TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

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VERSION **v. 1.2**

RELATED SUPPORT

- TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2

This document contains the following Sections

Key Project Information

KEY PROJECT INFORMATION

GS ID of Project	11659
Title of Project	Clean Cooking to Combat Climate Change in Tanzania
Time of First Submission Date	05/05/2022
Date of Design Certification	N/A
Version number of the PDD	3.3
Completion date of version	10/02/2023
Project Developer	Offgridsun S.R.L.
Project Representative	Ceres-Enve
Project Participants and any communities involved	Mutina Group
Host Country (ies)	United Republic of Tanzania
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☒ Small Scale ☐ Large Scale
Other Requirements applied	
Methodology (ies) applied and version number	AMS-II.G (V12.0) "Energy efficiency measures in thermal applications of non-renewable biomass"
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☒ Regular ☐ Retroactive

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Goals Targeted	SDG Impact (defined in B.6.)	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)	Amount of GHG emissions avoided or sequestered	12,799	tCO2e
15	Total non-renewable wood fuel saved	10,771	Tonnes/yr
3	Percentage of households that observed reduction in PM2.5and CO concentration reductions	95%	Percentage
5	Percentage of households with average time saving associated with cooking time and fuel collection	95%	Percentage
8	Total number of jobs	140	Number
1	Average household savings at cooking	496	USD/yr

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

OffgridSun Srl and Mutina Group will distribute/ install improved cookstoves (ICS)to reduce the use of fuelwood or charcoal in rural Tanzania. The project aims at reaching a total number of 5,000 households living in 6 villages located in Morogoro Region within Ifakara Province, Kilembero District and Malinyi District. By the implementation of the project, traditional stoves will be replaced with the project stoves that have higher efficiency and the fuelwood consumption and related carbon emissions will be lessened.

More than 96% of the approximately 60 million people in Tanzania rely on biomass – mostly firewood and charcoal- as their primary fuel for cooking. Most rural households use the three stone fire place to cook their meals, whereas low quality charcoal cookstoves are used in urban and peri-urban households. Mean kitchen PM10 concentrations levels (656 µg/m^3) measured in Tanzanian homes during cooking far exceed globally tolerable limits for indoor pollution exposure (UNIDO, 2019[1]). On a national level, the annual mortality rate attributed to indoor air pollution (IAP) is 139 every 100,000 deaths (World Bank, 2016[2]). Due to the increasing demand on fuelwood, Tanzania lost 2.86 Mha of tree cover between 2001 to 2020, equivalent to a 11% decrease in tree cover and 970Mt of CO_2e emissions since 2000[3].

Traditional cookstoves mostly used in Tanzania are the three stone fire and single walled metal charcoal stove[4] (Figure. 1). The national penetration of ICS in Tanzania is only 4% that is even lower in rural regions of the country in 2020 [5]. Lack of agents in rural remote areas, long distances and poor road conditions, lack of finance for the producers who are small scale artisans are among the reasons for the low penetration of improved cookstoves in the local market, especially in rural areas. On the other side, low-income level of rural households and lack of awareness on the economic, health and

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[1] Health and Pollution Action Plan, United Reoublic of Tanzania, Feb 2019
(https://www.unido.org/sites/default/files/files/2019-10/Tanzania%20HPAP.English_2.pdf)
[2] World Bank data (https://data.worldbank.org/indicator/SH.STA.AIRP.P5?locations=TZ)
[3] Global Forest Watch Web page (https://www.globalforestwatch.org/dashboards/country/TZA/)
[4] ICS Assessment and Testing Report (https://tarea-tz.org/storage/app/media/Blog/ICS%20Assessment%20and%20Testing.pdf)
[5] https://trackingsdg7.esmap.org/country/united-republic-tanzania

environmental advantages of clean cooking solutions are the main factors related to low uptake of improved cookstoves technologies among rural communities.

Figure 1: Traditional stoves used in Tanzania (Left: Three stone fire, Right: single walled metal charcoal stove)

In order to overcome those challenges, the proposed project will distribute portable efficient cookstoves in rural Tanzania. The cookstoves will be sold at a subsidized affordable price to facilitate the access of the poorest families. Sensitization campaigns on clean cooking and environmental conservation will be also provided to the targeted communities. Unemployed local youth and women will be trained to become local agents to sell the cookstoves within the villages. The income generated by the sales will be partially devoted to pay the local agents, who will take their commissions out of the cookstoves' sale and partially will be used to finance the project management activities (distribution, monitoring) and to purchase more project stoves to scale up the intervention and replace the broken cookstoves.

The project will generate 12,799 tCO2e per annum and 63,993 tCO2e for the first crediting period of 5 years. Indicative dates for the project milestones have been given in Table.2.

Table 2. Project Milestones

Cookstove Production	Dec 2022- Feb 2023
Training and organization of local distributors	January-February 2023
Public events and distribution of cookstoves	March- August 2023
Start of first Monitoring Period	March 2023

A.1.1.   Eligibility of the project under Gold Standard

The eligibility criteria identified in GS4GG Principles and Requirements are met as follows:

Eligibility criteria	Justification
3.1.1 (a) Types of Project: Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section.	The project plans to install improved cookstoves to the households in rural regions of Tanzania and Gold Standard approved Community Services Activity Requirements is applicable for the project. The project type is, therefore; automatically eligible as per section 4.1.3 of GS4GG Principles & Requirements.
3.1.1 (b) Location of Project: Projects may be located in any part of the world.	Location of the project is Ifakara Province of Morogoro Region in Tanzania and specified in Section A.2.
3.1.1 (c) Project Area, Project Boundary and Scale: The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact Quantification Methodologies and Products Requirements. In order to avoid double counting the Project shall not be included in any other voluntary or compliance standards programme unless approved by Gold Standard (for example through dual certification). Also, if the Project Area	The project is located in and the project boundary and scale are defined based on the CDM Methodology AMS-II.G: "Energy efficiency measures in thermal applications of non-renewable biomass". The project boundary is the physical, geographical site of the efficient devices that utilize biomass. Project is small scale as per 9.1.2 b Type-2 End-use energy efficiency project improvement in GHG Emission Reductions and Sequestration Product Requirements. The aggregate energy savings of a single project activity shall not exceed the

overlaps with that of another Gold Standard or other voluntary or compliance standard programme of a similar nature, the project shall demonstrate that there is no double counting of impacts at design and performance certification (for example use of similar technology or practices through which the potential arises for double counting or misestimation of impacts amongst projects).	equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input. The project does not seek certification under any other voluntary or compliance standards programme. The host country, Tanzania does not have an emission reduction cap enforced OR have the possibility to trade emissions that include the scope of the proposed project. If a risk of double counting exists, the project developer commits to retire eligible units equal to the quantity of Gold Standard VERs.
3.1.1 (d) Host Country Requirements: Projects shall be in compliance with applicable Host Country's legal, environmental, ecological and social regulations.	The project is in compliance with all related legal, environmental, ecological and social regulations. Please see safeguarding principles assessment in Appendix.1.
3.1.1 (e) **Contact Details:** As part of the Project Documentation the Project Developer shall provide (i) name and (ii) contact details of all Project Participants; AND in case of an organisation (iii) the legal registration details and (iv) documentation by the governing jurisdiction that proves that the entity is in good standing (defined as being a legal or other appropriate entity	Contact details can be found in Appendix.2

