminary study, a conservative assumption of 90% is applied for sample size calculation.
Min. required Sample size	42.67	At 95% confidence level
Sample size (rounded up)	43	Min required sample

For Sampling Frame 2 (i.e. instances with Lamasinina ICS):

$$n \geq \frac{1.96^2 \times 27,208 \times 0.9 (1 - 0.9)}{(27,208 - 1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times 0.9 (1 - 0.9)}$$

Which comes out to be $n \geq 42.62$

$$n = 43$$

Screenshot from the Sampling survey sheet, given below for reference:

B. For sampling frame with Lamasinina-ICS:		
Definition	Value	Justification
The population size N is	27,208	Total number of population as per the stove distribution database, under each CPA
The expected proportion p for n_{y_i} is	0.9	Even if 100% of ICS installed still in operation as per a preliminary study, a conservative assumption of 90% is applied for sample size calculation.
Min. required Sample size	42.62	At 95% confidence level
Sample size (rounded up)	43	Min required sample

Thus, PP has calculated this minimum required sample size number separately for the two sampling units: for instances with SaoRehitra ICS and Instances with Lamasinina ICS. As the sampling activity is applied at group level, therefore total sample size considered as 86 (43+43). Therefore, in this case a minimum sample size of 86 is to be sampled for both the parameters.

Other provisions:

PP may choose to use the same samples to monitor more than one parameter, this is because parameters have same units (i.e. proportion/fraction). Sampling more than one parameter within the same sample (household) helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter. Similarly, oversampling is strongly encouraged, not only to compensate for any attrition, outliers or nonresponse 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.

Thus, the sample size shown above will be adjusted upwards to account for any situational non-responses (such as absence of respondent on the day of visit, medical urgency, climatic condition etc.). Here PP may determine the appropriate non-responses rate based on previous experience or based on the local conditions at the time of such sampling survey. In this regard, oversampling is considered as part of the registered monitoring plan. However, based on prior experience of sampling it has been realized by PP that responses from min. required samples are generally achievable. Hence, oversampling may not be a mandatory requirement; but as part of standard sampling practice followed by PP additional samples are considered as over samples in the sample size under this project.

Final Sample size considered for the 1st Monitoring Period (with consideration of oversampling):
n (final) = 120

Outcome:

Both the parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ have been selected across the minimum required and randomly selected 120 samples, as stated above. Similarly, in order to pre-define the samples the online randomizer was used to randomly select samples. All these selected samples were recorded (screenshots of the online randomizer) at the time of sample selection and same are reported under the sampling result sheets for cross check.

Thus, the particular parameters were surveyed and tested based on the above sample size and selected randomly from the stove database, hence PP had interviewed all sampled households to check for the fraction of operational ICS ($N_{y,i,j}$) and the presence of baseline devices & their any probable usage (i.e. additional check for the parameter $\mu_{y,i,j}$ for backup reference purposes). Thus, for these two monitoring survey parameters ($N_{y,i,j}$ & $\mu_{y,i,j}$), data collection was done for total 120 randomly selected samples. Subsequently, results are calculated and presented for the parameters. The results are further treated via sampling equations to confirm Reliability Check and presented for each parameter in line with the sampling method and sample size estimated.

The detail calculation, sample equations, results, etc. are submitted in final Sampling Survey Data & Calculation sheets. The summary of the sampling results and formulae used calculation and reliability check etc. are also included in the Appendix 1 below, which can be further cross checked from the sample survey sheet, records of survey, sampling forms etc.

Other elements of monitoring plan:

The Monitoring Plan applied in this PoA involves a number of key elements that ensure that the PP have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Emission Reductions following AMS-II.G. version 09.0 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity. The key elements are the following:

- Project database management
- Spot Checks of ICS
- Sample Plan for the Monitoring Survey
- Data Quality, Consistency and Duplication Checks
- Monitoring Reporting

Project Database Management:

The information collected by the local representative team of PP will be stored both as primary record and in the electronic database which will be available with PP and it will be updated on ongoing basis by trained staff. The database will be sortable by the information collected as per Registration Process and will be made available to the VVB at verification. The PP will verify accuracy and completeness and confirm that there is no double entry of serial numbers in the database. The implementing team will identify any discrepancy and the correct information will be entered into the database.

There are two possible replacement cases:

- (a) replacement due to any damage,
- (b) replacement end the end of operational life of the ICS.

