



**Verified Carbon
Standard**

DELAGUA CLEAN COOKING GROUPED PROJECT IN THE GAMBIA



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Project ID	4000
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1 PROJECT DETAILS

1.1 Summary Description of the Project

A summary description of the technologies/ measures to be implemented by the project

The Grouped Project activity “DelAgua Clean Cooking Grouped Project in The Gambia”, with VCS ID 4000, aims at distribution of Improved Cook Stoves (ICS) to the rural households in The Gambia (Least Developed Country)¹. DelAgua Health The Gambia (Voluntary) Ltd (DelAgua) holds the Project Participant (PP) role, overseeing all communication, management, ICS distribution and ownership rights of the Greenhouse Gas (GHG) Emission Reduction Units (ERU). The distribution of ICS is not mandated by the Gambian law and the Grouped Project is a voluntary initiative being run by the PP. Though, the program is not being implemented because of any government legislation, the PP is implementing the project in association with the Government of the Gambia, and to that effect, the PP has signed an MoU with the authority.

The PP is planning to distribute a total of 200,000 ICS throughout the program’s lifetime. The ICS will be high efficiency cooking devices, leading to a reduction in the indoor smoke levels, time spent on collection of firewood used for cooking meals and boiling water for domestic use (hereafter combinedly termed as kitchen activities), and reduction in the usage of firewood compared with the pre-project scenario. Each beneficiary household will receive only one unit of ICS. The project activity (interchangeably called “program” or GP for Grouped Project) has already distributed over 76,140 ICS as of 31st December 2023.

Expected year-wise cumulative distribution of ICS over program’s lifetime is given below:

Year	Cumulative Distribution of ICS ²
23-Feb-2023 to 31-Dec-2023	76,140
01-Jan-2024 to 31-Dec-2024	150,000
01-Jan-2025 to 31-Dec-2025	200,000
01-Jan-2026 to 31-Dec-2026	200,000
01-Jan-2027 to 31-Dec-2027	200,000
01-Jan-2028 to 31-Dec-2028	200,000
01-Jan-2029 to 31-Dec-2029	200,000
01-Jan-2030 to 22-Feb-2030	200,000

The location of the project

Under the GP, DelAgua will distribute the project technologies to individual households within the host country the Gambia. The details of the locations of GP are provided in Section 1.12 of this

¹ <https://unctad.org/topic/least-developed-countries/list>

² This plan is tentative and subject to change based on actual implementation, influenced by market demand and user preferences, deemed outside the control of the PP, and shall not be considered a deviation from the project's description. The number of ICS units outlined in the table serves as an approximate figure for ex-ante calculations and is non-binding.

document. All households will be in rural areas of the identified regions in section 1.12 of this document.

An explanation of how the project is expected to generate GHG emission reductions or removals

The program is reducing the usage of non-renewable firewood as fuel used for kitchen activities at household level, thereby reducing the GHG emissions arising out of the burning of firewood in traditional stoves. This reduction in the firewood usage at the household level is achieved by the usage of project ICS, as it has a higher thermal efficiency, therefore, consuming lesser amount of fuel and time spent in kitchen activities. To claim the carbon credits for emission reductions, the project will follow the VCS Methodology from Sectoral Scope 3 - VMR0006 “Methodology for Installation of High Efficiency Firewood Cookstoves”, version 1.2. The implementation (distribution of ICS units) and parameters set for ER calculations within the project will be monitored on a periodic basis, based on the requirements provided within the applied methodology.

A brief description of the scenario existing prior to the implementation of the project

The scenario existing prior to the implementation of the project activity is usage of traditional cooking devices (3 stone fire), which have very low thermal efficiency value. These cooking devices, prior to the project implementation, consume huge amount of firewood due to the low thermal efficiency. The extensive collection of firewood from the area diminishes the available quantity for meeting kitchen needs, resulting in deforestation and the depletion of carbon sinks. Moreover, the time required for woody biomass collection increases consequently.

The average annual and total GHG emission reduction expected from the grouped project is expected to be 780,560 and 6,244,483 tCO₂e, respectively, over the first 7-year crediting period.

The first monitoring period for the project activity is 23-February-2023 to 31-December 2023-. The actual emission reduction achieved during the current monitoring period is 167,575 tCO₂e.

The project is neither transferred nor registered in any GHG mechanism, this project is a green field project and explicitly applying the VCS registration.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
<i>Validation/verification</i>	23-February-2023-- 31-December-2023)	VCS	Carbon Check Pvt. Ltd.	0.85 (311 days)
Total	23-February-2023-- 31-December-2023)	VCS	Carbon Check Pvt. Ltd.	0.85 (311 days)

1.3 Sectoral Scope and Project Type

Sectoral scope³	03 - Energy Demand
Project activity type	Type II (Energy Efficiency Improvement)

The project activity is designed as a Grouped Project Activity and includes several Project Activity Instances (PAIs) of the same project activity type and sectoral scope into one Project Description.
1 project activity instance (PAI) = 1 Improved cookstove (ICS)

1.4 Project Eligibility

1.4.1 General eligibility

The group project involves energy efficient cookstove distribution which falls under the category of efficiency improvements in thermal applications, therefore it is eligible under the scope of VCS Program. The eligibility of project under VCS Program Section 2.1 of the VCS Standard version 4.5 is demonstrated below.

Table 1: VCS Program scope

Scope	Applicability
The seven Kyoto Protocol greenhouse gases.	The program reduces GHG emissions associated with the combustion of cooking fuel. Gases included are CO ₂ , CH ₄ , N ₂ O.
Ozone-depleting substances (ODS).	The program does not involve any ODS.
Project activities supported by a methodology approved under the VCS Program through the methodology approval process.	The ICS distributed (& to be distributed) in the program uses the methodology “VMR0006 “Methodology for Installation of High Efficiency Firewood Cookstoves”, version 1.2.” which is a VCS approved methodology.
Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval.	Not applicable.
Jurisdictional REDD+ programs and nested REDD+ projects as set out in the Jurisdictional and Nested REDD+ (JNR) Requirements.	Not applicable.

Table 2: Excluded project activities under the VCS Program

Excluded Activity	Applicability
Grid-connected electricity generation activities using hydroelectric power plants. The exclusion does not apply to ocean energy (e.g., wave, tidal, salinity gradient, and ocean thermal energy conversion).	N/A. The GP activities are energy efficiency measures and do not generate electricity from hydro-power plants/units.

³ 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>

For hydro projects, large scale means a maximum capacity of greater than 15MW, where maximum capacity is the installed/rated capacity or authorized capacity (as determined in the activity approval from the project regulator, government, or similar entity), whichever is lower. Grid-connected means >50% of total generation is exported to a national or regional grid. See the VCS Program document VCS Program Definitions for the full definition.	
Grid-connected electricity generation activities using wind, geothermal, or solar photovoltaic (PV) power plants. The exclusion does not apply to concentrated solar thermal-to-electricity, floating solar PV, or energy storage systems (e.g., batteries). Grid-connected means >50% of total generation is exported to a national or regional grid. See the VCS Program document VCS Program Definitions for the full definition.	N/A. The GP activities are energy efficiency measures and do not generate electricity from wind, geothermal, or solar power plants/units.
Activities recovering waste heat for combined cycle electricity generation, or to heat/cool via cogeneration or trigeneration. The exclusion does not apply to waste gas recovery or electricity generation using waste heat recovery outside of combined cycle applications (e.g., organic Rankine cycles).	N/A. The GP activities are energy efficiency measures and do not utilize recovered waste heat for any purposes.
Activities generating electricity and/or thermal energy for industrial use from the combustion of non-renewable biomass, agro-residue biomass, or forest residue biomass. The exclusion does not apply to gasification, pyrolysis, combusting biofuels, biogas, fractions of renewable biomass in refuse-derived fuels, agro/forest biomass residues in waste streams that are sent to landfills, CO2 capture and storage from renewable biomass combustion, or thermal efficiency improvements (e.g., cook stoves).	N/A. The project does not involve thermal energy for industrial use and rather pertains to thermal efficiency improvements (cookstoves). Also, the project is located in the least-developed country i.e. the Gambia. For all these reasons, the project is eligible for the VCS program.
Activities generating electricity and/or thermal energy using fossil fuels, and activities that involve switching from a higher to a lower carbon content fossil fuel. The exclusion does not apply to the use of captured flare and/or vent gas or waste containing previously used petroleum products (e.g., used plastics, oils, lubricants).	N/A. The GP activities are energy efficiency measures and do not generate electricity and/or thermal energy using fossil fuels, neither involve fossil fuel switch. The GP includes energy efficiency improvements in thermal applications, i.e. cookstoves.
Activities replacing electric lighting with more energy-efficient electric lighting, such as the replacement of incandescent electrical bulbs with compact fluorescent lights (CFLs) or light emitting diodes (LEDs).	N/A. The GP activities does not include the replacement of electric lighting.

Large-scale means energy-efficient improvements with a maximum savings greater than 60 GWh/year or emission reduction greater than 60 kt CO ₂ e per year.	
Activities installing and/or replacing electricity transmission lines and/or energy-efficient transformers. Large-scale means energy-efficient improvements with a maximum savings greater than 60 GWh/year or emission reduction greater than 60 kt CO ₂ e per year.	N/A. The GP activities do not include the installation and/or replacement of electricity transmission lines and/or energy efficient transformers.
Activities that reduce hydrofluorocarbon-23 (HFC-23) emissions	N/A. The GP reduces GHG emissions associated with the combustion of cooking fuels.

The project start date is 23-February-2023. The project-initiated pipeline listing on 09-December-2022 which is prior to start date of the project and projects meet the requirement for pipeline listing. The project was open for public comment between 03-January-2023 to 02-February-2023. The opening meeting by VVB was done in November-2023 which is after the public comment period was complete.

1.4.2 AFOLU project eligibility

Not Applicable, as this is not a AFOLU project.

1.4.3 Transfer project eligibility

Not Applicable, as this project is not seeking any transfer from other GHG reduction programs such as CDM.

1.5 Project Design

The project is a Grouped project.

Grouped Project Design

Being a Grouped Project Activity, this project will be implemented while fulfilling the eligibility criteria provided in the Table below:

Eligibility criteria as per section 3.6.10 to 3.6.15 of the VCS Standard v4.5

Criterion	How the new project activity instances comply	Evidence
Grouped projects shall specify one or more clearly defined geographic areas within which project activity instances may be	Each PAI will have clearly defined geographic areas and such area will be	PAI has been implemented in Gambia. PP has submitted geodetic polygons to VVB

developed. Such geographic areas shall be specified using geodetic polygons	specified using geodetic polygons.	and added details in section 1.12 of the PD MR.
Determination of baseline scenario and demonstration of additionality are based upon the initial project activity instances. The initial project activity instances are those that are included in the project description at validation and shall include all project activity instances currently implemented on the issue date of the project description.	Baseline scenario and demonstration of additionality shall be based upon the initial project activity instances	Baseline scenario and additionality has been demonstrated for PAIs which is included at the time of validation in section 3.4 and 3.5 of the PD MR.
Where a grouped project includes multiple project activities, the project description shall designate which project activities may occur in each geographic area.	The grouped project includes only one project activity.	The PAIs includes distribution of improved cookstoves to households that are dependent on traditional cookstoves using woody biomass for cooking.
The baseline scenario for a project activity shall be determined for each designated geographic area, in accordance with the methodology applied to the project.	Baseline scenario for a project activity shall be determined for each designated geographic area, in accordance with the methodology applied to the project	Baseline scenario has been determined for PAIs for Gambia. Details have been added in section 3.4
The additionality of the initial project activity instances shall be demonstrated for each designated geographic area, in accordance with the methodology applied to the project	Additionality for a project activity instance shall be determined for each designated geographic area, in accordance with the methodology applied to the project	Additionality has been determined as per the designated methodology. Details have been added in section 3.5.
Where factors relevant to the determination of the baseline scenario or demonstration of	All the factors relevant to the determination of baseline or demonstration	Assessment of baseline and demonstration of

additionality require assessment across a given area, the area shall be, at a minimum, the grouped project geographic area. Examples of such factors include, inter alia, common practice; laws, statutes, regulatory frameworks, or policies relevant to demonstration of regulatory surplus; determination of regional grid emission factors; and historical deforestation and degradation rates	of additionality shall be done for the geographical boundary of the grouped project	additionality for PAIs has been done for Gambia.
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Eligibility criteria as per section 3.6.16 to 3.6.18 of the VCS Standard v4.5

Table 3: VCS Standard Eligibility Criteria

S No	Criterion	How the new project activity instances comply	Evidence
New Project Activity Instance Eligibility Criteria (Section 3.6.16)			
1	Project Activity Instances (PAIs) must meet the applicability conditions set out in the applied methodology.	Please refer the subsections below.	Please refer the subsections below.
1.a.	This methodology applies to project activities that introduce energy efficiency and fuel switch measures in thermal applications (including cookstoves, ovens, and dryers) that: 1) Increase thermal efficiency to reduce the consumption of non-renewable biomass; OR 2) Switch from fossil fuel (coal or kerosene) to renewable biomass in new or existing improved thermal energy generation units.	Each PAI under the GP will distribute the improved cookstoves replace inefficient traditional cookstoves. These improved cookstoves will have high thermal efficiency, thereby reducing the consumption of non-renewable biomass compared to traditional inefficient stoves.	a) Manufacturer's specifications. b) Project ICS distribution database containing unique household end user information. Project activity instances disturbed under the GP lead to increase in thermal efficiency to reduce the consumption of non-renewable biomass. The evidence mentioned above has been submitted to VVB.
1.b.	This methodology is applicable to both 'Projects' and 'Large Projects' under the following conditions:	As per estimated annual emission reduction potential, the grouped project activity falls under large projects. Each PAI will meet	a) Please refer to below separate subsections for applicability conditions of AMS.II.G v 13.0.

	1) All applicability conditions of the latest version of AMS II.G. must be met. 2) The project activities must be implemented in households, community-based kitchens, institutions (e.g., schools), or small and medium-sized enterprises (SMEs).	1) all the relevant applicability conditions as per Version 13.0 of CDM AMS-II G methodology. 2) Each PAI will be deployed for domestic end-users only i.e. households	b) Project ICS Distribution database, containing households' information such as their names, address and their IDs The evidence mentioned above has been submitted to VVB. The project activity instances distributed under this GP are solely for domestic use.
1.c.	The renewable biomass sources must be documented in the project description and monitoring periods, including origin, quantities, and pre-project conditions. If the biomass is sourced from a third-party, proof of purchase must be provided (e.g., contractual agreements or purchase receipts)	Not applicable. Each PAI will use non-renewable biomass for kitchen activities.	Not Applicable
1.d.	More than one type of biomass may be used (e.g., briquettes and wood chips)	Not Applicable.	Not Applicable.
Applicability conditions of AMS II.G version 13 (In accordance to point 1.b. (1) above)			
1.b.1 (a)	In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 25 per cent.	Each PAI will have a thermal efficiency of at least 25% and deploy single-pot improved cookstoves.	1. Manufacturer's specifications. 2. Test reports from CREEC. The PAIs included under grouped project activity has distributed Kuniokoa generation 2 stoves having thermal efficiency of 51.3%. The supportive for the same is submitted to VVB.
1.b.1 (b)	The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	Each PAI will comply with and demonstrate this requirement.	As per the applied small-scale methodology AMS-II.G, the referred "TOOL19: Demonstration of additionality of microscale project activities" Version-10.0, is applicable due to

			its paragraph 14 and 15, which state that “For CPAs applying microscale thresholds at the unit level rather than at the aggregate level of the CPA, the term ‘project activities’ in paragraphs 4, and 11 to 13 above shall be read as ‘units’. If each of the units contained in the CPA satisfies the condition to qualify as a ‘microscale CDM unit’, then the coordinating/managing entity is not required to demonstrate compliance of the CPA with the microscale or small-scale thresholds at the aggregate level of the CPA. PAI included under the GP has an energy saving of 0.28 GWhth/year which is less than 20 GWhth/year. Hence, they qualify as microscale units. As per para 15 of CDM tool 19, if each unit (PAI) qualifies as microscale unit, then the PP is not required to demonstrate compliance of the project with the microscale or small-scale thresholds at the aggregate level. Evidence: ER sheet
1.b.1 (c)	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	This has been demonstrated at grouped project level that demonstrate that Non-renewable biomass has been used in the project region since 31 December 1989.	Publicly available reports are being used to confirm the biomass usage in the host country since 1989. Please refer section 3.2 for detail. No further assessment required during PAI inclusion.
1.b.1 (d)	For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.	Each PAI under this grouped project will use non-renewable biomass as cooking fuel. The non-renewability has been demonstrated in previous subsection.	Not Applicable. PAIs use non-renewable biomass for kitchen activities.