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registered in or allowed to operate within the required jurisdiction and with no evidence of insolvency or legal/criminal notices placed against it or any of its Directors). Gold Standard retains the right (at its own discretion) to refuse use of the Standard where reputational concerns are highlighted.	
3.1.1.(f) Legal Ownership: Full and uncontested legal ownership of any Products that are generated under Gold Standard Certification, (for example carbon credits) shall be demonstrated. Where such ownership is transferred from project beneficiaries this must be demonstrated transparently and with full, prior and informed consent (FPIC). Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately report to Gold Standard any land title/tenure disputes arising.	Legal ownership of the Products generated by the project will be transferred from end-users to the project owner. This is explained in detail to the stakeholders in the consultation meeting and included in the project design.
3.1.1 (g) Other Rights: As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (f*or example, access rights, water rights etc.)*. Any known disputes	The project will provide improved cookstoves to households. Each household will sign a carbon rights waiver for the stoves they have bought. A memorandum of understanding will also be signed with project stove manufacturer and wholesale providers.

or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	
3.1.1 (h) Official Development Assistance (ODA) Declaration: All Project Developers applying for project activities located in a country named by the OECD Development Assistance Committee's ODA recipient list and seeking Gold Standard Certification for carbon credits shall declare the Official Development Assistance (ODA) support. The Project Developer shall follow the GHG Emissions Reduction & Sequestration Product Requirements and submit the declaration at the time of Design Certification.	ODA declaration has been submitted to GS registry.

The eligibility criteria identified in Community Services Activity Requirements are met as follows:

Eligibility criteria	Justification
2.1.2 All CSA Projects shall lead to climate change mitigation and/or adaptation by providing or improving access to services/resources at household or community or institution level. Eligible services include electricity and energy, water and sanitation, waste management, housing, etc.	The project will decrease the fuelwood/charcoal consumption in households by installing improved cookstoves; therefore reduce the GHG emissions.

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• *3.1.1 Types of project – (b) End-use energy efficiency: Project activities that reduce energy requirements as compared to baseline scenario without affecting the level and quality of services or products, where the end-user of the products and services are clearly identified and when the physical intervention is required at the user end. For example, efficient cooking, heating, lighting, etc.*	The users will switch to efficient cooking technology which reduces energy requirements as compared to baseline scenario.
3.1.2 Project Area, Boundary and Scale: Project Area and Boundary shall be defined in line with the applicable Methodologies or Product Requirements	The project is located in Kilembero and Malinyi Districts, within Ifakara Province in Morogoro Region in Tanzania and the project boundary and scale are defined based on the CDM methodology AMS-II.G (V12.0). The aggregate energy savings of the project activity does not exceed the equivalent of 180 GWh thermal per year in fuel input. Each ICS installed saves 0.013 GWh_{th}; that is 0.007% of the threshold.
3.1.3 Certain Impact Quantification methodologies allow projects to account Suppressed Demand scenario when establishing a baseline. In such cases, the application of Suppressed Demand baseline is limited to Small Scale and Microscale Projects. Where a Suppressed Demand baseline is applied, it is not possible to 'stack' Gold Standard Certified Impact Statements or Products	The project does not apply Suppressed Demand baseline.

as the definition of the baseline may be contradictory.	
3.1.4 Legal Ownership: (a) Projects involving the distribution of a large number of devices for services such as heating, cooking, lighting, electricity generation, water treatment technology such as water filter, etc. shall provide a clear description of the ownership of the Products that are generated under Gold Standard Certification all along the investment chain. In line with the FPIC requirement, the proofs that end-users are aware of and willing to give up their rights on Products shall be provided.	Each stove installed will be registered by assigning a unique serial number along with name, contact details, address and date of installation. All users will be informed about the transfer of the rights of carbon credits to the project developer. The purchase agreement entered between the stove user and the stove producers includes terms transferring the ownership of VERs from user to the producers. By the purchase of the stove, the user accepts to waive the carbon rights.
3.1.4 (b) The transfer of Product ownership shall be discussed during local stakeholder consultations for projects.	The transfer of rights of carbon credits were discussed during the explanation of how carbon finance would be used to support project implementation at the level of local stakeholder consultation.

A.1.2.   Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

The Verified Carbon Reductions (VER) generated by each stove belongs to the individual stove user. The purchase agreement entered between the stove user and the stove producers includes terms transferring the ownership of VERs from user to the producers. By the purchase of the stove, the user accepts to waive the carbon rights.

A.2 Location of project

The project is located in United Republic of Tanzania, Morogoro Region, Kilembero District and Ulanga District, Ifakara and Malinyi Provinces as shown below in Figure.2. The villages are listed below:

Kilembero District	Ulanga District
Man'gula A	Mtimbira
Mwaya	Malinyi
Mgudeni	Sofi Majiji