In case a replacement stove is being issued to a customer already registered on the project database (example: case (a)), a new registration will not be required. The replacement stove will be recorded in the project database in such a way that it is clear that the replaced stove ceases to be included in the Instance; and the replacement stove is associated with the customer's details as a replaced stove. In case of new stove which is given as replacement at the end of life of the current ICS (e.g. case (b)), the same is included in the Instance as a new stove with a new serial number and will be treated as re-distribution.

All technical staff responsible for installation and maintenance of the stoves will be trained in terms of the understanding the requirements of VCS on the monitoring system. The technical, operational and maintenance trainings provided for the personnel will be described in each monitoring report.

Spot Checks of ICS Installed:

Trained field staff (generally termed as "Local Agents") will continually randomly select households included in the database and visit them to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (e.g. change in the

address of a user) will be updated on the database, and in the case, ICSs are found to be no longer in use, they will be clearly marked as such and excluded from emission reductions calculations. The spot check will be performed during first year of operation of the Instances, wherein for each Instance random selection of household will be done through central database system, afterwards a team will visit to each household selected and will confirm the information as per registered database. In case any change in information the same will be updated and an action will be decided based on changes observed. These spot checks will also be used as part of sample required establishing the ICS in operation and if any use of pre-project devices along with ICS.

Such spot-check monitoring practice is recorded in particular format and same will serve the purpose of evidence as well as the backup reference supporting the outcome of the parameter μ during sampling surveys.

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:	SoaRehitra portable ICS per instance: 13,752 Lamasinina Fixed ICS) per instance: 13,604
Comments	All data sources are maintained as transparent and verifiable. It is assumed ex-ante that there is only one project stove being used per household for calculating $B_{old,i,j}$ therefore, ex-post sampling based monitoring shall also include assessment of presence of multiple operational project stoves in a sampled household. The number of project stoves shall be adjusted accordingly to claim emissions reduction only for one operational project stove per household to ensure equivalence with the baseline established.

Data / Parameter	$\eta_{new,y,i,j}$												
Data unit	Fraction												
Description	Efficiency of the improved cookstove type												
Value applied:	The values applied for the current monitoring period are as follows: <table><tr><th>Vintage year of ICS</th><th>SoaRehitra ICS</th><th>Lamasinina ICS</th></tr><tr><td>1</td><td>31.50%</td><td>31.71%</td></tr><tr><td>2</td><td>29.41%</td><td>30.93%</td></tr><tr><td>3</td><td>27.32%</td><td>30.15%</td></tr></table>	Vintage year of ICS	SoaRehitra ICS	Lamasinina ICS	1	31.50%	31.71%	2	29.41%	30.93%	3	27.32%	30.15%
Vintage year of ICS	SoaRehitra ICS	Lamasinina ICS											
1	31.50%	31.71%											
2	29.41%	30.93%											
3	27.32%	30.15%											

Comments	The efficiency values are considered conservatively and in line with the requirements of the applied methodology. The calculation to be referred in the ER sheet.
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Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Value applied:	1
Comments	A sampling monitoring survey has been conducted on calculated sample size as per the sample plan and in line with the provision given under the page 14 of the applied methodology to record usages consumption level in lieu of continued baseline stoves. The option 2 of the page 14 of the methodology has been referred while conducting the sampling survey as baseline devices are three stone fire across all the households. As per the methodological requirements, the survey was designed to capture the cooking habits and stove usage of households for the identified samples, including quantification of use of baseline devices. Thus, number of meals cooked with project ICS, fulfilment of cooking needs, etc. were captured and also in case of samples where baseline stoves were identified their usages detail were recorded. Please refer to the sampling survey sheets for the results derived from the survey and also the ER sheet for application of the values.

Data / Parameter	Life Span
Data unit	Number of years
Description	The operating lifetime of the project device. The life span should be reported if the methodology is adopted to determine the project stove efficiency
Value applied:	SoaRehitra portable ICS: 5.5

	Lamasinina Fixed ICS: 15
Comments	The value is taken from third party certified test reports conducted for ICS performed by experienced professional under “THE NATIONAL INDUSTRIAL AND TECHNOLOGICAL RESEARCH CENTER” (under Ministry of Higher Education and Scientific Research, Madagascar).

7.2 Baseline Emissions

The methodology does not account for baseline emissions separately. It quantifies net emission reductions achieved by the project which has been described in Section 5.4 of this document. The emission reductions calculations have been provided in an excel spreadsheet.