1.b.1 (e)	The Project Design Document shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo)	To avoid double counting of emission reductions through the method of distribution, each cookstove has a unique identifier number and the distribution of each stove is logged onto a database which includes unique information for each recipient Each PAI will have system for avoiding double counting with data being collected via a smartphone app (where possible), or via paper forms, including: 1. Date of distribution 2. A unique serial number ⁴ on each technology 3. Available end-user data: name, phone number, address/physical location, ID number	1. Project (GP) Distribution database can be checked to verify the distribution approach, along with the distribution system (includes both plan and execution steps) established by the PP. 2. The VCS GP ICS units have unique engravings or text specifically mentioning the unit is strictly “not for sale” along with the DelAgua logo. 3. Each ICS under the grouped project have a unique identification number to ensure no double counting of the ICS in any other project of PP.
1.b.1 (f)	The Project Design Document shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The End User Agreement confirms that the ownership rights of the ER/VCUs generated by the PAI reside with the PP. The signature of each end user confirming their understanding of this agreement will be collected at the point of distribution. The End User Agreement will be in English and translated into a local language where required. If necessary, it will be read out to the End User. All rights to distribute the delivered stoves and claim the resultant GHG emissions reductions belong to the PP. The GP will not include any PAI that has been rejected by another GP, or PA-DDs of any other GHG programs.	a) End users have been asked to sign the End User Agreement and this information has been stored in the monitoring database. b) Each PAI includes a statement on the uniqueness of the Project and by listing other similar activities (from other GHG programme registries) that are taking place within the project boundary to demonstrate its uniqueness. Each PAI under the GP has confirmed their agreement through signature on posters during distribution. The distribution database shared with VVB.

⁴ There are no similar programs running in the host country The Gambia where the same ICS models are distributed by another entity under different program(s). If this is found during the project ICS monitoring or verification, it shall be ensured that double counting is avoided by using distinct nomenclature for the unique ID code of the ICS compared with the different programs, and also making sure that it has a distinct color, label, or marking.

2	Use the technologies or measures specified in the project description.	Only ICS that conform with the GP description are to be distributed in the project. The ICS will be chosen to deliver a level of service at least equivalent to the baseline appliance.	Manufacturer's specifications. The ICS distributed under the GP is Burn Kuniokoa generation 2 stoves, which is as per technology description of the grouped project.
3	Apply the technologies or measures in the same manner as specified in the project description.	The ICS distributed in the PAIs will adhere to the GP description and replace biomass burned in the baseline scenario.	Manufacturer's specifications. The ICS distributed under GP reduces fuel wood consumption due to better thermal efficiency and replaces the baseline traditional stoves, the same can be checked with distribution record and sample survey results.
4	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	All new PAIs will be implemented only in regions within the geographic borders of <i>The Gambia</i> subject to the same baseline scenario determined in Section 3.4 in this Project Description. The geographical location of the project ICS can be traced through the information provided in the distribution database, which includes the latitude and longitude data of the ICS distributed.	ICS Distribution database Each PAI records end user registration database with clear delineation of project boundary i.e. host country of Gambia is provided to the VVB for their reference.
5	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	All new PAIs will use the activity method for demonstration of additionality. Step 1: Regulatory Surplus There is no government mandated programme or policy in host country of this project ensuring the distribution of new project activity instances. Step 2: Positive List The inclusion of new project activity instances will comply with the positive list as it satisfies criterion 1 where it meets all the applicability conditions of the methodology. Where the project activity installs or distributes stoves	Step 1: Regulatory Surplus There is no mandatory legal requirement for installation of cookstoves in households/ institutions of Gambia. Step 2: Positive List Further, the PP distributing ICS free of cost to end users, hence there is no revenue stream than sale of VCUs, hence the project activity instances are automatically additional. The above can be checked with end user agreement and declaration from PP on the same.

		at zero cost to the end-user and has no other source of revenue other than the sale of GHG credits, the project activity shall be deemed additional.	The PP has provided end user agreement and declaration to VVB to support free distribution of ICS.
Eligibility conditions specific to inclusion of New PAIs (Section 3.6.17 and 3.6.18)			
6	The new PAI must occur within one of the designated geographic areas specified in the project description	The distribution of the ICS will be within the jurisdictions of The Gambia, and therefore, the project activity will only distribute to the beneficiaries that are in agreement with the requirements of the program.	Each PAI under grouped project is within host country The Gambia. The same can be checked with distribution data base wherein location details of each end user will be recorded. For the current PAI the distribution record with end user location is shared with VVB.
7	The new PAI must comply with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial compliance with multiple sets of eligibility criteria is insufficient.	The eligibility criteria set must be complied by the PAIs at all points in time throughout the crediting period. If at any point, it is found that the PAI is not complying with the set of eligibility criteria, then it may be excluded from the crediting for the duration of the monitoring period, until it is able to demonstrate the compliance of the eligibility criteria.	The MR will act as the documentary compliance summary. However, for each specific eligibility criteria (as laid down above), the supporting evidence will be provided by the PP. All the PAIs meet the eligibility criteria for inclusion under grouped project activity.
8	The new PAI must be included in the monitoring report with sufficient technical, financial, geographic and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body.	The new PAIs will include all the technical, financial, geographic and other relevant information related to the compliance of the applicable set of eligibility criteria & also enable sampling by the VVB.	The MR for the specific monitoring period will act as the supporting evidence for the stated condition/requirement. The PAIs are part of VCS grouped project validation/verification, hence no further assessment.
9	The new PAI must have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance (i.e., the date	The PAI related evidence on the project ownership will be in the form of a distribution end user receipt poster. This will be signed by the end user, and a photograph of him/her holding the poster along with the ICS will be saved in the PAI database.	1. A photograph of the PAI distribution first end user holding the poster along with the ICS. 2. A scan of the poster, which will show the first distribution date. 3. The distribution database of the GP will

	upon which the project activity instance began reducing or removing GHG emissions).		provide the start date in the form of the first sales made by the PAI. Waiver of carbon credits from the end users are submitted to the VVB.
10	The new PAI must have a start date that is the same as or later than the grouped project start date.	The GP is under planning stage right now, and therefore, the new PAIs will have a start date later than the GP start date.	This can be verified through the GP distribution database, wherein each PAI can be verified for its start date.
11	The new PAI must 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, through to the end of the total project crediting period	The PAI will be only eligible for the crediting from its start date through to the end of the project crediting period (only).	1. The start date of the PAI can be checked through the distribution database. 2. The end date of the GP crediting shall be referenced from the VCS Project Registry webpage. 3. The overlap of monitoring periods may be checked through the previous monitoring reports (available publicly on VCS project registry webpage for those periods). The PAIs are eligible for crediting from the start date of the GP through to the end of the project crediting period
12	The new PAIs shall not be or shall not have been enrolled in another VCS project	It will be ensured that the PAI that is being enrolled under the VCS GP was not previously enrolled under any other VCS project and will not be enrolled under other VCS project if it is removed from the VCS GP.	Since, project proponent is also the implementer, no further approval is required, however for the cases, where implementer other than PP, an approval on the same shall be given by PP in order to include the instance into this grouped project.
13	The new PAI shall adhere to clustering requirement that states the project proponent shall include in a singular project all project activity instances within ten kilometers of another instance of the same project activity and with the same project proponent	It will be ensured that PAI included within 10 kilometers of another instance of the same project activity by the same PP is in a singular project	In compliance with section 3.6.8 of the VCS Standard v4.5, PP has included all the PAIs (i.e., ICS) in a singular project only regardless of their distances from each other (another instance) within the country. There are no other project of the same project activity and by the same PP in the Gambia. Thus, the grouped project

			complies with the requirement that all project activity instances within ten kilometers of another instance of the same project activity and with the same project proponent are included in a single project only. All the new PAIs shall be included in this project only.
14	Where a capacity limit applies to a project activity included in the project, no PAI shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows: Each device that exceeds one percent of the capacity limit shall be identified. Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters. None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause any of the clusters to exceed the capacity limit.	The GP does not have any specified capacity limits applicable, since there are no capacity limits defined within the applied methodology, VMR0006, ver. 1.2. Therefore, this eligibility criteria are not applicable.	N/A
15	Where inclusion of a new project activity instance necessitates the addition of a new project proponent to the project, such instances shall be included in the	It will be ensured that if new PAI necessitates the addition of a new project proponent such shall be included in the GP within two years of the PAI start date.	The project proponent will be added if new PAI necessitates the addition. There are no PPs added during the current monitoring period.

	grouped project description within two years of the project activity instance start date		
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1.6 Project Proponent

Organization name	DelAgua Health The Gambia (Voluntary) Limited
Contact person	Rory McDougall
Title	Commercial and Finance Director
Address	DelAgua Health The Gambia (Voluntary) Limited Poinciana House, West Mall & Poinciana Drive Freeport The Bahamas
Telephone	+22 09977211
Email	vcsprojects@delagua.org

Organization name	DelAgua Health Rwanda (Voluntary) Limited
Contact person	Rory McDougall
Title	Commercial and Finance Director
Address	c/o Cafferata & Co., Poinciana & West Mall Drove, Freeport, Grand Bahama, P.O. Box F-42614, Commonwealth of the Bahamas
Telephone	+250-790002992
Email	vcsprojects@delagua.org

1.7 Other Entities Involved in the Project

No other entities are involved in the project.

1.8 Ownership

DelAgua Health The Gambia (Voluntary) Limited is the owner of the VCS grouped project activity. During the distribution of the improved cookstoves, the participating households sign an end user agreement between ICS beneficiaries and DelAgua. The end user agreement has customer information, unique identification number, product details etc. The agreement follows the requirements of para 3.7.1 of the VCS Standard ver4.5 which states the evidence to establish

project ownership should be “An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals which vests project ownership in the project proponent.”

The agreement confirms that the ownership rights of the VERRA project and the carbon assets generated from this project lie with the project proponent. The customer under the End User Agreement “releases all rights to the greenhouse gas reductions and carbon credits produced by the use of the clean energy product in the favour of DelAgua and agree to not sell or transfer the GHG or carbon credits to any other third party or use these credits for any other purposes.

This will be evidenced through the below:

DelAgua has executed a Memorandum of Understanding with the Government of Gambia, whereby DelAgua is assigned responsibility for managing and implementing the project and is recognized as the sole direct recipient of all carbon credits derived from it.

Manufacturer agreements confirm that DelAgua is the sole owner of all technologies purchased under this project. These agreements further confirm the manufacturer’s understanding that the carbon credits associated with use of the technologies shall be within the jurisdiction of DelAgua.

During the distribution of the ICS, the participating household will sign an End User Agreement to confirm that the ownership rights of the carbon assets generated from this project lie with the project proponent.

1.9 Project Start Date

Project start date	23-February-2023
Justification	The start date is the commissioning of first ICS (project activity instance) under grouped project

1.10 Project Crediting Period

Crediting period	Seven years, twice renewable
Start and end date of first or fixed crediting period	23-February-2023 to 22-February-2030

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

- ☐ < 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)
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23-February-2023 to 31-December-2023	358,389
01-January-2024 to 31-December-2024	820,037
01-January-2025 to 31-December-2025	1,045,571
01-January-2026 to 31-December-2026	1,033,939
01-January-2027 to 31-December-2027	978,671
01-January-2028 to 31-December-2028	969,008
01-January-2029 to 31-December-2029	912,114
01-January-2030 to 22-February-2030	126,754
Total estimated ERRs during the first or fixed crediting period	6,244,483
Total number of years	7
Average annual ERRs	780,560

1.12 Description of the Project Activity

The project involves distribution of high thermal efficiency fuel-efficient improved cookstoves (ICS) to replace the baseline cookstoves at household level in The Gambia.

The project ICS will improve the efficiency of combustion and thermal transfer to the pot compared with a traditional pot support or three-stone fire. The reduction in the consumption of firewood from the usage of project ICS will result in the GHG emissions avoided compared with the pre-project scenario. This will be documented, monitored on periodic basis, and calculated for GHG emission reductions by applying a valid version of applicable methodology. The information on the methodology applied, and its applicable eligibility criteria are provided in Sections 3.1 & 3.2 of this PD-MR respectively.

There are few models of ICS planned to be distributed under the GP. One of the indicative models planned to be distributed under the GP is shown below:

Kuniokoa Generation 2 with Pot Skirt

Stove manufacturer – Burn
Stove Type – Natural Draft
Stove Body – Stainless Steel
Stove height – 32.1 cm
Stove diameter – 28.2 cm

Thermal efficiency (with pot-skirt)- 51.3%
 Thermal efficiency (without pot-skirt) - 43.4%
 High Power Output – 2.9 KW
 Stove lifetime – 10 years

Figure 1: Kuniokoa Stove Model reference picture



Other models of improved cookstoves may also be offered under the GP as long as they meet all the requirements of the applied methodology.

With pot skirt, the level of retention of heat surrounding the pot will be higher, giving the ICS a higher thermal efficiency than using it without the pot skirt. Since the project ICS are being distributed with the pot skirt, the stove units have increased efficiency, thus reducing the firewood consumption to more than 50% than pre-project levels.

The project technology (ICS distributed under the GP) will achieve the equivalent or higher levels of performance by consuming firewood at a much lower rate than the existing technologies in use, which include the 3 stone fire, Furno and conventional stoves without any air vent, draft or chimney. The level of performance is being ensured by educating the local population on the best usage practices for kitchen activities. All these activities will be taking place at a significantly lower smoke level. This will lead to improved health of the people, in terms of their respiratory health and the health of their eyes.

PP is collecting the necessary information to uniquely identify households and end users, thus creating a database of users (households) registered to be using project ICS within the GP crediting period. To allow a unique registration, each ICS is assigned a unique serial number, which can be tracked through the barcode on the ICS package box, and QR code on the stove body. This QR code label of unique serial number is mapped with the id of the household to which it is distributed. The distribution database will be maintained on a continuous basis and shall be revised for any updates. The unique ICS serial number will be recorded during the registration process together with the following information (wherever appropriate and available):

- Name of ICS user or head of the household
- Address / GPS of ICS household
- Phone number of ICS user or household, where available.

- Improved Cooking Stove model
- Date of distribution/installation
- ICS serial number

The distribution database will be maintained electronically and will be used towards monitoring.