	Ifakara	Malinyi
Latitude	-8.15113	-8.92873
Longitude	36.68507	36.13612
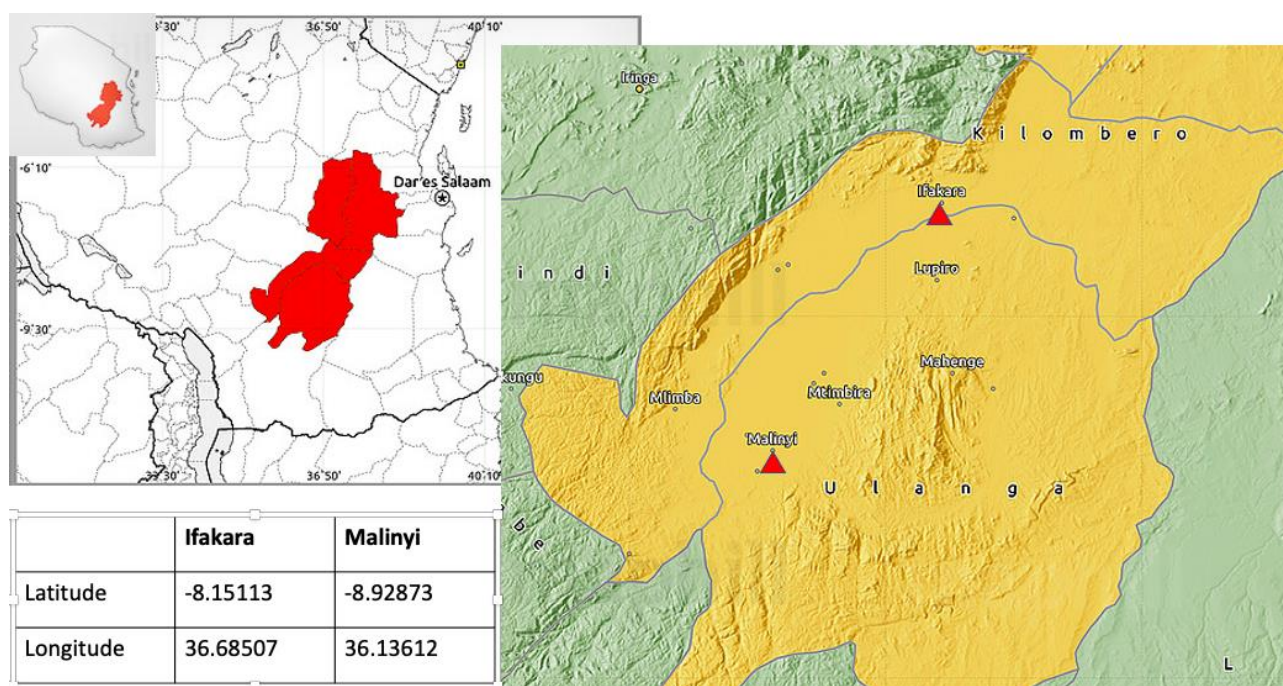
Figure 2. Project Location

A.3 Technologies and/or measures

Jiko Makini stove is made of metal with a ceramic liner inside. There are two handles on two sides and a metal top cover for the pot rest. A layer of sawdust and pumice mixture between the ceramic liner and metal outer surface provides high thermal efficiency. There is firewood intake door in the front and air intake at the back of the stove. The stove can be used by both firewood and charcoal. Thermal efficiencies are given for both fuel types in table below.

Table.3. Stove specification

Technical Specifications – Jiko Makini Stove

Thermal efficiency (firewood)	30.6 %
Thermal efficiency (charcoal)	38.5%
Portability	Portable
Design	Single Pot
Stove Life	3 years
Size (stove)	Width: 32 cm Height: 35 cm

Figure 3 Jiki Makini Stove

Figure 4. Jiko Makini Stove in use

The manufacturer is the Tanzanian company Envotec Services Limited, legally registered in Tanzania, which has experience in the production of cookstoves.
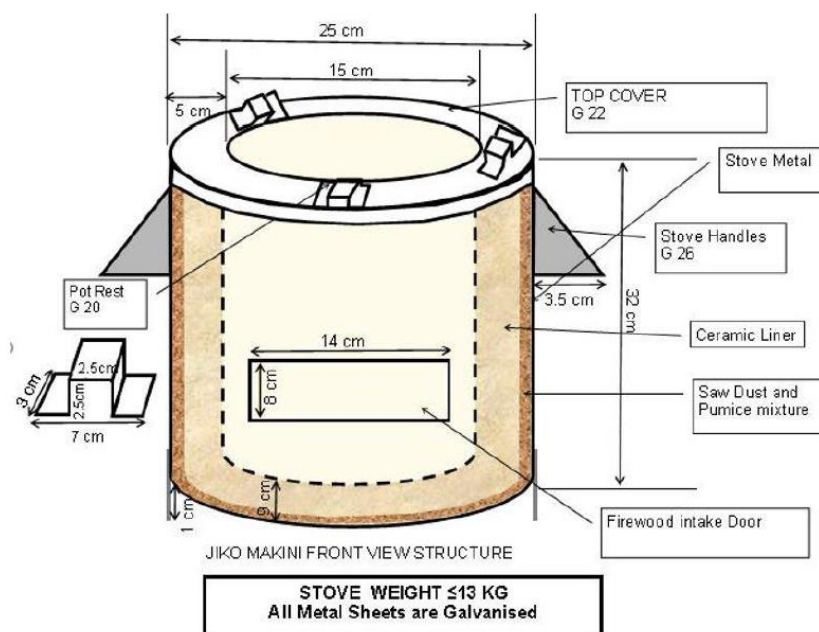
The project is developed under Sectoral Scope 3: Energy demand

A.4 Scale of the project

The project is small-scale and annual thermal energy savings are capped at 180 GWh.

A.5 Funding sources of project

The project will be implemented by the project developer, OffgridSun; in cooperation with the local partners. The funding for the production of stoves will be provided by OffgridSun that will be legal owner of the VERs

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass Version 12.0.[6]

Sectoral Scope: 03: Energy demand

Applicable tools for the methodology are as follows:

- TOOL21: Demonstration of additionality of small-scale project activities (V13.1)[7]
- TOOL30: Calculation of the fraction of non-renewable biomass (V4.0)[8]

B.2. Applicability of methodology (ies)

AMS-II.G methodology defines the following applicability criteria:

Applicability	Justification
In the case of cookstoves, the methodology is applicable to the	All installed cookstoves exceed the limit of 20% thermal efficiency; which will be

[6] Registration- request shall be submitted until 05 May 2023
(https://cdm.unfccc.int/methodologies/DB/GNFWB3Y6GM4WPXFRR2SXKS9XR908IO)
[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf
[8] Registration request shall be submitted until 05 May 2023
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf

introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 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 DOE.	proven by certificates and results of Water-Boiling-Test (WBT)
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.	The thermal energy savings of the project is below 180 GWh in any year of the crediting period. Please see the energy saving calculation for a single stove below.
Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	Non-renewable biomass has been the main source of energy for decades in Tanzania. Firewood is the most commonly used forest products and is reported to be exclusively used by 96% of the households. The estimate of the average demand for wood is 1.39 m3/year/capita while annual sustainable supply is estimated at 0.95 m3/year/capita. The annual supply of wood is therefore unable to meet annual demand. The rate of deforestation between 1995 and 2010 was 372,816 ha per year [9]

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[9] NAFORMA (2015) at https://www.tfs.go.tz/uploads/NAFORMA_REPORT.pdf

For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.	N/A
The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	The registration of each stove includes assigning a unique serial number and collecting GPS coordinates/ address, and date of installation. The household also receives a registration card with the corresponding serial number.
The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	A Memorandum of Understanding is signed including all project participants, stating that legal owner of the VERs is OffgridSun that provided the funding for the project.