7.3 Project Emissions

The methodology does not account for project emissions separately. It quantifies net emission reductions achieved by the project which has been described in Section 5.4 of this document. The emission reductions calculations have been provided in an excel spreadsheet.

7.4 Leakage Emissions

Default leakage adjustment factor of 0.95 has be considered in accordance with methodology.

7.5 GHG Emission Reductions and Carbon Dioxide Removals

ER summary³⁴ at the Group Project level:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
21-April-2022 to 31-December-2022	238,264	0	0	238,264	0	238,264
01-January-2023 to 31-December-2023	341,044	0	0	341,044	0	341,044
01-January-2024 to 30-April-2024	113,058	0	0	113,058	0	113,058
Total	692,366	0	0	692,366	0	692,366

³⁴ Since this is a grouped project activity, the ER values at group level presented. Also, instance wise segregated ER values are also reported with their respective start dates. This is to be noted that these vintages are based on yearly allocation of ERs for the purpose of issuance of VCUs at VERRA; whereas vintage representation of ICS operation is differently calculated as per commissioning date definition of ICS batches with conservative application of ICS efficiency.

Instance 1:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
21-April-2022 to 31-December-2022	34,961	0	0	34,961	0	34,961
01-January-2023 to 31-December-2023	50,041	0	0	50,041	0	50,041
01-January-2024 to 30-April-2024	16,589	0	0	16,589	0	16,589
Total	101,591	0	0	101,591	0	101,591

Instance 2:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
09-June-2022 to 31-December-2022	28,092	0	0	28,092	0	28,092
01-January-2023 to 31-December-2023	49,775	0	0	49,775	0	49,775
01-January-2024 to 30-April-2024	16,364	0	0	16,364	0	16,364
Total	94,231	0	0	94,231	0	94,231

Instance 3:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
30-June-2022 to 31-December-2022	24,976	0	0	24,976	0	24,976
01-January-2023 to 31-December-2023	49,277	0	0	49,277	0	49,277
01-January-2024 to 30-April-2024	16,200	0	0	16,200	0	16,200
Total	90,453	0	0	90,453	0	90,453

Instance 4:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
29-August-2022 to 31-December-2022	16,706	0	0	16,706	0	16,706

01-January-2023 to 31-December-2023	48,780	0	0	48,780	0	48,780
01-January-2024 to 30-April-2024	16,037	0	0	16,037	0	16,037
Total	81,523	0	0	81,523	0	81,523

Instance 5:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
14-November-2022 to 31-December-2022	7,015	0	0	7,015	0	7,015
01-January-2023 to 31-December-2023	53,341	0	0	53,341	0	53,341
01-January-2024 to 30-April-2024	17,537	0	0	17,537	0	17,537
Total	77,893	0	0	77,893	0	77,893

Instance 6:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
19-December-2022 to 31-December-2022	1,686	0	0	1,686	0	1,686
01-January-2023 to 31-December-2023	47,350	0	0	47,350	0	47,350
01-January-2024 to 30-April-2024	15,568	0	0	15,568	0	15,568
Total	64,604	0	0	64,604	0	64,604

Instance 7:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
14-February-2023 to 31-December-2023	40,373	0	0	40,373	0	40,373
01-January-2024 to 30-April-2024	14,367	0	0	14,367	0	14,367
Total	55,010	0	0	55,010	0	55,010

Instance 8:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
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17-April-2023 to 31-December-2023	51,055	0	0	51,055	0	51,055
01-January-2024 to 30-April-2024	1,958	0	0	1,958	0	1,958
Total	53,013	0	0	53,013	0	53,013

Instance 9:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
30-June-2023 to 31-December-2023	22,459	0	0	22,459	0	22,459
01-January-2024 to 30-April-2024	13,821	0	0	13,821	0	13,821
Total	36,280	0	0	36,280	0	36,280

Instance 10:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCU (tCO ₂ e)
17-July-2023 to 31-December-2023	22,031	0	0	22,031	0	22,031
01-January-2024 to 30-April-2024	15,737	0	0	15,737	0	15,737
Total	37,768	0	0	37,768	0	37,768

Comparison of Ex-ante emission reductions and achieved emissions reductions:

Instances	Ex-ante estimated reductions	Achieved reductions	Percent difference	Reason/Remarks
Instance 1 (CPA 31)	93,934	101,591	8.15%	Marginally higher due to 100% results of the ex-post parameters
Instance 2 (CPA 33)	93,934	94,231	0.32%	Marginally higher due to 100% results of the ex-post parameters
Instance 3 (CPA 35)	93,934	90,453	-3.71%	Marginally lower due to the impact of year fraction of ICS operation during the current MP
Instance 4 (CPA 37)	93,934	81,523	-13.21%	Lower due to reduced year fraction of ICS operation during the current MP

Instance 5 (CPA 39)	93,934	77,893	-17.08%	Lower due to reduced year fraction of ICS operation during the current MP
Instance 6 (CPA 41)	93,934	64,604	-31.22%	Lower due to reduced year fraction of ICS operation during the current MP
Instance 7 (CPA 30)	93,938	55,010	-41.44%	Lower due to reduced year fraction of ICS operation during the current MP
Instance 8 (CPA 43)	93,934	53,013	-43.56%	Lower due to reduced year fraction of ICS operation during the current MP
Instance 9 (CPA 32)	93,938	36,280	-61.38%	Lower due to reduced year fraction of ICS operation during the current MP
Instance 10 (CPA 45)	93,934	37,768	-59.79%	Lower due to reduced year fraction of ICS operation during the current MP

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Not applicable.

Section	Information	Justification
NA	NA	NA

APPENDIX 2: DETAILS RELATED TO SAMPLING SURVEY

Details of the Sampling Survey:

The results of the biennial sampling survey conducted during May 2024 have been applied for the current monitoring period. The details are summarized below:

For parameter $N_{y,ij}$ & $\mu_{y,ij}$:

Sampling Survey was conducted across the randomly selected samples at Grouped Project level, across the 10 Instances. The calculated sample size was considered with inclusive of oversamples as per the provision of the CDM registered sampling plan in line with the Sampling Guidelines. The total sample size (i.e. 120) is distributed across the Instances such that equitable number of samples are randomly selected from each Instance.

All sample households were interviewed with pre-designed questionnaires to check and record the presence of project ICS, usage pattern, fulfilment of cooking needs with project ICS, etc.

The detailed sampling size, sampling method, sample selection, survey data, results, reliability check etc. are included in a separate Excel file, which was submitted to audit team for validation & further references. As per calculated sampling size (i.e. based on 95/10 confidence/precision), a total of 120 samples were surveyed for both the parameters $N_{y,ij}$ and $\mu_{y,ij}$. All these samples were randomly selected across the Instances (but with an approach of equal weightage in each instance) from their ICS database to consider a representative and unbiased sample selection to derive the results. The project ICS were found to be operational without any issue. The regular cooking needs are fulfilled with using the project ICS. There was no parallel or any single use of old baseline devices during the entire monitoring period.

The input of the sampling survey, results derived from the sampling survey and reliability check are presented under the sampling sheet and also summarized below:

Ny: Usage Rate (120 Samples)	100.00%	%
Population Size	137224 ³⁵	number
Sample Size	120	number
Proportion for Usage Rate	1.00	Fraction
Standard error of proportion for Usage Rate	0.00	
Precision for Usage Rate	0.00%	%
Result for Usage Rate	ok, acceptable	--

μ_y: (Adjustment fraction)	100.00%	%
Population Size	137224	Number
Sample Size	120	Number
Proportion for Usage Rate of baseline device	1.00	Fraction
Standard error of proportion for Usage Rate	0.00	
Precision for Usage Rate	0.00%	%
Result for Usage Rate	ok, acceptable	--

³⁵ The values presented here under the results and reliability assessment tables are the total population at grouped level, where results were derived from the total samples taken across the 10 instances (i.e. at group level). Under the sampling survey sheet, all samples' data are presented, and assessment has been done.

Also, for the parameter μ_y : as per applicability of the methodology:

- i) If the pre-project devices are decommissioned and no longer used, as determined by the monitoring survey its value is 1.0.
- ii) If both the project devices and pre-project devices are used together, measurement campaigns shall be undertaken.
- iii) Surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire.
- iv) Example - the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75. Where a more precise data is available i.e. the thermal capacity of the project and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used.

The sampling survey was designed and conducted following the above reference and confirmed that (ref. sampling survey sheets) the Project ICS are being regularly used in all households to meet daily cooking requirements. Additionally, the survey also included SDG related inputs from the beneficiaries and the communities, hence this survey also to be referred for SDG related requirements. The detailed presentation of sampling frame, sample size calculation, sample selection, sampling data, calculation of results and precision check etc. are demonstrated in the sampling sheets.