1.13 Project Location

The project boundary is the geographic borders of The Gambia. The project boundary for each Project Activity Instance is the physical, geographical location of the ICS distributed within the geographical boundaries of The Gambia.

Also, each individual distribution under the project technology will record the geographical coordinates (i.e. lat/long data) or beneficiaries' household address, which can be verified from the recorded data (monitoring surveys).

The KML file attached which indicate the geographical boundaries of the host country The Gambia and current PAI geographic area.



Figure 2: Project Location

The geo co-ordinates of the project location are 13.4432° N, 15.3101° W.

1.14 Conditions Prior to Project Initiation

The baseline scenario as per baseline study for VCS 4000 is the same as the conditions existing prior to the Grouped Project implementation. Within the baseline scenario, majority of households use firewood as the cooking fuel, and traditional/conventional cooking technologies to meet their kitchen needs. The traditional cooking technologies mainly include the 3 stone fire, and the cooking structures made without chimney, grate or flue gas ventilation.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Gambia government or laws do not have any regulations on the distribution of improved cookstoves to households within The Gambia.

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

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

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

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

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

1.18 Sustainable Development Contributions

1.18.1 Sustainable Development Contributions Activity Description

Following sustainable contributions are expected to be associated with the distribution of ICS in The Gambia:

- The project activity will reduce the indoor air pollution levels to a significant level, thereby reducing the risks people face with the 3 stone fires or the traditional cooking devices. The number of deaths among children per year accounted to the indoor household air pollution is high in The Gambia, and lack of quality health interventions at local level increase the risk further. The lower respiratory disease risk and improved indoor air quality will reduce the mortality rates caused due to it.
- Women in The Gambia spend a significant amount of time every day to collect firewood. While using ICS, the less amount of fuel used for kitchen activities means that they must spend less time in the field collecting wood. This time saved by the women can now be used towards better management of household, or can be used towards any livelihood or income generating activity, e.g. farming, poultry, animal products, etc.
- The project activity aims to distribute ICS to the individual households in hot country The Gambia at free of cost, and this will reduce their reliance on the firewood fuel usage. The project ICS models claim to reduce fuel usage by more than 50% than their baseline consumption. This will save a significant amount of firewood fuel usage per household on daily basis, which consequently will allow them to lead a healthy and less worried life.
- The project activity will be providing indirect employment to the distribution team and provides them with per diem for their services. These contractual workers will support the distribution and will act as the point of program's connectivity with the households. The project activity maintains permanent staff working from the management office located in the capital city of Gambia i.e., Banjul. Both contractual staff and permanent staff will be increased, based on the program's success. The workforce will be trained from time to time, in order to meet the requirements of the monitoring data recorded at the time of project ICS distribution.
- The GHG emissions caused by the burning of firewood will be reduced by the usage of project ICS. The reduction in the firewood consumption compared with the baseline levels provide the amount of GHGs avoided, by application of VCS methodology VMR0006, ver. 1.2.

1.18.2 Sustainable Development Contributions Activity Monitoring

Summary description of project activities implemented during the monitoring period that result in SD contributions (i.e., technologies/measures implemented, activity location):

The VCS GP involved PAIs that led to a combined Sustainable Development action through the distribution of ICS units across rural households in The Gambia. The distribution of ICS leads to several direct and positive impacts into the lives of these beneficiary households. An explanation of how project activities result in the SD contributions described in Table 1 below.

The VCS GP impacts the lives of the rural households in many ways. These are then reviewed by the PP, and it was found out that these impacts from the project activity at every household level may be documented with the help of UN SDGs. Each impact is then mapped against a relevant SDG indicator, which is then planned for the monitoring. Survey questionnaire used for monitoring the project activity includes questions on the SDG impacts, and the responses from the end user acting as respondent to the monitoring survey are then recorded against those. These survey responses recorded are saved in the online survey form, and these are then analysed.

Identification of which SD contributions described in Table 1 below contribute to achieving any nationally stated sustainable development priorities, including any provisions for monitoring and reporting the same.

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	1.4	Indicator 1.4.1: Proportion of population living in households with access to basic services	Implemented activities to increase	Cooking is considered a basic service, as food is considered a basic need of humans and other forms of life. Therefore, improved cooking access is a basic need as well. Under current monitoring period, total households with access to basic services are: Investor Group 1: 26,741 * 99% HHs Investor Group 2: 24,773 * 100% HHs Investor Group 3: 24,626 * 99% HHs So, a total of 75,486 households now have access to improved cookstoves during the current MP when compared with the baseline.	75,486 households got access to ICS As this is the first monitoring period for this GP, the cumulative SDG impacts are the same as the monitored ones.

2)	3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	Implemented activities to decrease	Mortality rate attributed to HH and ambient pollution will decrease for those HHs using the DelAgua improved cookstove. The improved design specifications of the project ICS model(s) ensure there is very less pollution in the households. The survey results demonstrate that 99.57% households confirmed reductions in the smoke level. Out of the total population of The Gambia, a total of 76,140 x 99.57% x 8.28=627,756 people now have less risk towards respiratory ailments due to smoke inside their homes due to the implementation of VCS 4000 (for first monitoring period).	Total 627,756 individual benefited. As this is the first monitoring period for this GP, the cumulative SDG impacts are the same as the monitored ones.
3)	12.8	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	Implemented activities to increase	Due to grouped project the team involved in the distribution of ICS being provided training, who further educates the end user HHs about the sustainable kitchen activities and awareness on climate change impacts. The end users have been provided with training on how usage of improved cookstove contributes to sustainable development in host country. Total 76,140 households being under current monitoring period imparted with such awareness and knowledge.	Total 76,140 households benefited during current monitoring period. As this is the first monitoring period for this GP, the cumulative SDG impacts are the same as the monitored ones.

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	Survey to be conducted to determine the reduction in time spent for collection of fuel wood. As per monitoring survey results 99.57% users confirmed that the time required for collection of fuel wood for kitchen activities has reduced. Hence 75,816 household benefited.	99.57% users are spending less time to collect fuel wood for kitchen activities i.e. 75,816 households are benefited. As this is the first monitoring period for this GP, the cumulative SDG impacts will be the same as the monitored ones.
5)	8.3	8.3.1 Proportion of informal employment in total employment, by sector and sex	Implemented activities to increase	The implementation of the project so far has led to generation of around 13 permanent employment, 17 temporary employment and 528 community-based employment during distribution.	13 permanent employment, 17 temporary employment and 528 community-based employment. As this is the first monitoring period for this GP, the cumulative SDG impacts will be the same as the monitored ones.
6)	7.1:	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Implemented activities to increase	For this GP, the baseline scenario is the households using traditional cook stoves. This project increases the adoption rate of efficient cookstoves. The outcome of SDG 7 will be measured by the number of efficient cookstoves distributed during the project. 76,140 HHs received ICS during current monitoring period.	Number of project households predominantly using clean cooking devices such as Improved Cook Stoves. 76,140 HHs during the monitoring period. This is the first monitoring period therefore the cumulative sum is equal to the contribution during the monitoring period.
7)	13.0.	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to decrease	The emission reductions will be quantified as per the methodology applied. 167,575 tCO _{2e} saved during the current monitoring period.	GHG Emissions measured in tons CO _{2e} 167,579 tCO _{2e} saved. This is the first monitoring period therefore the cumulative sum is equal to the contribution during the monitoring period.

1.19 Additional Information Relevant to the Project

Leakage Management

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

Commercially Sensitive Information

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

Further Information

Not Applicable.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The primary stakeholders for the project are the recipients of the improved cookstoves i.e. rural households across the Gambia. Other stakeholders include project staff employed by DelAgua and the Ministry of Petroleum and Energy, which is responsible for promoting clean cooking within the Gambia.
Legal or customary tenure/access rights	As the project is not a land use project, there are no legal or customary tenure issues or access rights that are impacted by the project.
Stakeholder diversity and changes over time	The primary stakeholders in the project are rural households across the Gambia. No expected change has happened to the stakeholders' makeup.
Expected changes in well-being	Household air pollution (HAP) due to use of inefficient cookstoves is well documented to cause long-term ailments and deaths across the world. Distribution of efficient cookstoves would reduce release of harmful pollutants. Also, since these cookstoves consume less fuelwood, women would spend less time in collecting fuelwood and in cooking meals. Thus, they could devote more time to other productive work, leisure or childcare.
Location of stakeholders	Primary stakeholders i.e. project beneficiaries are all located in rural communities across the Gambia. The project staff is too located in the rural Gambia. Ministry of

	Petroleum and Energy of the Government of the Gambia is housed in Banjul, the capital city of the Gambia.
Location of resources	As this is not a land use project, this is not applicable.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	21-November-2022
Stakeholder engagement process	Before the meeting identified stakeholders were informed by press release published in the newspaper “The Standard Times” which is a well-read newspaper in the country. dated 15th November 2022 and email to identified stakeholder dated 04th November 2022. Also, the identified stakeholders were invited by posters in public places (also accessible to women) and other means to join the meet. The comments were invited in an open and transparent manner in the physical meeting by facilitating with a presentation on the proposed project activity.
Consultation outcome	The agenda of the meeting was to showcase the VCS grouped project being implemented and invite local stakeholders to understand about the project, submit their grievances, and raise their concerns, wherever required. Below are the steps followed during stakeholder consultation meeting 1. The meeting started with presentation on grouped project activity and associated benefits to society, ecology and economic aspect due to use of improved cookstoves. 2. The sample cookstove unit to be distributed under VCS 4000 implementation (Burn Kuniokoa), was demonstrated to the local stakeholders present for its usage. 3. During the meeting, stakeholders were invited to raise their queries and concerns. These were duly responded to during the meeting itself. During local stakeholder consultation held in 2022, participants raised some queries. PP responded to those queries satisfactorily. The queries pertained to whether the project would generate local employment, to which the PP replied affirmative. Other Q&As are summarized: Q.1. Which districts/region the project is planned under the current project activity? Ans: The PP representative explained that the project boundary for the grouped project activity is host country The Gambia and all the districts will be covered. Q.2. What will be the price of ICS to the end users. Ans: The ICS will be distributed free of cost, the beneficiary need to comply with usage norms and monitoring requirement. Q.3. Whether only one stove per household will be provided or more? Ans: Initially one stove per household is planned to be given, however in future the same may be assessed.

	Q.4. Whether the project will be complying with local regulations? Ans: The DelAgua has informed government about the project activity, as the project will import ICS from other part of Africa, hence there will be no manufacturing unit.
Ongoing communication	DelAgua email id: DelAgua email is the main source of connection through which the stakeholders can connect with DelAgua. All contacts with government, and operational partners are done via email. Through Village Development Committees: DelAgua builds upon existing rural networks to distribute, monitor and educate on stove use. These networks also play a critical role in ensuring strong feedback mechanisms are in place. VDC members are part of communities where stoves have been distributed. They are personally known to all stove recipients. As part of their training, they are directed on ensuring feedback about the programme, and grievances raised are quickly and accurately communicated to full time DelAgua staff – who submit grievances via an online form. This form of on-going communication is critical in rural areas where individuals may lack access to phone or email. Apart from the mechanism available for local stakeholders connecting with the DelAgua, the follow-up visits by the DelAgua staff are also undertaken to user households.
Stakeholder input	The PP has not received any feedback or inputs from the stakeholders during the on-going communication. Nor, the PP received any negative comments during local stakeholder consultation. No comment warrants change in project design.

2.1.3 Free Prior and Informed Consent

Obtaining consent	Prior to commencing the project, DelAgua signed a Memorandum of Understanding with Ministry of Petroleum and Energy to distribute improved cookstoves to rural households across the Gambia. Following this, DelAgua has signed Collaboration Agreements with the Regional Governors that the project has been delivered in (to date.) These agreements help the population in protecting the environment by scaling down firewood consumption while reducing indoor air pollution leading to improved respiratory health. Finally, Primary stakeholders have been approached to ask if they wish to sign up to receive a free improved cookstoves.
Outcome of FPIC	The outcomes of the ways in which consent was sought is that DelAgua operates under an MoU with the Government of the Gambia (through the Ministry of Petroleum and Energy) that ensures we are operating with government approval and requires us to regularly report to government. With the primary stakeholders, we have ensured that every individual stakeholder is able to give their consent to take part in the project.

2.1.4 Grievance Redress Procedure

Development process	DelAgua generated its grievance redress procedure through the utilisation of frameworks it had already tested and utilised in other sub-Saharan African contexts. We took these foundations and asked our local team to adapt to the local context before sense checking with government stakeholders. We then field tested the process within our pilot period, before iterating and rolling out for the wider project. The key stakeholder in this process are the village development committees, outlined below, but we also ensure dedicated resource within the DelAgua team was allocated to the GRM. Grievances are able to be raised to all local beneficiaries through the trust and social bond system tapped into through the use of these VDCs. Grievances are quickly reported to DelAgua staff, where they are allocated a dedicated lead, dependant on their topic and that lead has clearly laid out timelines in which to respond. As grievances come up through local contacts, they are managed in cultural appropriate ways, with communication channels being at the benefit of the grievance raiser.
Grievance redress procedure	DelAgua email id: DelAgua email is the main source of connection through which the stakeholders can connect with DelAgua. All contacts with government, and operational partners are done via email. Through Village Development Committees: DelAgua builds upon existing rural networks to distribute, monitor and educate on stove use. These networks also play a critical role in ensuring strong feedback mechanisms are in place. VDC members are part of communities where stoves have been distributed. They are personally known to all stove recipients. As part of their training, they are directed on ensuring feedback about the programme, and grievances raised are quickly and accurately communicated to full time DelAgua staff – who submit grievances via an online form. This form of on-going communication is critical in rural areas where individuals may lack access to phone or email. Apart from the mechanism available for local stakeholders connecting with the DelAgua, the follow-up visits by the DelAgua staff are also undertaken to user households.
Grievances received	Resolution and outcome
N.A	DelAgua has built upon existing rural networks in the form of Village Development Committees (VDC) to distribute, monitor and educate on stove use. These networks also play a critical role in ensuring strong feedback mechanisms are in place. VDC members are part

of communities where stoves have been distributed. **They are personally known to all stove recipients.** As part of their training, they are directed on ensuring feedback about the programme, and grievances raised are quickly and accurately communicated to full time DelAgua staff – who submit grievances via an online form. This form of on-going communication is critical in rural areas where individuals may lack access to phone or email.