Thermal efficiency savings per stove is calculated as follows:

$$TE_{savings,i,j} = B_{old,i,j} \times \left(1 - \frac{n_{old}}{n_{new}}\right) \times NCV_{biomass} \times f_{GWh}$$

$$TE_{savings,i,j} = 4.33\frac{ton}{y} \times \left(1 - \frac{0.1}{0.35}\right) \times 0.0156\frac{TJ}{ton} \times 0.27778 = 0.013 GWh$$

The number of stoves that is fully functional within the small size limit of 180 GWh in a year is 13,846.

B.3. Project boundary

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Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Combustion of non-renewable biomass for cooking with traditional methods	CO_2	**Yes**	Major source of emissions
		CH_4	**No**	Minor source of emissions, not required by the methodology
		N_2O	**No**	Minor source of emissions, not required by the methodology
Project scenario	Combustion of non-renewable biomass for cooking with ICS	CO_2	**Yes**	Major source of emissions
		CH_4	**No**	Minor source of emissions, not required by the methodology
		N_2O	**No**	Minor source of emissions, not required by the methodology

B.4. Establishment and description of baseline scenario

As per AMS-II.G (version 12.0), it is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices.

Majority of the households (79.1%) rely on fuelwood in rural Tanzania while urban households uses charcoal (55%) in 2019[10]. Only 4% of the population has been reported to have access to clean cooking services in 2020[11]. Therefore; the baseline scenario is continued use of non-renewable biomass for meeting thermal energy needs. The emission reductions will be achieved by annual biomass savings by introduction of improved cookstoves.

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[10] 2019/20 Energy Access and Use Situation Survey II, Tanzania, Mainland, Nationa Bureau of Statistics Tanzania and Rural Energy Agency, July 2020, pages:74-78
[11] https://trackingsdg7.esmap.org/country/united-republic-tanzania
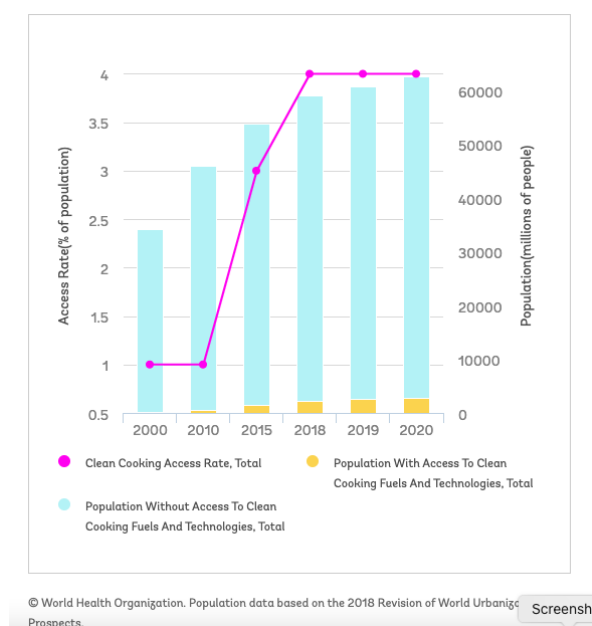
Figure.1. Access to clean cooking in Tanzania

B.5. Demonstration of additionality

Specify the methodology, activity requirement or product requirement that establishes deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	As per Community Services Activity Requirements(v 1.2): 4.1.9 Projects that meet any of the following criteria are considered as deemed additional and therefore are not required to prove Financial Additionality at the time of Design Certification: (a) Positive list (Annex B) (b) Projects located in LDC, SIDS, LLDC (c) Micro-scale projects
Describe how the proposed project meets the criteria for deemed additionality.	The proposed project is located in the Republic of Tanzania which falls under the category of a LDC. The project also complies with the requirement 1.1.3 of Annex B:

	Project activities solely composed of isolated units where the users of the technology/measure are households or communities or institutions and where each unit results in <= 600 MWh of energy savings per year or <=600 tonnes of emission reductions per year.

B.5.1 Prior Consideration

N/A

B.5.2 Ongoing Financial Need

N/A

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact
		Indicator (Proposed or SDG Indicator)
13 Climate Action (mandatory)	13.2. Integrate climate change measures into national policies, strategies and planning	Amount of GHG emissions avoided or sequestered
15.Life on Land	15.1. By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Total non-renewable wood fuel saved
5. Gender equality	5.4. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	Percentage of households with average time saving associated with cooking time and fuel collection

3. Good Health and Wellbeing	3.9. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Percentage of households that observed reduction in PM2.5and CO concentration reductions
8. Decent Work and Economic Growth	8.5. By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Total number of jobs
1.No poverty	1.1. By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	Average household savings at cooking

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

SDG 13: Take urgent action to combat climate change and its impacts

Parameter: Amount of GHG emissions avoided or sequestered

Following formula is used for emission reduction calculations as per AMS-II.G (V 12.0) methodology:

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

Where;

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

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

ER_y = Emission reductions during year y (tCO2e)

$ER_{y,i,j}$	=	Emission reductions by project device of type i and batch j during year y (tCO2e)
LE_y	=	Leakage emissions in the year y (tCO2e)

Emission reductions by project devices of type i and batch j during year y is calculated as follows:

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{0,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel} \qquad \text{Equation (2)}$$

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved per cookstove device of type i and batch j during year y (tonnes)
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (fraction or %)
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected\_fossilfuel}$	=	Emission factor of fossil fuels projected to be used to substitute non-renewable woody biomass by similar consumers (tCO2e/TJ).
$N_{0,i,j}$	=	Number of project devices of type i and batch j commissioned (number) in year y
$n_{y,i,j}$	=	Proportion of commissioned project devices of type i and batch j ($N_{0,i,j}$) that remain operating in year y (fraction)
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year y

Number of project devices commissioned ($N_{0,i,j}$) will be monitored through database and monitoring surveys. For emission factor for fossil fuels displaced by the project stoves ($EF_{projected,\ fossil\ fuel}$) and net calorific value of the non-renewable woody biomass ($NCV_{biomass}$), default values will be applied (73.2 tCO2e/TJ and 0.0156 TJ/tonne).

Fraction of woody biomass is determined as using ex-ante option at the validation stage and will be fixed as 0.91 for the crediting period as per CDM Tool 30: Calculation of the fraction of non-renewable biomass[12]

Leakage effects due to the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users are accounted by multiplying $B_{y,savings,i,j}$ by a net to gross adjustment factor of 0.95.