2.1.5 Public Comments

Comments received	Actions taken
No comments received	Not applicable as none was received during the 30 days listing period on VERRA registry. The VCS PD was made available for the public comments from 03 January 2023 to 02 February 2023

2.2 Risks to Stakeholders and the Environment

	Risks identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk identified	Before the meeting identified stakeholders were informed by press release published in the newspaper “The Standard Times” which is a well-read newspaper in the country. dated 15th November 2022 and email to identified stakeholder dated 04th November 2022. Also, the identified stakeholders were invited by posters and other means to join the meet. The comments were invited in an open and transparent manner in the physical meeting by facilitating with a presentation on the proposed project activity.
Working conditions	DelAgua staff at risk from working in remote locations	DelAgua maintains a health, safety & security policy for all staff in the Gambia. In addition, DelAgua maintains a risk register (as part of an overall risk management policy) that tracks all risk types (in addition to safety

		and security.) This is updated on a quarterly basis.
Safety of women and girls	Women and girls are exploited as a result of participating in the project. No risk identified for project beneficiaries.	DelAgua ensures all staff follow a clear Code of Conduct that they sign up to upon recruitment. This policy is regularly updated and enforced. With regard to project beneficiaries, on contrary, it reduces instances of collecting wood, thereby reducing vulnerability to wildlife or to potential criminal eventualities.
Safety of minority and marginalized groups, including children	Children are recruited to deliver the project. No risk identified for project beneficiaries.	DelAgua maintains a policy on child labor which all staff, suppliers and vendors are required to adhere to. This policy is regularly updated and enforced. With regard to project beneficiaries, on contrary, it reduces the exposure to smoke production during cooking meals, when children are in the vicinity of their mothers during cooking.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified for both staff and project beneficiaries	N/A, the project does not involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous materials. With regard to project beneficiaries, on contrary, the project activity aims to reduce smoke produced during cooking, with the help of improved design of the project stove.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	DelAgua maintains several HR policies for staff as well as a safeguarding policy for beneficiaries. These policies are maintained, monitored and implemented by DelAgua's HR unit. No instances of
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	discrimination or sexual harassment were record during this monitoring period.
Management experience	DelAgua has been delivering cookstove projects for over 10-years and has several active projects listed under VERRA. DelAgua does not sub-contract any of the implementation of this project to non-DelAgua entities.
Gender equity in labor and work	DelAgua maintains recruitment policies that specifically commit the organization towards gender equity. Where possible, DelAgua works to try to increase female recruitment into the organization.
Human trafficking, forced labor, and child labor	DelAgua maintains policies on forced and child labour and requires that all staff, suppliers and vendors agree to adhere to these policies.

2.3.2 Human Rights

The project involves the distribution of improved cookstoves to individual households and is not a land use project. Therefore, in this context, there are no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights held by stakeholders, indigenous people (IPs), local communities (LCs), or customary rights holders.

The primary stakeholders are given the opportunity to provide their details if they wish to receive a free improved cookstove. It is entirely their choice whether to sign up or to decline. Once they have signed up, stoves are distributed irrespective of tribal, ethnic, religious or political backgrounds of the beneficiaries. Beneficiaries are not subjected to forced or coerced to use the stoves during ongoing monitoring work.

2.3.3 Indigenous Peoples and Cultural Heritage

Not applicable. The project involves distribution of improved cookstoves to households in the Gambia and does not affect the cultural heritage sites. Primary stakeholders are invited to give their name during the beneficiary data collection progress if they wish to receive an improved cookstove. They are not compelled to do so, nor are they told to change their traditional practices beyond being encouraged to use their improved cookstove for future cooking events.

2.3.4 Property Rights

N/A. The project does not impact any IP, LC or any other customary rights involving resources, territories or properties.

Rights to territories and resources	N/A
Respect for property rights	N/A

2.3.5 Benefit Sharing

This section is not applicable, as the project does not impact the property rights of individuals.

Process used to design the benefit sharing plan	N/A
Summary of the benefit sharing plan	N/A
Approval and dissemination of benefit sharing plan	N/A
Benefit sharing during the monitoring period	N/A.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure taken
Impacts on biodiversity and ecosystems	No risk identified	The ICS reduces GHG emissions through its better design and improved performance as compared to traditional stove, without changing the baseline fuel or introducing additional pollutants. Therefore, the project has no impact on biodiversity and ecosystems.
Soil degradation and soil erosion	No risk identified	The project stoves directly decrease wood fuel demand and reduce the pressure from wood cutting within the project boundary. Thus, project activity will indirectly avoid erosion associated with tree cutting/ felling
Water consumption and stress	No risk identified	The project activity which is the distribution of improved cookstoves in the Gambian households, does not affect water consumption patterns in the localities. Therefore, no risk identified.
Usage of fertilizers	No risk identified	The grouped project does not involve use of fertilizer.

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

Does not require further assessment, as the project is not located in or adjacent to habitats for rare, threatened, or endangered species.

2.4.2 Introduction of species

N/A. This section is not applicable to this grouped project as it does not involve planting and/or species introduction.

2.4.3 Ecosystem conversion

This section is not applicable, as the grouped project does not belong to the categories of ARR, ALM, WRC or ACoGS.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	VMR0006	VMR0006: "Methodology for Installation of High Efficiency Firewood Cookstoves"	1.2
Methodology	AMS-II.G	AMS-II.G: "Energy efficiency measures in thermal applications of non-renewable biomass"	13.0
Tool	Tool 19	CDM TOOL19 "Demonstration of additionality of microscale project activities"	10.0
Tool	Tool 30	CDM TOOL30 "Calculation of the fraction of non-renewable biomass"	04.0
Tool	Tool 33	CDM TOOL33 "Default values for common parameters"	02.0
Guideline	CDM Guideline	CDM Guideline "Sampling and surveys of CDM project activities and programmes of activities"	04.0
Standard	CDM Standard	CDM Standard "Sampling and surveys for CDM project activities and programmes of activities"	09
Guidelines	CDM Guidelines	Guidelines: "General Guidelines for CDM SSC methodologies"	

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
VMR0006	This methodology applies to project activities that introduce energy efficiency and fuel switch measures in thermal applications (including cookstoves, ovens, and dryers) that:	The grouped project involves the distribution of improved cookstoves to replace inefficient traditional cookstoves. These improved cookstoves have high thermal efficiency, thereby reducing the consumption of non-

	1. Increase thermal efficiency to reduce the consumption of non-renewable biomass; or 2. Switch from fossil fuel (coal or kerosene) to renewable biomass in new or existing improved thermal energy generation units.	renewable biomass compared to traditional inefficient stoves.
VMR0006	This methodology is applicable to both 'Projects' and 'Large Projects' under the following conditions: 1. All applicability conditions of the latest version of AMS II.G. must be met. The project activities must be implemented in households, community-based kitchens, institutions (e.g., schools), or small and medium-sized enterprises (SMEs).	As per estimated annual emission reduction potential, the grouped project activity falls under large projects. 1. The justification to AMS-II.G Version 13.0 is incorporated below. 2. Each PAI is deployed for domestic use to household end users. The ICS distributed are at individual households for domestic use (kitchen activities).
VMR0006	For fuel switch activities, the following additional conditions must be met: Projects must exclusively use renewable biomass, and meet the following additional conditions: (a) If biomass residues are used, they have been left for decay or burned without energy recovery before the implementation of the project activity. (b) If biomass residues from a production process are used, the implementation of the project does not result in an increase of the processing capacity of raw input or any other substantial changes (e.g., product change) in this process. (c) If biomass from dedicated plantations is used, the applicability conditions of TOOL16 "Project and leakage	Not Applicable. The grouped project activity does not involve fuel switch measures. Hence criterion not applicable.

	emissions from biomass” must be satisfied.	
VMR0006	The renewable biomass sources must be documented in the project description and monitoring periods, including origin, quantities, and pre-project conditions. If the biomass is sourced from a third-party, proof of purchase must be provided (e.g., contractual agreements or purchase receipts).	The grouped project activity does not involve fuel switch measures. Hence criterion not applicable.
VMR0006	More than one type of biomass may be used (e.g., briquettes and wood chips).	The grouped project activity does not involve fuel switch measures. Hence criterion not applicable.
AMS-II.G	In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 25 per cent. Refer to the requirements indicated in “Data / Parameter table 14” which details the options for testing and certification as well as supporting documentation (e.g. certificate issued by third party or test results) that needs to be presented to the validating Designated Operational Entity (DOE).	ICS distributed in each PAI will have a thermal efficiency of at least 25%. PP has deployed single pot Kuniokoa Stoves manufactured by Burn having thermal efficiency of more than 51.3% as per third party lab test report in line with WBT, the test certificate submitted to VVB.
AMS-II.G	The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	As per the applied small-scale methodology AMS-II.G, the referred “TOOL19: Demonstration of additionality of microscale project activities” Version-10.0, is applicable due to its paragraph 14 and 15, which state that “For CPAs applying microscale thresholds at the unit level rather than at the aggregate level of the CPA, the term ‘project activities’ in paragraphs 4, and 11 to 13 above shall be read as ‘units’. If each of the units contained in the CPA satisfies the condition to qualify as a ‘microscale CDM unit’, then

		the coordinating/managing entity is not required to demonstrate compliance of the CPA with the microscale or small-scale thresholds at the aggregate level of the CPA. PAI included under the GP has an energy saving of 0.28 GWhth/year which is less than 20 GWhth/year. Hence, they qualify as microscale units. As per para 15 of CDM tool 19, if each unit (PAI) qualifies as microscale unit, then the PP is not required to demonstrate compliance of the project with the microscale or small-scale thresholds at the aggregate level.
AMS-II.G	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	Proof that non-renewable biomass has been used in the project region i.e. in host country The Gambia since 31 December 1989 is available through widespread documentation 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 Countries⁵, wherein fraction of non-renewable biomass usage in The Gambia is established as 91%. The wood fuel being main source for households kitchen need and for other sectors as well even before 1989. A fuelwood survey carried out by National Agricultural Research Institute (NARI) indicated that 97.8%⁷ of all households

⁵ CDM SSC WG 35th Meeting Report, Annex 20

⁶ <https://www.fao.org/3/X6808E/X6808E06.htm>

⁷ <https://www.fao.org/3/X6808E/X6808E06.htm>

		surveyed use wood as primary source of fuel particularly for kitchen activities. The majority of the Gambian population no other energy source is economical than wood. According to the survey results, some 73% of the households sampled use the traditional 3-stone stove for kitchen activities. Some, mainly the urban and semi-urban households use metal, gas or charcoal stoves. Astonishingly, none of the rural households interviewed used improved mud stoves such as the 'kumba gaye' type according to the NARI. The access to clean fuel in The Gambia has decreased from around 3.5% in 1990's to 1.5% in 20208, hence its concludes that The Gambian households are more reliant on wood fuels for kitchen activities. The total dependence of wood biomass energy by majority of the population has impacted The Gambia negatively. According to reports, The Gambia's forest area is declining as the demand for forest products and wood fuel increases⁹. The above clearly shows that the rural areas in the host country are dependent on biomass since and before 1989 with not much change in the trend which clearly depicts the dependence of the people of the host country on woody biomass as fuel for meeting thermal energy requirement for kitchen activities at households.
AMS-II.G	For cases where the biomass is sourced from renewable	The grouped project activity does not involve fuel switch

⁸ <https://ourworldindata.org/energy/country/gambia>
⁹ fNRB report by third party

	sources, the project participants should use a corresponding Type I methodology.	measures. Hence criterion not applicable.
AMS-II.G	The project document shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	In order to avoid double counting of emission reductions through the method of distribution, each cookstove has a unique identifier number and the distribution of each stove is logged onto a database which includes unique information for each recipient. Each PAI will have system for avoiding double counting with data being collected via a smartphone app (where possible), or via paper forms, including: Date of distribution A unique serial number on each technology Available end-user data: name, phone number, address/physical location, ID number.
AMS-II.G	The project documents shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The End User Agreement confirms that the ownership rights of the ER/Vcus generated by the PAI reside with the PP. The signature of each end user confirming their understanding of this agreement will be collected at the point of distribution. The End User Agreement will be in English and translated into a local language where required. If necessary, it will be read out to the End User. All rights to distribute the delivered stoves and claim the resultant emissions reductions belong to the PP. The GP will not include any PAI that has been rejected by another GP, or CPA/VPA-DDs of any other GHG programs.
Tool 30	This tool may be used by: (a) DNAs to submit region- or country-specific default fNRB values, following the	Option (b) applied to calculate the project specific fNRB value as described under in the separate fNRB

	procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants to calculate project- or PoA-specific fNRB values.	spreadsheet submitted to VVB
Tool 30	Project participants and DNAs shall identify and clearly delineate the applicable area for which fNRB is determined. For project- or PoA-specific fNRB values, project participants shall assess and use the area from which woody biomass is sourced for end-users included in the project activity and justify the selection of the area in CDM project design documents. For region- or country-specific fNRB values, DNAs shall specify the applicable area.	The PP has chosen host country The Gambia as region for the grouped project activity.
	Project participants and DNAs may choose between the following two options to determine the value of fNRB: (a) Use the default value as provided in TOOL33; or (b) Calculate fNRB by determining the share of renewable and non-renewable woody biomass in the total quantity of woody biomass consumption for the country/region or the project area (hereinafter referred as the applicable area) following the procedure and requirements in the paragraphs below. The project participants shall compare and analyse the calculated values against the values for fNRB reported in relevant scientific literature and justify any differences. This analysis shall be	The PP has chosen option b), wherein a third-party consultant has established the fNRB for host country. Please refer Appendix for calculation details and comparison with literature.

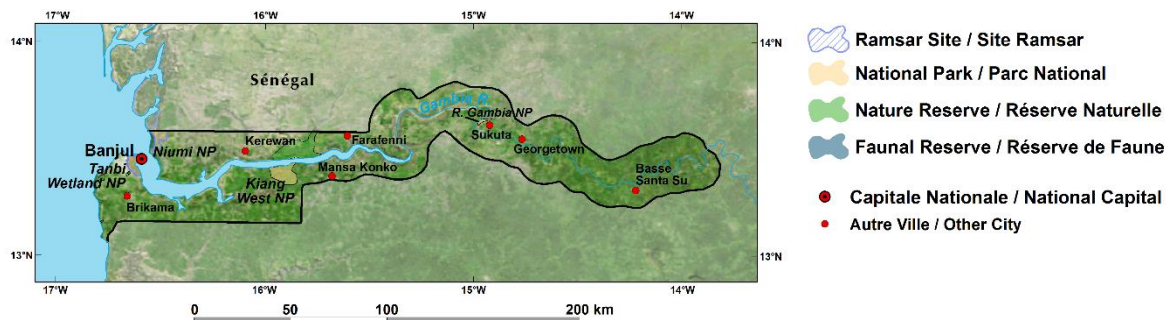
	included in the appropriate section of the PDD. The relevant scientific literature should include at least: (i) Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015). The carbon footprint of traditional woodfuels. Nature Climate Change, 5(3), pp. 266–272.	
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3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Source 1 – Emission from burning of non-renewable Biomass, i.e. Woody Biomass for household kitchen requirements	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	No other source identified
Project	Source 1 – Emission from burning of non-renewable Biomass, i.e. Woody Biomass for household kitchen requirements	CO ₂	Yes	Major source
		CH ₄	Yes	Major source
		N ₂ O	Yes	Major source
		Other	No	Not applicable

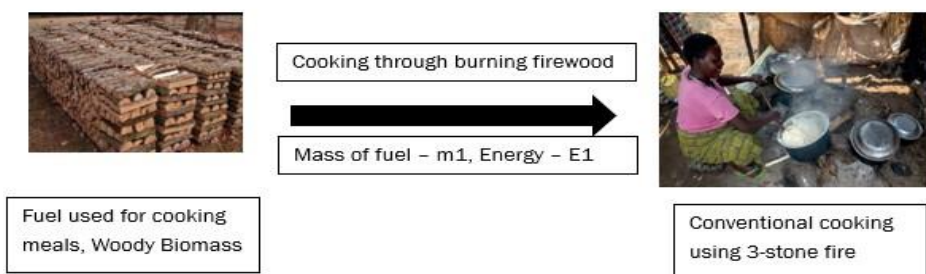
Figure 3: Project boundary map¹⁰ showing physical locations of the Host country, where Grouped Project distribution is planned

¹⁰ Source: USGS; URL: <https://eros.usgs.gov/westafrica/country/republic-gambia>

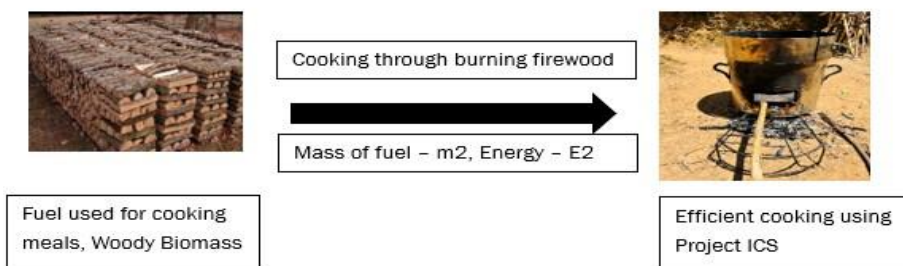


Flow of mass and energy in the project activity:

Baseline Scenario:



Project Scenario:



Here, the change in mass of firewood between baseline and project scenario is $m_1 > m_2$.

The change in energy consumed for kitchen activities between baseline and project scenario is $E_1 < E_2$.

3.4 Baseline Scenario

The grouped project activity baseline is the usage of inefficient, conventional cooking devices by majority of the rural population of The Gambia. The existing traditional stoves used in the baseline are 3-stone stove or having stone with poor combustion air supply or flue gas ventilation system i.e. without a grate or a chimney. Therefore, as per Tool 33, default value of 15% has been considered as the thermal efficiency of baseline cookstove. These stoves use non-renewable

biomass (firewood). A baseline survey was undertaken to confirm the baseline technology, it was confirmed that three stone was the baseline practice along with a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney. Also, PP verifies this for every individual household where distribution of project ICS is taking place, that they were using unimproved cooking device using firewood as fuel prior to receiving it. This is acknowledged by the end-user in the form of a signed ICS usage practices poster where the information is written down. This information can be checked through the sample posters.

PP has conducted the baseline surveys (KPTs) in line with the applied methodology VMR0006 ver 1.2, latest version of AMS.II.G and Clean Cooking Alliance (CCA) KPT protocol¹¹. PP used guidance provided in latest version of AMS.II.G in line with applied methodology VMR0006 ver 1.2 to conduct the baseline survey. The details of the sample size calculation for baseline surveys, sample selection criteria, procedures used for conducting KPT, and the results of KPT are as follows:

Sample Size Calculation and Selection Criteria:

Sample size was determined using CDM Guideline: Sampling and Survey for CDM PA and PoA version 4.0.

The Gambia is divided into 5 Regions. With each Region comprising of multiple Districts. To demonstrate generalisation of results each Region was selected, with a District randomly chosen from each Region. This resulted in the following 6 Districts being selected:

1. Foni Jarrol (Western Region),
2. Kiang Central (Lower River Region),
3. Upper Baddibu (North Bank Region),
4. Niamina East (Central River Region);
5. Sami (Central River Region);
6. Fulladu East (Upper River Region).

(Central River Region was sub-divided into Northern and Southern districts based on contextualized insight from local experts within The Gambia, resulting in 2 districts being chosen from this Region).

The sample size was calculated as per CDM Guideline on 95/10 precision confidence. This resulted in a required minimum sample size of 43 for the parameter Bold. PP then oversampled to account for potential non-responses, data quality concerns, and hardware errors. This process resulted in a total target sample size of 150 i.e. 25 samples per district. Out of the 150 target samples, baseline KPTs were successfully conducted on a total of 142 households in line with CCA KPT protocol.

Procedures followed for Conducting KPT:

¹¹ <https://www.cleancookingalliance.org/technology-andfuels/testing/protocols.html>

The KPT surveys were conducted by a competent team trained for the KPT surveys for performing KPTs, based on the KPT protocol. Once the districts were selected by the operational team, enumerators were issued with protocols for the selection of the individual households. These protocols outlined that the selected households should, but are not limited to, the following criteria in accordance with the KPT protocol:

- Have the person who is primarily responsible for cooking available for visits once a day for the next 4 days;
- Not have any events scheduled that would disrupt normal cooking practices during this time (e.g Weddings, community events);
- Primarily cook on wood

Additionally, the enumerators were instructed to follow, but are not limited to, the following criteria in accordance with the KPT protocol:

- Please avoid a measurement campaign during special occasions, holidays, or any day when cooking is not normal and be aware of local events like market days that may involve above-average fuel consumption. Be aware that 3 days of testing involves 4 days in contact with the family—the first day is spent briefing families, as explained in the next step.
- To explain the purpose of the test to the family members and arrange to measure their fuel consumption.
- Stress to household members that their cooking practices should remain as close to normal as possible for the duration of the test.
- Explain to family members that the surveyor will visit the respondent daily (for the next ~3 days) to collect the information.
- Ask the family to define an inventory area to store the fuel during the test. Record the weight and moisture content of the initial stock of fuels and if the family is going to collect or purchase fuel during the days of the test, ask them to keep newly collected or purchased fuel separate from fuel that has already been tested for moisture and weighed.
- Visit each household at roughly the same time each day, without being intrusive.
- Record fuel consumption by weighing the remaining fuel. Record the weight and moisture content of newly collected fuel before it is added to the family's stock.
- Moisture should be read the day before from the stock of fuel that is going to be used during the next 24-hour period. For each day, randomly draw 3 pieces of the fuel and measure its moisture in three positions.

The map illustrates the administrative divisions of Senegal, categorized into five regions: Western Region (WR), Lower River Region (LRR), North Bank Region (NBR), Central River Region (CRR), and Upper River Region (URR). The Gambia River is shown on the left, flowing into the Atlantic Ocean. Districts are labeled within these regions. Five districts are circled in orange: Upper Badiubu, Kinag Central, Kinag East, Foni Borom, and Foni Jarra. Two districts are circled in blue: Niamina East and Sami.

A digitized data collection approach was taken by the team, where the survey responses and measurement records were recorded in the electronic survey forms through smartphones. The survey responses for each household were recorded in the centralized database, where all the survey results were combined, and the final KPT survey Excel sheet was exported.

The parameter was within the 95/10 confidence/precision which can be checked in the table below:

Mean Consumption	0.839 (tonnes/person/Year)
Precision (95/10)	7.37%

3.5.1 Regulatory Surplus

¹² <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/83-1.pdf> and <https://cleancooking.org/binary-data/DOCUMENT/file/000/000/604-1.pdf>

¹³ <https://globaldatalab.org/areadata/table/hhsize/GMB/?levels=1+4>

☐ 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

This section does not apply as there is no any law, statute, or regulatory framework ab initio to cover such project activity.

3.5.2 Additionality Methods

The applied methodology provides the two options to choose from, within the activity method, to demonstration additionality. This is elaborated below.

Activity Method

- **Step 1: Regulatory Surplus**

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

Households may only participate voluntarily in this project. It is hereby confirmed that the proposed project is a voluntary coordinated action by DelAgua.

- **Step 2: Positive List**

Requirement:

The project must demonstrate that it meets all of the applicability conditions of the methodology as well as the below condition.

1. Where the project activity installs or distributes stoves at zero cost to the end-user and has no other source of revenue other than the carbon credits
2. Project activity is not implemented as part of government schemes or supported by multilateral funds.

The project activity shall be deemed additional.

Justification:

The project meets all the applicability conditions of the applied methodology as demonstrated in section 3.2 above plus the above two mentioned criteria.¹The ICSs under the project are to be distributed at zero cost or at highly subsidized to the end users and therefore the project fulfils the criteria for positive list. The project has no other source of revenue other than carbon credits. Carbon revenue will only make viable the project activity.

2. The project activity is voluntary activity and not supported by any government scheme.

Based on the above substantiation, the grouped project complies with the requirement of positive list and no further demonstration required for additionality.

Therefore, the GP is considered an additional activity.

3.6 Methodology Deviations

No deviation taken from applied approved methodology VMR0006 V1.2.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The grouped project planned to distribute the 200,000 improved cookstoves in host country. The first ICS under the grouped project was distributed on 23-February-2023. The monitoring period for the current issuance request is 23-February-2023 to 31-December-2023. Last stove distributed under the current MP is on 03 October 2023. Total 76,140 ICS have been distributed till the end of the monitoring period.

For administrative purposes, the ICS have been clubbed as per investor groups. The cookstoves distributed under the current MP is Burn Kuniokoa stoves. For the current monitoring period, there are three investor groups. The operation of stoves was confirmed by a survey undertaken as part of monitoring requirements of VCS PD and it was found that 99-100% of the stoves are in use. The results of surveys are demonstrated in the ER spreadsheet and furnished to VVB for verification. The cookstoves were distributed in the targeted project area, with the location chosen in consultation with the local representative. Considering there were no stove distribution after 03 October 2023, hence the first monitoring surveys were undertaken between 15th November and 27th November 2023 by visiting the sampled households. Sample size was selected by using the latest version 4 of CDM guideline, "Sampling and surveys for CDM project activities and programmes of activities" version 04.

5 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Methodology VMR0006, ver. 1.2 does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer section 5.4 below.

5.2 Project Emissions

Methodology VMR0006, ver. 1.2 does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer section 5.4 below. The grouped project does not involve fuel switch.

5.3 Leakage Emissions

As referred by applied approved methodology VMR0006 ver. 1.2, in line with para 41 of AMS-II.G Version 13.0, $B_{y,savings,i,j}$ will be multiplied by net to gross adjustment factor 0.95 to account for leakage.

The grouped project does not involve fuel switch and charcoal usage.

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

Equation for Improved Cookstove as per VMR0006

$$ER_y = \sum_i \sum_j \frac{B_{y,savings,i,j} \times N_{o,l,j} \times n_{y,l,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times (EF_{wf\ CO_2} + EF_{wf\ non-CO_2}) \times ADJ_{LE}}{(1-U_d)} \quad \text{Equation (1)}$$

Where:

ER_y = Emission reductions during year y in t CO_{2e}

$B_{y,savings,i,j}$ = Quantity of woody biomass that is saved in tonnes per project device i and batch j in year y (tonnes)

$N_{o,l,j}$ = Number of project devices of type l and batch j commissioned (number)

$n_{y,i,j}$ =	Proportion of commissioned project devices of type i and batch j ($N_{o,i,j}$) that remains operating in year y (fraction)
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 (%)
$N_{biomass}$ =	Net calorific value of the non-renewable woody biomass that is substituted or reduced (TJ/tonne)
$EF_{wf\ CO_2}$ =	CO ₂ emission factor for the non-renewable woody biomass (tCO ₂ /TJ)
$EF_{wf\ non-CO_2}$ =	Non-CO ₂ emission factor for the non-renewable woody biomass (tCO ₂ /TJ)
Adj_{LE} =	Adjustment factor to account for leakage related to the non-renewable woody biomass saved by the project activity (fraction)
u_d =	Uncertainty deduction for f_{nrB} (%)

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of improved cook stoves will be estimated using Option 3 i.e. equation 7 of AMS-II.G Version-13.0 as follows:

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

Where:

$B_{old,i,j}$ = 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).

$\eta_{old,i,j}$ = Efficiency of old devices being replaced by the project devices of type i and batch j (fraction)

$\eta_{new,i,j}$ = Efficiency of the project device i and batch j (fraction).

In line with AMS-II.G Version 13.0, the PP has chosen para 37 (c) to determine the loss of efficiency of project device due to aging i.e. “Determine the rate of efficiency drop for a representative sample of the first batch of project device i in year y and assume that same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices i apply to all subsequent batches”.

The efficiency of the project devices in the first batch will be monitored annually through representative samples and this rate of loss in efficiency will be applied correspondingly to all batches.

Each household will receive only one unit of ICS. Therefore, the baseline fuel consumption shall be determined as

$$B_{old,i,j} = B_{old,HH} / N_{d,HH}$$

Where,

$B_{old,HH}$ = Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices (tonnes/household/year)

$N_{d,HH}$ = Number of project devices per household (number)

Further, in line with para 38 of AMS-ILG Version-13.0, the PP may replace or chose to repair the project devices with same model or models with higher efficiency. Sample VCU estimates (based on the calculation for third year of ICS monitoring estimates) for Burn Kunikoa model:

$\mu_y = 0.95$, assumption for ex-ante and will be monitored ex-post

$f_{NRB,y} = 0.9$, As per third party fNRB report as per Tool 30 V04

$\eta_{old,i,j} = 0.15$, default value as per CDM tool 33

$\eta_{new,i,j} = 0.4819$, calculated based on assumption of pot skirt usage for Kuniokoa

($\eta_{new-skirt} = 0.4930$ and $\eta_{new-noskirt} = 0.4140$; pot-skirt usage = 0.86 and non-use of pot-skirt = 0.14. Weighted average $\eta_{new,i,j} = 0.4930 * 0.86 + 0.4140 * 0.14 = 0.4930$)

$N_{o,i,j} = 200,000$, assumption for sample calculations

$n_{y,i,j} = 98\%$, assumption for ex-ante

$B_{old,i,j} = 6.947$ Tonnes/household/year

$u_d = 26\%$, default value

$Adj_{LE} = 0.95$, default value

$EF_{wf\ CO2} = 112$ tCO₂e/TJ, default as per meth

$EF_{wf\ non-CO2} = 9.46$ tCO₂e/TJ, default as per meth

$NCV_{biomass} = 0.0156$ TJ/tonne, default value

And based on that,

$B_{old,p} = 0.839$ tonnes per person per year

$N_{p,HH} = 8.28$, $N_{d,HH} = 1$

Therefore, $B_{old,HH} = 0.839 * 8.28 = 6.947$ tonnes per HH per year

$B_{y,savings,i,j} = 6.947 * (1 - (0.15/0.4930)) = 4.785$ tonnes per year

$$ER_y = \sum_i \sum_j B_{y,savings,i,j} \times N_{o,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times (EF_{wf\ CO2} + EF_{wf\ non-CO2}) \times Adj_{LE} \times (1-u_d)$$

$$ER_y = 4.785 \times 200,000 \times 0.98 \times 0.95 \times 0.90^{14} \times 0.0156 \times (112+9.46) \times 0.95 \times (1-0.26)$$

$$ER_y = 1,045,571 \text{ tCO}_2\text{e/annum}^{15}.$$

Detailed calculations on the VERs, for both (i) estimates throughout the crediting period, and (ii) actual VERs obtained in the first monitoring period, are provided in the ER Sheet.

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)
23-Feb-2023 to 31-Dec-2023	-	-	-	358,389	-	358,389
01-Jan-2024 to 31-Dec-2024	-	-	-	820,037	-	820,037
01-Jan-2025 to 31-Dec-2025	-	-	-	1,045,571	-	1,045,571
01-Jan-2026 to 31-Dec-2026	-	-	-	1,033,939	-	1,033,939
01-Jan-2027 to 31-Dec-2027	-	-	-	978,671	-	978,671
01-Jan-2028 to 31-Dec-2028	-	-	-	969,008	-	969,008
01-Jan-2029 to 31-Dec-2029	-	-	-	912,114	-	912,114
01-Jan-2030 to 22-Feb-2030	-	-	-	126,754	-	126,754
Total	-	-	-	6,244,483		6,244,483

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter

Bold,p

¹⁴f_{NRB} value is sourced from third party report prepared by C4 Ecosolutions for host country The Gambia.

¹⁵ The sample calculations are for Kuniokoa ICS distribution plan, and ER estimates are made for its third year of operations.