Because of the nature of traditional baseline stoves in Tanzania – including three stone fires and traditional pot supports – it is not possible to ensure that these are disposed of. Therefore, a monitoring survey will be conducted to determine continued use of pre-project devices and to calculate the adjustment factor (μ_y).

Calculation of $B_{y,savings,i,j}$

$B_{y,savings,i,j}$ due to implementation of efficient thermal devices is estimated as per Option 3 Water Boiling Test:

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

Equation (7)

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 the old devices being replaced by project devices of type i and batch j (fraction)

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[12] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v3.0.pdf

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

In case of more than one project device is used in the household, following formula will be used to estimate the annual quantity of woody biomass that would have been used in the absence of the project activity:

$$B_{old,i,j} = B_{old,HH} \div N_{d,HH} \qquad\qquad\qquad \text{Equation (10)}$$

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 thermal energy equivalent to that provided by the project devices (tonnes/household/year)

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

The lifetime of each type of the project devices shall be documented in the PDD based on manufacturer's specification.

The loss in efficiency of the project devices i in each batch j due to aging shall be accounted during the monitoring period. Following options are applicable to monitor the loss in efficiency if Option 3: WBT Test is selected for ER calculation:

(a) A default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device; or

(b) Manufacturer of project devices shall confirm with technical justification based on certification by a national standards body or an appropriate certifying agent recognized by that body that no decrease in efficiency of project device is envisaged during the crediting period; or

(c) 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;

(d)   Determine the loss in efficiency annually from a representative sample of each batch and use the actual loss rate that is measured.

Option(a) is selected.

SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Parameter: Total non-renewable fuelwood saved

Project database and monitoring survey will be used to calculate total quantity of wood fuel saved by the project compared to baseline scenario.

SDG 3. Ensure healthy lives and promote well-being for all at all ages

Parameter: Percentage of households that observed reduction in PM2.5and CO concentration reductions

The beneficiaries of project stoves will be asked to evaluate any improvement in their health conditions compared to baseline situation during the household survey. By reduction of smoke due to the usage of project stoves, respiratory diseases such as itchy eyes or coughing are expected to lessen.

SDG 5. Achieve gender equality and empower all women and girls

Parameter: Time saving associated with cooking time and fuel collection

Average time spent by gender in Tanzania is shown in the figure below[13] as total hours spent daily that is 2.41hrs. During the household survey, questions about time

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[13] https://www.google.com/search?client=opera&q=clean+and+improved+cooking+in+sub-saharan+africa&sourceid=opera&ie=UTF-8&oe=UTF-8

spent on cooking and fuelwood collection will be asked to women in order to understand whether using project stoves saves time. Percentage of households who reported time savings equal to or more than 0.5 hours will be accounted.
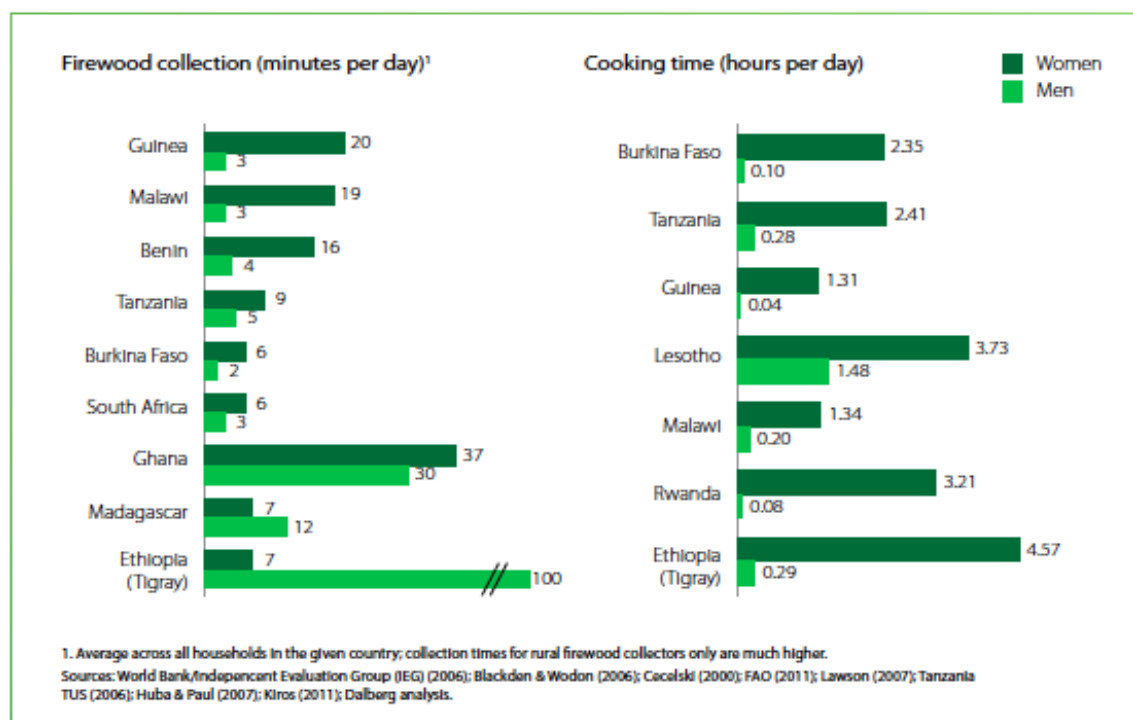
Figure.3 Firewood collection and cooking time by gender

SDG 8. Promote inclusive and sustainable economic growth, employment and decent work for all

Parameter: Total number of jobs

Number and type of jobs created will be recorded with employment status and duration. Training will be provided to the distributors and promoters on sale of cookstoves. Each distributor will report the sales volume to the project proponents monthly.

SDG 1. Zero Poverty

Parameter: Average household savings at cooking

Total non-renewable wood fuel saved will be multiplied by the price of 10 kg bag sold in the market. For ex-ante calculations, it is assumed to be USD 2.00/ bag; therefore 0.2 USD per kg

B.6.2 Data and parameters fixed ex ante

SDG13

Data/parameter	$f_{NRB,y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Calculated
Value(s) applied	0.91
Choice of data or Measurement methods and procedures	Calculated as per CDM Tool 30: Calculation of the fraction of non-renewable biomass (version 3.0)
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG13

Data/parameter	$n_{old,i,j}$
Unit	Fraction
Description	Efficiency of the baseline system being replaced in Baseline Scenario
Source of data	AMS-II.G. (v12) default value
Value(s) applied	Three stone fire- 0.10 Traditional Charcoal Stove- 0.11
Choice of data or Measurement methods and procedures	Default value for three-stone fire is used.

	WBT results for traditional charcoal stove is used[14].
Purpose of data	Calculation of baseline emissions
Additional comment	The project stoves will only be sold to the end-users who previously used traditional 3 stone fire or single wallet charcoal stove.

SDG 13

Data/parameter	$EF_{projected\_fossil\ fuel}$
Unit	tCO2e/TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers
Source of data	AMS-II.G. (v 12)default value
Value(s) applied	73.2
Choice of data or Measurement methods and procedures	Default value for Sub-Saharan Africa
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG13

Data/parameter	$NCV_{biomass}$
Unit	TJ/tonne

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[14] Fabrication and Performance Evaluation of an Improved Charcoal Cooking Stove (https://www.researchgate.net/publication/285160063_Fabrication_and_performance_evaluation_of_an_improved_charcoal_cooking_stove)

Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	IPCC default value
Value(s) applied	0.0156
Choice of data or Measurement methods and procedures	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.
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG 15 and SDG 13

Data/parameter	$B_{old,HH}$
Unit	tonnes/household/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate thermal energy equivalent to that provided by the project devices
Source of data	Estimation Of Household Energy Consumption Intensities Around And Within Miombo Woodlands In Morogoro And Songea Districts, Tanzania (2021)[15]
Value(s) applied	4.33
Choice of data or Measurement methods and procedures	The data based on a sample survey carried out in Morogoro.
Purpose of data	Calculation of baseline emissions

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[15] https://www.ajol.info/index.php/tjfnc/article/view/210921

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Additional comment	The value is cross-checked with similar projects developed in the country and found to be conservative[16].

SDG 13

Data/parameter	LE_y
Unit	Fraction
Description	Factor for the consideration of leakage
Source of data	AMS-II.G. (v 12)default value
Value(s) applied	0.95
Choice of data or Measurement methods and procedures	AMS-II.G. (v 12)default value
Purpose of data	Calculation of baseline emissions
Additional comment	

B.6.3 Ex ante estimation of SDG Impact

SDG 13: Take urgent action to combat climate change and its impacts
Parameter: Amount of GHG emissions avoided or sequestered

Ex-ante calculation for a project stove by using the parameter values fixed ex-ante is demonstrated as follows:

[16] VCS 2676 Up-Energy Social and Climate Impact Programme, baseline survey carried out showed that annual woody biomass consumption is 5.95 ton/year/hh (https://registry.verra.org/app/projectDetail/VCS/2676)

Parameter	Unit	Data Source	Value
$B_{old,HH}$	Tonnes/ household/ year	Estimation Of Household Energy Consumption Intensities Around And Within Miombo Woodlands In Morogoro And Songea Districts, Tanzania (2021)[17]	4.33
$\eta_{old,i,j}$	Fraction	Default as per AMS-II.G (V12.0)	0.1016
$\eta_{new,i,j}$	Fraction	Efficiency test results (WBT)	0.3125
f_{NRB}	Fraction	UNFCCC Default value for Tanzania	0.91
L	Fraction	Default as per AMS-II.G (V12.0)	0.95
μ_y	Fraction	Assumed	1
$NCV_{Biomass}$	TJ/tonne	Default as per AMS-II.G (V12.0)	0.0156
$EF_{projected\_fossilfuel}$	tCO2/TJ	Default as per AMS-II.G (V12.0)	73.2

$$B_{y,savings,i,j} = B_{old,i,j} \times (1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}}) \qquad \text{Equation (7)}$$

$$B_{y,savings,i,j} = 4.33 \; t/y \times (1 - \frac{0.1016}{0.3125})$$

$$B_{y,savings,i,j} = 2.92 \; t/y$$

Emission reductions per each stove per year is calculated by Equation 2:

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{0,i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\,fuel} \qquad \text{Equation (2)}$$

ERy = 2.92 t/y x 1 X 0.95x 1 x 0.91 x 0.0156 TJ/t x 73.2 tCO2/TJ= 2.88 tCO2/y

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[17] https://www.ajol.info/index.php/tjfnc/article/view/210921

Mutiplying for leakage emission factor of 0.95, emission reductions for each stove is:

ER_y=2.88 x 0.95= 2.74 tCO2e for the first year of operation. This amount decreases gradually as the stove ages. The project stoves that have completed their economic life at the end of the third year will be replaced by the new project stoves. The new project stoves are assumed to be operational in the fourth year of the crediting period.

Number stoves will be monitored by the project database.

SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Parameter: Total non-renewable fuelwood saved

$B_{y,saving, i, j}$ will be multiplied by the number of stoves sold and fraction of non-renewable biomass.

Total non-renewable fuelwood saved= $B_{y,saving, i}$ X $N_{0,j}$ x f_{NRB}

Fuel savings per household will decrease due to the loss of efficiency throughout the years as follows. The cookstoves will be replaced by new ones at the end of their lifespan on the 4th year:

	1st year	2nd year	3rd year	4th year	5th year	AVERAGE
Fuelwood savings per stove (t/hh/y)	2.659	2.455	2.172	2.659	2.455	2.480

Therefore; each stove will save 2.48 tonnes of fuelwood annually on average, adjusted by the loss of efficiency over the crediting period. Annual average savings will be 10,771 tonnes.

Total savings will be adjusted by the monitored number of project stoves operational.

SDG 3. Ensure healthy lives and promote well-being for all at all ages

Parameter: Percentage of households that observed reduction in PM2.5and CO concentration reductions

No calculation is applicable, the results of the household survey will be used.

SDG 5. Achieve gender equality and empower all women and girls

Parameter: Percentage of households with average time saving associated with cooking time and fuel collection

No calculation is applicable, the results of the household survey will be used.

SDG 8. Promote inclusive and sustainable economic growth, employment and decent work for all

Parameter: Total number of jobs

Project database and training records will used to predict the number of employment.

SDG 1. Zero Poverty

Parameter: Average household savings at cooking

Total number of non-renewable fuelwood saved will be multiplied by the average fuelwood price in the market.

One household saves 2.480 tonnes annually on average; 2,480 kg fuelwood, multiplied by 0.2 USD/kg, equals 496 USD savings per year.