Data unit	tonnes/person/year
Description	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Baseline KPT survey report
Value applied:	0.839
Justification of choice of data or description of measurement methods and procedures applied	The value is sourced from KPT survey conducted by third party consultant in host country. The survey revealed that the average annual wood consumption per person in the Gambia 0.839. The sampling was done in line with CDM guideline: Sampling and Survey for CDM project activity and programme of activity, version 4.0. Quantitative measurement of fuel wood which is the primary fuel, done with a weighing scale and moisture meter and its consumption was measured for 3 consecutive days in the sampled households, visiting those households on 4 consecutive days. The details of the baseline KPTs including target population, sample size, sampling method has been added in section 3.4.
Purpose of data	Calculation of baseline emission calculation
Comments	The value is fixed ex-ante. PP conducted the baseline KPTs in November 2022, to assess quantity of fuels consumed and the cooking technologies in use in pre-project scenario. The survey focused on 6 districts across all regions of Gambia. Baseline KPTs were done in 142 households to determine fuel consumption per day.

Data / Parameter	$N_{p,HH}$
Data unit	Number/household
Description	Average number of persons served per household prior to project implementation
Source of data	https://shorturl.at/I0589 ¹⁶
Value applied:	8.28
Justification of choice of data or description of measurement methods and procedures applied	The value is sourced from published report available in public domain for The Gambia.
Purpose of data	Calculation of baseline emission calculation
Comments	The value is fixed ex-ante.

¹⁶ <https://globaldatalab.org/areadata/table/hhsize/GMB/?levels=1+4>

Data / Parameter	B_{old,HH}
Data unit	tonnes/household/year
Description	Annual quantity of woody biomass that would have been used the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Calculated from B _{old,pp} and N _{p,HH} $B_{old,HH} = B_{old,p} \times N_{p,HH}$
Value applied:	6.947
Justification of choice of data or description of measurement methods and procedures applied	The value is sourced from KPT survey conducted by third party consultant in host country
Purpose of data	Calculation of baseline emission calculation
Comments	The value is fixed ex-ante.

Data / Parameter	B_{old,i,j}
Data unit	tonnes/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Sourced from KPT survey in host country ¹⁷ .
Value applied:	6.947
Justification of choice of data or description of measurement methods and procedures applied	The quantity of annual wood consumption per household is established using KPT survey, wherein the per capita wood consumption is established using KPT for baseline stoves, the same is multiplied by average family size in The Gambia. $B_{old,HH} = B_{old,p} \times N_{p,HH}$ $= 0.839 \times 8.28$ $= 6.947$ $B_{old,i,j} = B_{old,HH} / N_{d,HH} ; N_{d,HH} = 1 \text{ (Only one ICS unit per household)}$ $= 6.947$
Purpose of data	Calculation of emission reductions
Comments	B _{old,i,j} will remain fixed for the entire crediting period. Since each HH is entitled to only one ICS, therefore N _{d,HH} = 1. Thus, B _{old,HH} = B _{old,i,j}

¹⁷ KPT Survey

Data / Parameter	$\eta_{old,i,j}$
Data unit	Fraction
Description	Efficiency of pre-project device
Source of data	CDM Tool 33
Value applied:	15%
Justification of choice of data or description of measurement methods and procedures applied	As per the baseline survey conducted for 142 households, all households were found to be using 3-stone fired or conventional stoves without ventilation or chimney. The samples size of 142 was determined based on “Standard for sampling and surveys for CDM project activities and programmes of activities” version 9.0,
Purpose of data	Calculation of emission reductions
Comments	$\eta_{old,i,j}$ will remain fixed for the entire crediting period.

Data / Parameter	$EF_{wf\ CO2}$
Data unit	ton CO ₂ /TJ
Description	CO ₂ emission factor for woody biomass
Source of data	IPCC
Value applied:	112 tCO ₂ /TJ
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology.
Purpose of data	Calculation of emission reductions
Comments	-

Data / Parameter	$EF_{wf\ non-CO2}$
Data unit	ton CO ₂ /TJ
Description	Non-CO ₂ emission factor for woody biomass
Source of data	IPCC
Value applied:	9.46 tCO ₂ /TJ
Justification of choice of data or description of	Default value as per applied approved methodology.

measurement methods and procedures applied	
Purpose of data	Calculation of emission reductions
Comments	-

Data / Parameter	Adj _{LE}
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 as per AMS-II.G
Value applied:	0.95
Justification of choice of data or description of measurement methods and procedures applied	In-line with the applied methodology VMR0006, ver. 1.2 and AMS-II.G Version 13.0
Purpose of data	Calculation of emission reductions
Comments	-

Data / Parameter	f _{NRB,y}
Data unit	Fraction
Description	Fraction of woody biomass that can be established as non-renewable biomass
Source of data	Third party report in line with TOOL 30 Version-04
Value applied:	0.90
Justification of choice of data or description of measurement methods and procedures applied	The value is sourced from third party report, is prepared in line with TOOL30 version-04.
Purpose of data	Calculation of emission reductions
Comments	-

Data / Parameter	U _d
Data unit	Fraction

Description	Uncertainty deduction for fNRB
Source of data	Default as per VMR0006 v1.2
Value applied:	0.26
Justification of choice of data or description of measurement methods and procedures applied	Default value as per AMS-II.G.
Purpose of data	Calculation of emission reductions
Comments	-

6.2 Data and Parameters Monitored

Data / Parameter	$No_{i,j}$
Data unit	Number
Description	Number of commissioned project devices of type i and batch j
Source of data	Distribution Database
Description of measurement methods and procedures applied	The number of new devices distributed will be recorded along with details of end users and date of commissioning.
Frequency of monitoring/recording	-
Value applied:	200,000 (cumulative ICS sales)
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

Data / Parameter	$ny_{i,j}$
Data unit	Number

Description	Proportion of commissioned project devices of type i and batch j (No,i,j) that remain operating in year y
Source of data	Monitoring surveys
Description of measurement methods and procedures applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years (biennial)
Value applied:	0.99 for ex-ante estimation
Monitoring equipment	Monitoring Surveys
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	Third party Lab test report (Option 1 is used for this MP)
Description of measurement methods and procedures applied	The efficiency of the project devices will be based on certification by a national standards body or an appropriate certifying agent recognized by that body. Loss of efficiency will be calculated as para 37c) of AMS.II.G ver 13.0.
Frequency of monitoring/recording	(i) Recorded at the time of commissioning/distribution; (ii) Adjusted for the loss of efficiency as paragraph 37
Value applied:	Kuniokoa ¹⁸ Generation 2: • 0.4340 for project stove without skirting • 0.5130 for project stove with pot skirting Efficiency loss of 1% is assumed for ex-ante estimation
Monitoring equipment	-
QA/QC procedures applied	-

¹⁸ CREEC lab Certification reports provided to the VVB.

Purpose of data	Calculation of emission reductions
Calculation method	Efficiency shall be measured/estimated as per the following: The efficiency of the project devices shall be based on certification by a national standards body or an appropriate certifying agent recognized by that body. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used. The WBT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the WBT Protocol or ISO 19867-1 listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-andfuels/testing/protocols.html)) For 1 and 2 above, the sampling test of stoves by such certification bodies/agents or manufacturers shall be conducted following a 90/10 precision in accordance with the “Standard for sampling and surveys for CDM project activities and programme of activities” However, the following simplified approach may be used, when the efficient cookstoves are produced by a manufacturer with a recognized management system in place (e.g. ISO certification) to ensure that the individual equipment produced do not vary beyond the range of acceptance limits (e.g. characteristics such as materials, critical dimensions): Conduct a sample test on three cookstoves with three tests conducted for each stove. The test can be carried out by project proponents by themselves or stove manufacturers; If the standard deviation of the nine test results indicated above is very small and 90/10 precision requirement is met (in this case, the value of the t-distribution for 90 per cent confidence shall be used instead of Z value), the efficiency determined is acceptable, otherwise more sample tests would be required until 90/10 precision is met. The loss of efficiency will be calculated as per para 37 c) of AMS-II.G Version-13.0 “Determine the rate of efficiency drop for a representative sample of the first batch of project device i in year y and assume that same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices i apply to all subsequent batches. The efficiency of the project devices in the first batch has to be monitored annually through representative samples and this rate of loss in efficiency may be applied correspondingly to all batches”
Comments	The parameter will be calculated as a weighted average of the efficiency of a skirted stove and a non-skirted stove, taking into consideration the usage of pot skirt. Surveys shall be conducted to determine the number of kitchen activities that occur with and without a pot skirt. PP has used the test reports from the certification or national lab i.e. Centre for Research in Energy and Energy Conservation (CREEC) Laboratory. The Centre for Research in Energy and Energy Conservation (CREEC) is recognized under the Uganda National Bureau of Standards (UNBS) Laboratory Recognition Scheme in accordance with the international standard ISO IEC 17025: 2005

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Monitoring
Description of measurement methods and procedures applied	This parameter should be monitored using one of the following methods: 1. If both the project devices and pre-project devices are used together, measurement campaigns shall be undertaken using data loggers/sensors such as stove utilization monitors (SUMs) which can log the operation of all devices (recording the situation of the device being used or not during any day 'd' of the measurement campaign) in order to determine the average device utilization intensity (to establish the relative share of the usage of the devices). The measurement campaign shall be conducted in at least 10 randomly selected participant households of the project activity or the component project activity (CPA) for at least 90 days during the year y. If seasonal variation is observed, the average value determined through the campaign shall be annualised taking into account seasonal variation of device utilization. If this option is chosen by project participants, the value determined using the data loggers/sensors shall be applied. 2. Alternatively, 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. If this option is chosen by project participants, the average minus one standard deviation value determined using the questionnaire surveys shall be applied

Frequency of monitoring/recording	At least once every two years (biennial)
Value applied:	0.95 (for ex-ante estimation) PP has opted for option 2 as baseline stove for the project is majorly 3 stone-fired stoves.
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	N/A
Comments	-

Data / Parameter	NCV _{biomass}
Data unit	TJ/tonne
Description	Net calorific value of renewable biomass
Source of data	IPCC Default for firewood
Description of measurement methods and procedures applied	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass
Frequency of monitoring/recording	Annual
Value applied:	0.0156
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

Data / Parameter	Life Span
Data unit	Years

Description	The operating life time of the project device. The life span should be reported in cases where the PPs are opting to account the efficiency loss as per paragraph 37 of AMS .II.G v13
Source of data	Manufacturer's specifications
Description of measurement methods and procedures applied	The operational life of cookstove is sourced from manufacturer specification.
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution
Value applied:	10 years
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

Data / Parameter	$N_{d,HH}$
Data unit	Number
Description	Number of project devices distributed per household
Source of data	Sale database
Description of measurement methods and procedures applied	The number of new devices distributed to each household will be recorded.
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution
Value applied:	1
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-

Comments	-
Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data	Sales Database
Description of measurement methods and procedures applied	To be recorded once at the time of distribution
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Value applied:	-
Monitoring equipment	
QA/QC procedures applied	
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	To be reported in the monitoring report
Data / Parameter	Date of commissioning of project device i
Data unit	Date
Description	Actual date of commissioning of the project device
Source of data	Sales Database
Description of measurement methods and procedures applied	To be recorded once at the time of distribution
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of project device
Value applied:	23-February-2023
Monitoring equipment	-

QA/QC procedures applied	-
Purpose of data	Calculation of emission reductions
Calculation method	-
Comments	-

6.3 Monitoring Plan

The Grouped Project in The Gambia is following VCS standard requirements applicable, along with the methodological requirements on monitoring a grouped non-AFOLU large project activity. The Monitoring Plan is elaborated in multiple sub-sections for the sake of clarity. The monitoring surveys for the current monitoring period i.e. 23-February-2023 to 31-December-2023 were conducted from 15 November 2023 to 27 November 2023.

Team Involved: The DelAgua team involved in the GHG operations management is the local staff based in The Gambia along with the senior management.

The key responsibilities are shared by the team as follows:

Roles and Responsibility:

Chairman – Supervises the overall programme at strategy and financial side.

COO – Acts as central point of strategy, programme management, finance, and technical domains of the programme.

Director Business Intelligence – Manages the programme at implementation level, and acts as an internal technical reviewer for the programme documents and procedures.

Carbon Operations Manager – Manages the operations for GHG emission mitigation programme, from planning to implementation stage. Additionally, manages the Sustainability aspects of the programme.

Country Director – Supports programme in the operations and management at the host country level and acting as point of communication between DelAgua and government of The Gambia.

The collective responsibilities of DelAgua as the Project Participant will be the following:

- Acts as the project managing entity
- Development of PD
- Registration of the project with VERRA
- Inclusion of new PAIs upon satisfaction of the eligibility criteria stipulated in the PDD
- Authorized entity for any official communication with the VERRA and VVB
- Manage and archive the database for all appliances
- QA/QC of database during distribution & data collection

- Maintain local repair/replacement facilities
- Education and public awareness raising during initial distribution as well as periodic education campaigns.
- Data collection during distribution & delivery of data to database
- QA/QC of data collection

Quality Assurance and Quality Control:

The quality assurance and quality control of the programme is managed by the quality management standard of DelAgua. The following points summarize the DelAgua view on quality:

Wherever any instrument is used in the program for meeting any of the objectives, it is ensured that the team involved is competent and trained for the operation, handling, and maintenance of the same.

The teams involved in the programme operations are trained on a periodic basis, to cater for any of the improvements/updates introduced to the programme.

Refresher training is conducted whenever there is an activity resuming after a brief period of time.

The documents drafted for the programme are reviewed internally as well as in line with the requirements of the VCS ver. 4.5 (i.e. Validated and Verified by VCS approved third party auditors, VVB).

The project proponent applied a confidence/precision of 95/10 for each monitored parameter allowing for non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to both parameters i.e. number of operational cookstoves, and adjustment factors. The project proponent monitored a particular parameter till the required level of confidence/precision has been reached, as long as the calculated minimum number of samples has been achieved.

The monitoring plan followed procedures in place to ensure good quality data. The project proponent ensured that field personnel have reviewed, understood and have agreed to follow the monitoring plan procedures, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. A quality control and assurance strategy were audited and documented. The monitoring plan explained how to properly survey households to prevent bias from interviewer. In the case a household refuses to participate, another household is chosen at random. To reduce interviewer bias, good questionnaire design and well-tested questionnaires were developed. The calculation of the sample size was carried out using values from pilot study for number of operational cookstoves, adjustment factor and standard deviations, as the actual characteristics of the population/sampling frame are unknown.

The quality of programme is maintained throughout its operation period, and the feedback is recorded from the end-users on continuous basis.

There are safeguards defined to maintain the degree of reliability and conservativeness prior to stating any claims on the performance of the programme in its operations. These safeguards are defined in-line with the requirements of the VCS Standard.

Training and Maintenance Procedures:

DeAgua is responsible for training any contractors used during distribution, education, and monitoring activities. DeAgua ensures training of all on-site staff with respect to adherence to the Monitoring Plan of the project activity. Records of the training will be kept. Training records are saved for such training programs, where step-by-step training is provided to the surveyors for a quality data collection process, where they are expected to not impact the materially, degree of conservativeness, and perform the surveys in an unbiased manner. The surveyors are trained on a periodic basis, and refresher trainings are also provided to improve the quality of surveys from time to time. During these audits all the data and parameters that need to be monitored as per the monitoring plan will be checked and shortcomings if any will be reported and addresses. Since the surveys are electronic in format, recording of responses and the record keeping procedure for these surveys are conveyed to the team through rigorous trainings.

During the current monitoring period, DeAgua on-site staff conducted the monitoring activities. Before the start of the monitoring, DeAgua conducted a training for all the on-site staff who were involved in the monitoring activities. The elaborate programme helped the staff to understand the best practices and dos and don'ts of monitoring.