B.6.4 Summary of ex ante estimates of each SDG Impact

SDG 13

Year	Baseline estimate (tCO2e)	Project estimate (tCO2e)	Net benefit (tCO2e)
01/03/2023-31/12/2023	18,866	6,136	11,489
2024	22,503	8,300	12,818
2025	22,503	9,818	11,448
2026	22,503	7,742	13,322
2027	22,503	8,280	12,836
01/01/2028 - 29/02/2028	3,699	1,395	2,079
Total	**112,577**	**41,671**	**63,993**
Total number of crediting years	**5 years**		
Annual average over the crediting period	22,515	8,334	12,799

SDG 15

Year	Baseline estimate (tonnes/year)	Project estimate (tonnes/year)	Net benefit (tonnes/year)
01/03/2023-31/12/2023	15,695	5,905	9,790
2024	18,721	7,987	10,734
2025	18,721	9,448	9,273
2026	18,721	7,450	11,271
2027	18,721	7,968	10,753
01/01/2028 - 29/02/2028	3077	1,343	1,735
Total	**93,656**	**40,101**	**53,555**
Total number of crediting years	**5 years**		
Annual average over the crediting period	18,731	8,020	10,711

The total number of project stoves operational is assumed to be 4,750 as per the assumed usage rate.

SDG 3

4,750 (95%) of the households are expected to experience less indoor air pollution due to reduced PM2.5and CO concentrations.

SDG 5

95% of all users of the project stoves are expected to save at least half an hour from cooking activities.

SDG 8

At least 140 jobs will created for manufacturing, distribution and sale support of the project cookstoves. The project is going to involve 60 distributors (local businesses) who will sell the cookstoves and 60 promoters who will have the role of promoting the cookstoves among the population. All these people will get a commission on the sale of the cookstoves.

About 20 people will be involved for the production of stoves.

SDG 1

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Each household will save USD 496 per year on average over the crediting period; each households will save 2,480 USD in total during the 5 years of crediting period.

Year	Baseline estimate (USD/year)	Project estimate (USD/year)	Net benefit (USD/year)
01/03/2023-31/12/2023	-	446	446
2024	-	499	499
2025	-	443	443
2026		516	516
2027	-	497	497
01/01/2028 - 29/02/2028	-	81	81
Total	**-**	**2,481**	**2,481**
Total number of crediting years	**5 years**		
Annual average over the crediting period	-	496	496

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

SDG 13

Data / Parameter	$N_{o,j}$
Unit	Number
Description	Number of commissioned project devices batch j
Source of data	Monitoring
Value(s) applied	5,000
Measurement methods and procedures	Project Database
Monitoring frequency	Continuous recording

QA/QC procedures	Registered data will be crosschecked by the sales agreements and distributor records. The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG13

Data / Parameter	$N_{d,HH}$
Unit	Number
Description	Number of project devices distributed per household
Source of data	Monitoring
Value(s) applied	1
Measurement methods and procedures	Project Database
Monitoring frequency	Recorded at the time of commissioning/distribution of project devices
QA/QC procedures	Registered data will be crosschecked by the sales agreements and distributor records. The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Calculation of baseline emissions
Additional comment	The results of ex post usage/monitoring survey should not be used to determine the value

SDG13

Data / Parameter	$n_{y,i,j}$
Unit	Percentage
Description	Proportion of commissioned project devices batch j ($N_{0,j}$) that remain operating in year y
Source of data	Household Survey
Value(s) applied	95%
Measurement methods and procedures	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence/precision levels. Separate samples shall be taken for each batch.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later. The cookstove IDs associated with the registered user will also be cross-checked during the usage survey.
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG13

Data / Parameter	$n_{new,i,j}$
Unit	Percentage
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	WBT Results
Value(s) applied	Firewood: 30.6% Charcoal: 38.5%

Measurement methods and procedures	Water Boiling Tests were carried out separately for firewood and charcoal as per WBT Protocol 4.2.3 by CREEC, Uganda[18]. For the decrease in efficiency option 27 a) of AMS-II.G., version 12, is applied as follows:		
		First Year	Second Year	Third year
	Project stove efficiency (fuelwood)	30.6	27.07	23.53
	Project stove efficiency (charcoal)	38.50	32.33	26.17
	Weighted average	31.25	26.95	22.64
Monitoring frequency	Recorded once at the time of commissioning/distribution Adjusted for the loss of efficiency as paragraph **Error! Reference source not found.**(a)		
QA/QC procedures	Water Boiling Tests are carried out as per the latest protocol version 4.3.2. Default efficiency lost factor will be applied throughout the life span of the stoves.		
Purpose of data	Calculation of baseline emissions		
Additional comment			

Data / Parameter	μ_y
Unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Household Survey
Value(s) applied	1

[18] Center for Research in Energy and Energy Conservation is certified with ISO/IEC 17025: 2017 Laboratory Management Systems.

Measurement methods and procedures	As per methodology; 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.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Calculation of baseline emissions
Additional comment	When the data loggers are used, the days when only project devices or only pre-project devices are used will be attributed accordingly. The days where both devices have been used, if the data loggers are able to detect and record the time each device has been used (e.g. in hours), the share in the total duration of utilization will be used to attribute a fraction of this day to one or to the other device. Alternatively, if the data loggers are not able to determine the duration of the utilization, but only the situation of the device being on or off (i.e. used or not used during that day), the share of 50:50 may be used

Data / Parameter	Life Span
Unit	Number of years
Description	The operating life time of the project device.
Source of data	Manufacturer (certified by a national standards body or an appropriate certifying agent recognized by that body)
Value(s) applied	3 years
Measurement methods and procedures	N/A

Monitoring frequency	Fixed and recorded at the time of commissioning /distribution
QA/QC procedures	Each cookstove will be replaced with the new cookstove at the 3rd year operations. The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG13

Data / Parameter	Date of commissioning batch j
Unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data	Project database
Value(s) applied	N/A
Measurement methods and procedures	The cookstoves in each batch will be monitored weekly. The sales record will be complied at the end of the each week and stoves will accepted to be operational the first Monday of the next week.
Monitoring frequency	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Calculation of baseline emissions
Additional comment	

SDG 15

Data / Parameter	Total non-renewable fuelwood saved
Unit	t/yr
Description	Total non-renewable fuelwood saved by the use of project cookstoves
Source of data	Household Survey
Value(s) applied	11,780
Measurement methods and procedures	Measured by project database records for the number of stoves used and adjusted by the usage rate determined by usage survey.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	Registered number of stoves will be crosschecked with the sales agreements and distributor records.
Purpose of data	Demonstration of contribution to SDG 15
Additional comment	

SDG 3

Data / Parameter	Percentage of households that observed reduction in PM2.5and CO concentration reductions
Unit	Percentage
Description	Percentage of households who perceived reduced indoor air pollution
Source of data	Household Survey
Value(s) applied	95%
Measurement methods and procedures	The households will be asked questions about their perception of reduced smoke during cooking in the project survey
Monitoring freQuency	At least once every two years (biennial)

QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Demonstration of contribution to SDG 3
Additional comment	

SDG 5

Data / Parameter	Percentage of households with average time saving associated with cooking time and fuel collection
Unit	Percentage
Description	Percentage of households who saved at least 0.5 hrs from cooking activities.
Source of data	Household Survey
Value(s) applied	95%
Measurement methods and procedures	The households will be asked questions about their perception of reduced time spent for cooking in the project survey
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Demonstration of contribution to SDG 5
Additional comment	

SDG 8

Data / Parameter	Total number of jobs
Unit	Number
Description	Total number of jobs created by the project
Source of data	Training records and Project Database
Value(s) applied	140

Measurement methods and procedures	The project aims to employ at least 140 people for the production, distribution and sales of stoves. Measured by training records and project database will
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	Each distributor and promoter will receive trainings about the stove sale and will report the sales volume to the project owner each month. The number of active distributors will be cross-checked from project database and the commission records they have earned.
Purpose of data	Demonstration of contribution to SDG 8
Additional comment	At least 50% of the promoters will be women.