The modules for training of resources will be revised on a periodic basis, accounting for the need-based improvements in the training programs or the procedural requirements.

The data that is recorded in the monitoring surveys is collected and stored electronically, and then uploaded to the central database management system, where it is maintained online on a subscription-based server host.

The data is also stored offline, within the hard disk drives. The data collection procedures do not involve any paper records, to reduce the environmental footprint of the programme.

The project related data will be stored for two years after the implementation period is over for the project activity.

Survey Questionnaire:

DeAgua developed an elaborate questionnaire in line with applied methodology requirements and to capture the ground truth. The questions were designed in a way to avoid survey biases. Few sample questions part of the monitoring survey are listed below:

- Household consent
- Household details
- Family size
- Primary cooking stove
- Any other stove for cooking
- Cooking events/meals cooked on each cookstove
- Pot-skirt usage

Calculation of Emission Reductions:

Emission reductions was calculated using the results of the most recent survey data. The updated parameters adjust all emission reduction results for the year monitored. PP has, for internal purposes &

for meeting investor expectations, broken down distribution of ICS into investor groups. The ERs from these investor groups are then added up to get total ERs during the monitoring period,

Sampling Plan:

The sampling plan is intended to enable the discovery of unbiased and reliable estimates of monitored parameter values used in the GHG emission reduction calculations. The sampling plan design is based on the CDM Guideline: Sampling and surveys for CDM project activities and programmes of activities, version 4.

STEP 1: Monitoring Objectives

The objective was to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of monitoring period.

- a) $n_{y,i,j}$ Number of project devices of type i and batch j operating during year y (Annual/biennial)
- b) μ_y Adjustment to account for any continued use of pre-project devices during the year y
- c) Determine the loss of efficiency as per para 37 (c) of AMS.II.G. v13

As per Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities version 9.0, 95/10 confidence/precision has been adopted as this is a large-scale project for both the parameters. In cases where the confidence/precision are not achieved, the lower bound of the confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts.

A single sampling plan covering such groups is justified when the homogeneity of target population relative to the parameters of interest can be demonstrated. The Sampling activities were defined at the Grouped Project-level and the sampling plan presented here applied to assess parameter values to be included in the GP, either individually or in groups. It is clarified that for internal purposes and to meet investor demand, the PP has classified stoves under consideration for carbon credits, into three investment groups. Stoves distributed under each investment group are assigned two letter barcode initials unique to each group. Sampling was done separately for each group in this MP and ICS were monitored separately for estimation of parameters at each investor group level. For future verifications, simple random sampling or stratified random sampling will be conducted based on the applicable strata at that time (e.g., stove vintage and model). Sampling is independent of investment groups, as it pertains only to stove model and vintage in line with the applied methodology; investment groups are considered for internal purposes and to meet investor expectations. However, the PP may choose to consider investment groups in sampling for future verifications, though it will not be binding.

STEP 2: Target Population

Total ICS distributed till the end of the monitoring period is 76,140. For internal purposes, the ICS were clubbed into investor groups. Distribution as per investor groups are as follows:

Investor Group 1: 26,741

Investor Group 2: 24,773

Investor Group 3: 24,626

STEP 3: Sample Method

Sampling was conducted using simple random sampling technique over the sampling in this MP as only the Kuniokoa stove model was distributed, and exclusively in 2023, and detailed calculations are provided below as per CDM guidelines “Sampling and surveys for CDM project activities and programmes of activities” v 9.0.

To ensure a random selection of ICS, random number generators was 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 was then randomly chosen from the defined population up to the required sample size as calculated by the project proponent.

To determine the parameters, sampling involves the following approaches.

$N_{y,i,j}$: 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 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 was determined by cooking habits evaluated by survey questionnaire during the monitoring period.

Loss of efficiency: Water boiling test of the sampled households to determine the loss of efficiency. For year 1, third party WBT report has been used.

STEP 4: Sample Size –

The sample size for each monitoring activity is the total number of ICS distributed and included in the monitoring database under three investor groups. A sample size calculation sheet was used to calculate the number of samples.

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

The procedure to determine the sample of households ensured that they adequately represent the broader project population, minimizing sampling error. Using, a 95 per cent confidence level, and a 10 per cent margin of error, random samples were selected from each Primary Sampling Unit. There were three parameters that required estimation through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($n_{y,i,j}$), the continued use of old stoves, ($\mu_{y,i,j}$) and loss of efficiency. In line with sampling guidelines, all can be sampled in a single survey with a random sample of households using the above-described confidence/precision levels depending on annual or biennial monitoring frequency.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guidelines for Sampling and surveys for CDM project activities and programmes of activities, version 07.0 Appendix 1 paragraph 5, there are different ways available to obtain the estimates of the parameter of interest:

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

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

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

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

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

STEP 5: Sampling Frame

The sampling frame referred to all the information sources on the database. PP collected all the information sources on monitoring data through physical visit. The monitoring survey data was collected primarily through physical survey which is the primary mechanism in place for the data collection of the newly distributed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) which is used in the current monitoring period.

Following information were recorded during the monitoring survey.

- Product based Unique Identification number.
 - Contact information, geographical location or other relevant information of the end user
 - Sampling frame was representative of the entire population
 - No elements from outside the population of interest is present for the current monitoring period.
- Wherever information miss-match is observed, it is corrected in the database and conservative assumptions is applied.

STEP 6: Desired Precision / Expected Variance and Sample Size

To estimate the number of premises to be surveyed with a 10% margin of error at desired confidence level of 95%, the optimal sample size n is given by:

For proportional parameter

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

Here,

Parameter	Description
N	Sample Size
N	Total number of cookstoves (ICS) distributed
P	Expected proportion
1.96	Represents the 95% confidence required
0.1	Represent the 10% relative precision

For mean-based parameter

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

Here,

Parameter	Description
N	Sample Size
N	Total number of cookstoves (ICS) distributed
SD	Standard deviation
V	(SD/mean) ²
1.96	Represents the 95% confidence required
0.1	Represent the 10% relative precision

Requirements of Guideline for Sampling and surveys for CDM project activities and program of activities, version 4.0 has been followed.

The PP has computed sample size at investor group level. The details of sample size calculations have been reproduced in Appendix 2 of the PD-MR.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Data / Parameter	No.i,j																	
Data unit	Number																	
Description	Number of commissioned project devices of type i and batch j																	
Value applied:	<table><tr><th>S. No.</th><th>Investor Group</th><th>Total distribution of Burn Kunikoa</th></tr><tr><td>1</td><td>Investor Group 1</td><td>26,741</td></tr><tr><td>2</td><td>Investor Group 2</td><td>24,773</td></tr><tr><td>3</td><td>Investor Group 3</td><td>24,626</td></tr><tr><td></td><td>Total</td><td>76,140</td></tr></table>			S. No.	Investor Group	Total distribution of Burn Kunikoa	1	Investor Group 1	26,741	2	Investor Group 2	24,773	3	Investor Group 3	24,626		Total	76,140
S. No.	Investor Group	Total distribution of Burn Kunikoa																
1	Investor Group 1	26,741																
2	Investor Group 2	24,773																
3	Investor Group 3	24,626																
	Total	76,140																
Comments	The ICS distributed and commissioned have been clubbed under three investor groups for internal purposes. Each ICS commissioned is given a unique Barcode ID of 6 digits, with first two digits attributed to investor group.																	

Data / Parameter	n _{y,i,j}
Data unit	Number
Description	Proportion of commissioned project devices of type i and batch j (No _{i,j}) that remain operating in year y
Value applied:	Investment Group 1: 0.99 Investment Group 2: 1.00 Investment Group 3: 0.99

Comments	-		
Data / Parameter	$\eta_{new,i,j}$		
Data unit	Fraction		
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity		
Value applied:	Group	Pot-skirt usage	$\eta_{new,i,j}$
	Investor Group 1	97.15%	$0.513 \times 97.15\% + 0.4340 \times (1 - 97.15\%) = 0.5108$
	Investor Group 2	92.56%	$0.513 \times 92.56\% + 0.4340 \times (1 - 92.56\%) = 0.5071$
	Investor Group 3	92.21%	$0.513 \times 92.21\% + 0.4340 \times (1 - 92.21\%) = 0.5068$
Comments	The parameter has been calculated as a weighted average of the efficiency of a skirted stove and a non-skirted stove, taking into consideration the usage of pot skirt. Surveys have been conducted to determine the number of kitchen activities that occur with and without a pot skirt. For the current monitoring period, efficiency has been determined based on the third-party lab report.		
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:	S. No.	Year	μ_y Value Applied
	1	Investor Group 1	0.768
	2	Investor Group 2	0.666
	3	Investor Group 3	0.737
Comments	Considering the pre-project device is three stone fired or conventional devices without ventilation, PP has opted for Option 2 to conduct survey to capture the cooking habits and stove usage of households.		
Data / Parameter	$NCV_{biomass}$		
Data unit	TJ/ton		
Description	Net calorific value of the non-renewable woody biomass		
Value applied:	0.0156 TJ/tonne		
Comments	-		

Data / Parameter	Life Span
Data unit	Years
Description	The operating life time of the project device. The life span should be reported in cases where the PPs are opting to account the efficiency loss as per paragraph 37
Value applied:	Burn Kunikoa - 10 years
Comments	-

Data / Parameter	N _{d,HH}
Data unit	Number
Description	Number of project devices distributed per household.
Value applied:	1
Comments	-

Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Value applied:	03-October-2023
Comments	Only one batch under the current monitoring period

Data / Parameter	Date of commissioning of project device i
Data unit	Date
Description	Actual date of commissioning of the project device
Value applied:	23-February-2023
Comments	-

7.2 Baseline Emissions

There are no separate baseline emissions calculations provided in the applied methodology. Therefore, the ERs calculated as actuals have been provided in section 7.5 below.

7.3 Project Emissions

There are no separate project emissions calculation provided in the applied methodology. Therefore, the ERs calculated as actuals have been provided in Section 7.5 below.

7.4 Leakage Emissions

Net to gross adjustment factor of 0.95 shall be multiplied with the ERs calculated, thus accounting for the leakage requirements provided in the methodology.

7.5 GHG Emission Reductions and Carbon Dioxide Removals

Parameter	Unit	Investor Group 1	Investor Group 2	Investor Group 3	Source
$B_{old,i,j}$	tonnes/person / year	6.947	6.947	6.947	Baseline KPT.
$f_{NRB,y}$	Fraction	0.90	0.90	0.90	fNRB survey on the country basis established by third party as per the tool 30 furnished to VVB.
$E_{wf,nonCO2} + E_{wf,CO2}$	tCO ₂ e/TJ	121.46	121.46	121.46	As per the methodology
Adj_{LE}	Fraction	0.95	0.95	0.95	As per the methodology
$\eta_{old,i,j}$	Percentage	15%	15%	15%	Default value as per CDM Tool 33
U_d	Fraction	0.26	0.26	0.26	Default value
$N_{o,i,j}$	Number	26,741	24,773	24,626	ICS Installation database
$NCV_{biomass}$	TJ/tonne	0.0156	0.0156	0.0156	As per the methodology
$\eta_{new-skirt}$	Fraction	0.5130	0.5130	0.5130	Third party report
$\eta_{new-skirt}$	Fraction	0.4340	0.4340	0.4340	Third party report
% usage skirt	Percentage	97.15%	92.56%	92.21%	
$\eta_{new,i,j}$	Fraction	0.5108	0.5071	0.5068	Calculated
$B_{y,saving,i,j}$	Tonnes/ICS/year	4.91	4.89	4.89	Calculated as per equation 3 of VMR0006 by using the above input values.
μ_y	Fraction	0.768	0.666	0.737	Monitoring survey records, refer the ex-post ER sheet for the details of survey
$n_{y,i,j}$	Proportion	0.99	1.00	0.99	Monitoring Survey records
ER _y	tCO ₂	61,099	46,817	59,659	Calculated, refer the ex-post ER sheet for the details of survey
Total Emission Reduction (ER)	tCO ₂ e	167,575 (rounded down)			

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU's (tCO ₂ e)	Removal VCU's (tCO ₂ e)	Total VCU's (tCO ₂ e)
23-Feb-2023 to 31-Dec-2023	-	-	-	167,575	-	167,575
Total	-	-	-	167,575	-	167,575

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions / removals	Percent difference	Explanation for the difference
23-Feb-2023 to 31-Dec-2023	358,389	167,575	-53.24%	The decrease in emission reduction is mainly due to ICS distributed in phases during current monitoring period and average operational age of ICS are significantly lower than number of days in current monitoring period, which is appropriate.
Total	358,389	167,575	-53.24%	

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

N/A, there is no commercially sensitive information.

APPENDIX 2: FNRB CALCULATION

Step 1: Estimation of renewable biomass (RB) in the country of The Gambia as per equation (4) of the fNRB tool

$$RB = \sum (MAI_{forest,i} \times (F_{forest,i} - P_{forest,i})) + \sum (MAI_{other,i} \times (F_{other,i} - P_{other,i})) \quad \text{Equation (4)}$$

Where:

- $MAI_{forest,i}$ = Mean Annual Increment of woody biomass growth per hectare in sub-category i of forest areas in the relevant period (tonnes/ha/yr)
- $MAI_{other,i}$ = Mean Annual Increment of woody biomass growth per hectare in sub-category i of other land areas in the relevant period (tonnes/ha/yr)
- $F_{forest,i}$ = Extent of forest in sub-category i in the relevant period (ha)
- $F_{other,i}$ = Extent of other land in sub-category i in the relevant period (ha)
- $P_{forest,i}$ = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (in sub-category i) in the relevant period (ha)
- $P_{other,i}$ = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other land areas (in sub-category i) in the relevant period (ha)
- i = Sub-category i of forest areas and other land areas³

Parameters used:

Input parameter	Value	Data source
Forest	300,000	Geospatial data products for Gambia were analysed in R14–18 to estimate The Gambia’s renewable biomass. The forest and other wooded land cover for 2000 and 2021 was estimated using Hansen/UMD/Google/USGS/NASA ¹⁹ spatial data for 2000 and 2021, which is derived from Hansen et al. ²⁰ , and disaggregated according to the FAO ²¹ global ecological zones. The total woody cover extent, including forests and other wooded areas, was calculated for each ecological zone, within the protected areas and within areas that are either accessible or geographically remote.
Extent of forest and other wooded land in 2021	(in ha)	
Protected Areas	(in ha)	
Protected areas within forest areas	117,138	
Remote areas within forest areas	278,681	
Mean Annual Increment (MAI)	In t/ha/year	

¹⁹ Hansen/UMD/Google/USGS/NASA. Hansen Global Forest Change v1.9 (2000–2021).

²⁰ Hansen, M. C. C. et al. High-resolution global maps of 21st-century forest cover change. *Science* (80- .). **342**, 850–854 (2013)

²¹ FAO. *Global Forest Resources Assessment*. (2015)

Tropical dry Forest	1.60	The mean annual increment for forest is calculated as weighted average of the forest type and their MAI as per IPCC ²² values for Tropical moist forest, Tropical Mountain system and tropical rain forest.
Tropical moist forest	0.90	
Wood density	0.725 t/m³	FAO ¹¹

Geographically remote areas were determined to be areas beyond a harvestable distance from roads and settlements. Conservatively, it was assumed that forests and wooded areas adjacent to all roads within a distance of 2.5 km are harvestable, despite how geographically remote or inaccessible these roads may be. This threshold was determined based on the peer-reviewed literature on wood harvesting practices.

Banks et al.¹⁸ found that woody biomass density increases significantly as a function of distance from the edge of a settled area. Beyond 450 m, average biomass density was found to increase from 2.1 to 16.6 t/ha. Jumbe and Angelsen²³ modelled fuelwood choice from household survey data. They found that the most significant determinants of fuelwood choice are source attributes (size and species composition) and distance to source. The mean harvesting distance for their study was found to be 0.95 km. Bandyopadhyay et al.²⁴ matched household survey and remote sensing data to investigate wood fuel use in relation to poverty levels. They concluded that the one-way walk duration to wood fuel source for both poor and non-poor households is 0.6 hours. Assuming an average walking speed of 4 km/hr over uneven terrain, the average one-way distance to wood fuel source is less than 2.5 km. Areas beyond the harvestable distance were, therefore, determined to be geographically remote. Accessible areas are those that are not protected and not geographically remote, from which the annual renewable biomass production is calculated.

The default age-weighted mean annual increment (MAI) estimates of each ecological zone, as reported by the IPCC, were used for this study. The proportion of forest stand ages above and below 20 years old, including primary forests, were estimated for each ecological zone by extrapolating the observed forest gain extents between 2000 and 2012 to a 20-year period. The average MAI estimates for The Gambia are 0.92 and 1.60 t/ha/year for tropical dry forests and tropical moist forest, respectively between 2000 and 2012 to a 20 years period.

FAO Global Ecological Zone	Total forest cover (ha)	Protected area cover (ha)	Remote area cover (ha)	MAI (t/ha/yr)	Annual growth (t/yr)
Tropical dry forest	31,837	70	1,586	1.60	48,290
Tropical moist forest	57,217	3,096	2,453	0.90	46,425
Total	89,054	3,166	4,039	-	94,715

²² IPCC. *Forest Land. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use 4*, 1–29 (2019)

²³ Jumbe, C. B. L. & Angelsen, A. Modeling choice of fuelwood source among rural households in Malawi: A multinomial probit analysis. *Energy Econ.* **33**, 732–738 (2011).

²⁴ Bandyopadhyay, S., Shyamsundar, P. & Baccini, A. Forests, biomass use and poverty in Malawi. *Ecol. Econ.* **70**, 2461–2471 (2011)

Total renewable biomass RB = 94,715 t/year

Step 2: Estimation of consumption of woody biomass (H) in the country of The Gambia as per equation (2) of the fNRB tool

$$\text{NRB} = \text{H} - \text{RB}$$

Where,

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

$$\text{H} = \text{HW} \times \text{N} + \text{CE} + \text{NE}$$

Where,

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

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

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

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

The total woody biomass consumption combines the country's domestic and non-domestic *energy* and non-domestic *non-energy* consumption. The Gambia's estimate of total woody biomass consumption estimation is derived from World Bank population statistics²⁵ and consumption data sourced from literature^{26,27} and the FAO²⁸ data. Reported values of charcoal consumption are converted to the equivalent woody biomass using guidelines on kiln efficiency from the FAO forestry paper on industrial charcoal making²⁹ and the latest CDM Tool 30 v04.0 2022 default charcoal-to-wood biomass conversion factor. The CDM default value of 4 was applied to the urban domestic charcoal consumption and non-domestic energy charcoal consumption.

Data was drawn from the most recently available official reports/statistics, in this case from the UN's Statistics Division to demonstrate both the recent trend in increase of wood fuel use at the household level, plus also the most recently available data (from 2021). This increase in

25 UCLouvain. *ESA CCI Land Cover Maps v2.1.1. (2019)*

26 United Nations & African Union. *Review of woodfuel biomass production and utilization in Africa*

27 FAO. *Forestry Sector in 2020*

28 FAO Statistics. *Forest Products 2019*. <https://www.fao.org/3/cb3795m/cb3795m.pdf> (2021)

29 CDM. *CDM Methodological tool 33: Default values for common parameters. Version 02.0.*

<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-33-v2.0.pdf> (2022)

fuelwood use at the household level has had a significant impact on the parameter value fNRB. The density of fuel is not a time bound parameter, hence average of Africa is used as per published data by FAO.

Input parameter	Value	Data source
H (in t/year)	9,46,100	Calculated (2021)
Wood density (in t/m ³)	0.725	FAO
HW woody biomass consumption in households (in t/year)	600,409	Calculated
CE Non domestic woody biomass consumption for energy application (in t/year)	308,380	Calculated, using biomass expansion factor 1.040 ³⁰
NE Non domestic woody biomass consumption for non-energy application (in t/year)	37,311	Calculated using biomass expansion factor 1.040
Population of the country	2,486,937	World Bank

Equation (3) of the fNRB tool stipulates that the average household wood fuel consumption is multiplied with the number of households and industries consuming wood fuel for energy and non-energy applications within the country. Since most of the available and reliable data is total wood fuel consumption in households and commercial and other use.

The total population of host country has been sourced as per the published World Bank population data from 2021. This is in line with the fNRB tool.

Step 3: Estimation of quantity of non-renewable biomass (t/year) as per equation (2) of the fNRB tool

$$NRB = H - RB$$

Where,

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

This step calculates the quantity of non-renewable biomass (t/year) (NRB) by subtracting the renewable biomass estimated in step 1 from the total consumption of woody biomass estimated in step 2. No further input parameters are needed under this step.

$$NRB = 946,100 - 94,715$$

$$NRB = 851,385 \text{ t/year}$$

30 FAO. *Global Forest Resources Assessment, Country Report - Gambia*. (2020).

Step 4: Estimation of fraction of woody biomass that can be established as non-renewable (fNRB) as per equation (1) of the fNRB tool

$$fNRB = \frac{NRB}{NRB + RB} \quad \text{Equation (1)}$$

This step calculates the fraction of woody biomass that can be established as non-renewable (fNRB). The non-renewable biomass calculated in step 3 is divided by the sum of non-renewable biomass and renewable biomass calculated in step 1. No further input parameters are needed under this step.

$$fNRB = 851,385 / (851,385 + 94,715)$$

$$fNRB = 90\%$$

Step 5: As per para 6 of CDM tool 30, the resulting non-renewable biomass (NRB) was compared to the top-down product of average above-ground biomass (41.80 t/ha) and the most recent annual deforestation data (5,730 ha/yr)³¹. NRB, as calculated in this report according to the CDM Tool 30 v4.0 2022, was found to be 851,385 t/yr, greater than the cross-check results based on deforestation (239,514 t/yr). It is expected that the cross-check estimate of biomass loss from deforestation could underestimate the extent of non-renewable biomass consumption as it only considers the average biomass stocks from completely deforested areas. Unsustainable wood harvesting resulting in forest degradation and substantial reductions in biomass stocks, but not complete deforestation, are not considered in the cross-check. Therefore, the estimate of NRB is deemed applicable to this study, given that the guidance provided by CDM Tool 30 v4.0 2022 was followed.

The resulting fNRB value is higher than expected fNRB values determined using the WISDOM method as reported by Bailis *et al.*, 2015³² for the same region. While direct comparisons between the WISDOM and CDM methodologies are only sometimes appropriate given the different approaches of the methodologies, the following factors can contribute to variations in the fNRB estimates between the two methods:

1. More recent population statistics (2021)³³ for The Gambia were used in the present study. The more recent data represents a 42% increase in population numbers since the 2009 data utilised by Bailis *et al.*, 2015.
2. The total woody consumption estimated for the country in the present study utilises the 2021 population statistics in combination with 2019 per capita consumption values sourced from the FAO Forest Products 2020 report³⁴ accounting for a 12% increase in total woody consumption

³¹ FAO. *Global Forest Resources Assessment, Country Report - Gambia.* (2020).

³² Bailis, R., Drigo, R., Ghilardi, A. & Masera, O. *The carbon footprint of traditional woodfuels.* *Nat Clim Chang* 5, 266–272 (2015)

³³ The World Bank. *World Bank Open Data.* Accessed on 05/05/2022 from <https://data.worldbank.org/> (2022)

³⁴ FAO Statistics. *Forest Products 2019.* <https://www.fao.org/3/cb3795m/cb3795m.pdf> (2021).

when compared to forest products data for 2013³⁵, as used in the study reported by Bailis et al., 2015

3. Mean annual increments (MAI) were calculated by means of a weighted average that is based on the forest area of three categories (i.e., primary forests, above and below 20 years secondary forests). Data from the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for “Above-ground biomass growth rates for different ecological zones” was utilised³⁶. As per the Bailis et al., 2015 article, MAI values were derived from field observations followed by an estimation of growth rates as a percentage of standing stock and IPCC values. This approach yields higher MAIs compared to IPCC values leading to lower estimations of non-renewable biomass (NRB).

The calculated fNRB value of 0.90 indicates that Gambia’s woody biomass consumption exceeds the country’s capacity to renew the supply sustainably. This finding is supported by the consistent and widely reported deforestation rate and dynamics observed for the country³⁷.

³⁵ Food and Agriculture Organization of the United Nations. *FAO yearbook : forest products 2009-2013*. (2013)

³⁶ IPCC. *Forest Land. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use 4*, 1–29 (2019)

³⁷ FAO. *Global Forest Resources Assessment 2020: Main report*. Rome <https://doi.org/10.4060/ca9825en> (2020).

APPENDIX 3: SAMPLE SURVEY RESULTS

Investor Group 1

Sampling Constants	Values
Monitoring period start	23-02-2023
Monitoring period end	31-12-2023
Level of Sampling	single vintage
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.960

Monitoring parameter(s)		Stove Operating Fraction for determination of $N_{y,i,j}$		
Sampling frame(s)		Given stove model and vintage population		
Sampling approach		Simple random sampling		
Sampling Population (i)	Vintage (j)	Stove population	Expected operational proportion (SoF)	Calculated Minimum Sample Size (n)
1	2023	26741	0.90	43
Sample size determination				
Estimated SOF (p)				0.90
$V_{\text{SOF}} = p(1-p)$				0.090
Sample Size required (SOF)				43
Monitoring results				
Sampling Population (Batch)	Sampling frame size	Monitored Sample Size ($n_{i,j,\text{total}}$)	Operational Sample ($n_{i,j,\text{operational}}$)	Monitored Operating Fraction ($n_{i,j,\text{operational}}/n_{i,j,\text{total}}$)
2023	26741	80	79	0.99
Reliability Check				
Samples Monitored			80	
SoF Measured			0.99	
Standard Error of SoF			1.240%	
Relative precision (Margin of error)			2.46%	
Result			Ok, reliability level met	
Lower Bound confidence value			Not applicable	
Monitoring parameter(s)	Adjustment to account for any continued use of pre-project devices during the year $y - \mu_y$			
Sampling frame(s)	Given stove model population			
Sampling approach	Simple random sampling			
Sampling Population (i)	Stove population	Expected value	Calculated Sample Size (n)	

2023 (Vintage 1)	26741	0.85	49
Estimated results based sample size determination			
Estimated utilization (p)			0.85
$V_{\text{Utilization}} = p(1-p)$			0.13
Minimum Sample Size required (days of utilization)			49
Monitoring results			
Sampling Population	Sampling frame size	Monitored Sample Size	Monitored Utilization
2023 (Vintage 1)	26741	80	0.7680
Reliability Check			
Samples Monitored			80
Utilization Measured			61.44
Standard Error of Utilization			4.71%
Relative precision (Margin of error)			0.15%
Result			Ok, reliability level met
Lower Bound confidence value			Not applicable

Investor Group 2

Sampling Constants	Values
Monitoring period start	23-02-2023
Monitoring period end	31-12-2023
Level of Sampling	single vintage
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.960

Monitoring parameter(s)		Stove Operating Fraction for determination of $N_{y,i,j}$		
Sampling frame(s)		Given stove model and vintage population		
Sampling approach		Simple random sampling		
Sampling Population (i)	Vintage (j)	Stove population	Expected operational proportion (SoF)	Calculated Minimum Sample Size (n)
1	2023	24773	0.90	43
Sample size determination				
Estimated SOF (p)				0.90
$V_{\text{SOF}} = p(1-p)$				0.090
Sample Size required (SOF)				43
Monitoring results				

Sampling Population (Batch)	Sampling frame size	Monitored Sample Size (n _{i,j,total})	Operational Sample (n _{i,j,operational})	Monitored Operating Fraction (n _{i,j,operational} /n _{i,j,total})
2023	24773	78	78	1.00
Reliability Check				
Samples Monitored			78	
SoF Measured			1.00	
Standard Error of SoF			0.000%	
Relative precision (Margin of error)			0.00%	
Result			Ok, reliability level met	
Lower Bound confidence value			Not applicable	
Monitoring parameter(s)		Adjustment to account for any continued use of pre-project devices during the year y - μ _y		
Sampling frame(s)		Given stove model population		
Sampling approach		Simple random sampling		
Sampling Population (i)	Stove population	Expected value	Calculated Sample Size (n)	
2023 (Vintage 1)	24773	0.85	49	
Estimated results based sample size determination				
Estimated utilization (p)			0.85	
V _{Utilization} = p(1-p)			0.13	
Minimum Sample Size required (days of utilization)			49	
Monitoring results				
Sampling Population	Sampling frame size	Monitored Sample Size	Monitored Utilization	
2023 (Vintage 1)	24773	78	0.6664	
Reliability Check				
Samples Monitored			78	
Utilization Measured			51.98	
Standard Error of Utilization			5.33%	
Relative precision (Margin of error)			0.20%	
Result			Ok, reliability level met	
Lower Bound confidence value			Not applicable	

Investor Group 3

Sampling Constants	Values
Monitoring period start	23-02-2023
Monitoring period end	31-12-2023
Level of Sampling	single vintage

Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.960

Monitoring parameter(s)		Stove Operating Fraction for determination of $N_{y,i,j}$		
Sampling frame(s)		Given stove model and vintage population		
Sampling approach		Simple random sampling		
Sampling Population (i)	Vintage (j)	Stove population	Expected operational proportion (SoF)	Calculated Minimum Sample Size (n)
1	2023	24626	0.90	43
Sample size determination				
Estimated SOF (p)				0.90
$V_{sof} = p(1-p)$				0.090
Sample Size required (SOF)				43
Monitoring results				
Sampling Population (Batch)	Sampling frame size	Monitored Sample Size ($n_{i,j,total}$)	Operational Sample ($n_{i,j,operational}$)	Monitored Operating Fraction ($n_{i,j,operational}/n_{i,j,total}$)
2023	24626	77	76	0.99
Reliability Check				
Samples Monitored			77	
SoF Measured			0.99	
Standard Error of SoF			1.288%	
Relative precision (Margin of error)			2.56%	
Result			Ok, reliability level met	
Lower Bound confidence value			Not applicable	
Monitoring parameter(s)	Adjustment to account for any continued use of pre-project devices during the year y - μ_y			
Sampling frame(s)	Given stove model population			
Sampling approach	Simple random sampling			
Sampling Population (i)	Stove population	Expected value	Calculated Sample Size (n)	
2023 (Vintage 1)	24626	0.85	49	
Estimated results based sample size determination				
Estimated utilization (p)			0.85	
$V_{Utilization} = p(1-p)$			0.13	
Minimum Sample Size required (days of utilization)			49	
Monitoring results				

Sampling Population	Sampling frame size	Monitored Sample Size	Monitored Utilization
2023 (Vintage 1)	24626	77	0.7370
Reliability Check			
Samples Monitored			77
Utilization Measured			56.75
Standard Error of Utilization			5.01%
Relative precision (Margin of error)			0.17%
Result			Ok, reliability level met
Lower Bound confidence value			Not applicable