SDG 1

Data / Parameter	Average household savings at cooking
Unit	USD/yr
Description	Average household savings at cooking due to the use of less fuelwood.
Source of data	Project Database
Value(s) applied	USD 496
Measurement methods and procedures	Measured by project database on the basis of number of stoves sold. The number of operational stoves will be adjusted as per the usage rate determined during usage survey.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	The data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.
Purpose of data	Demonstration of contribution to SDG 1
Additional comment	

B.7.2 Sampling plan

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The Monitoring Plan applied involves a number of key elements that ensure high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Verified Emission Reductions (VERs) following AMS II.G version 12.0 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity.

Below is the description of the steps in monitoring plan.

1. Registration of stove: Project Implementer will collect/receive the necessary information requested in the Registration process from the user. Following information will be recorded:
   - Serial Number
   - Contact details of the user
   - Date of installation
   - Address of the user
   - Number of stoves purchased

Every beneficiary of an ICS will sign a user agreement (paper and/or electronic version) with Project Developer. A unique serial number will be allocated to each stove and the number is indicated on the user agreement.

2. Data logged into database: Project Implementer's trained staff will input the data in the database either manually (if data collected using hard copy form) or this will be automatically input if data was collected electronically. The database will be maintained throughout the crediting period.
3. Monitoring: Project Implementer will follow the requirements as per methodology requirements to collect the necessary information for a monitoring report.
4. Preparation of monitoring report: Project Implementers or Project Developer will prepare the final monitoring report to be provided to the verifier VVB for verification of emission reductions.

The monitoring plan shall be elaborated in accordance with the Sampling Plan below.

Sampling Plan

(i) Objective and Reliability Requirements:

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

Table.4. Monitoring Parameters

Sr.No	Parameter	Description of Parameter	Monitoring frequency
1	$n_{y,i,j}$	Proportion of commissioned project devices of type i and batch j ($N_{0,i,j}$) that remain operating in year y (fraction)	Annual/biennial
2	μ_y	Adjustment to account for any continued use of pre-project devices during the year y	Annual/biennial
3	SDG 3 indicator	Percentage of households that observed reduction in PM2.5and CO concentration reductions	Annual/biennial
4	SDG 5 indicator	Percentage of households with average time saving associated with cooking time and fuel collection	Annual/biennial
5	SDG 15	Total non-renewable fuelwood saved (based on the number of operational stoves)	Annual/biennial
6	SDG 1	Average household savings at cooking (based on the number of operational stoves)	Annual/biennial

(ii) Target Populations:
- The target population for parameters 1 and 2 are all households in the project database which are using fuel wood for cooking.

Sampling Method:
The sampling method for all monitored parameters is Simple Random Sampling and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Each ICS can thus be allocated a Sample Selection Number in each

monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size.

To determine the parameters, sampling will involve 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
μ_y	Interview with end user and visual inspection to determine if a baseline (replaced) stove is still being used in addition to ICS
SDG 3 SDG 5	In order to demonstrate the contributions to SDG 3 and SDG 5, questions regarding the perception of reduction in indoor air pollution and time saved from cooking will be asked during the household survey.

Sampling Frame:

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration process for newly distributed/installed ICS and the Household Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the project.

Confidence/precision level:

AMS-II.G (V12.0) defines confidence/precision criteria to be met in paragraph 48: 'When biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error shall be achieved for the sampling parameter. On the other hand, when the project proponent chooses to inspect annually, a 90 per cent confidence interval and a 10 per cent margin of error shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/10 precision are not achieved, the lower bound of the 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision. '.

Sample Size:

The following assumptions are made to exemplify the sample size calculation for parameters: $n_{y,i,j}$, μ_y and parameters for SDG 3 and 5

Project Developer envisages that a total of 5,000 ICSs will be distributed in Tanzania in the first eyar of operation. Hence, population size, N, is taken as 5,000 households/ICS (Assuming one ICS for one household).

It is expected at least 95% of ICS still in operation. Hence the expected proportion p for $n_{y,i,j}$ is taken as 0.95.

It is expected that the users of the project stoves will not continue to use three stone fire and the value for μ_y is taken as 1. However, this should be monitored as per the applied methodology. Therefore, the sample size calculation is based on anticipating a discontinued use of 95%.

For SDG 3 and 5; it is assumed that 95% of the users will respond that they have experienced a reduction indoor pollution and time spent for cooking.

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

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

Where:

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

Sample size calculation:
The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision. In all cases a

conservative approach is taken, however if for any parameter the required 95/10 confidence/precision is not met then the Project Developer will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Following sample sizes are calculated for parameters $n_{y,i,j}$ and μ_y:

Parameter	Population size (N)	Expected proportion (p)	Required Sample Size
$n_{y,i,j}$	5,000	95%	30
μ_y	5,000	95%	30
SDG 3 indicator	5,000	95%	30
SDG 5 indicator	5,000	95%	30

At least 30 households will be surveyed. All data will be stored at least two years after the end of crediting period or last issuance of carbon credits, whichever is later.

B.7.3 Other elements of monitoring plan

Data Collection and maintanance:

Project database will be established and maintained by the local partner MUTINA group, which will deploy its local staff on the ground to monitor the distribution of the cookstoves.

At the moment of the sale, details of the end-users will be collected by carbon right vouchers and information will be stored in a database managed by OffgridSun staff. A cross-check will be made from time to time to ensure the consistency of the data with the vouchers.

Training and After-sale Services:

All distributors and promoters will be trained regarding the registration of the cook stoves in the database.

After sale services will be performed by MUTINA by periodically communicate with the end-users both via phone and through personal visits. Moreover, the end-users will have the possibility to get in contact with the distributors and promoters in case of problems with the stoves (e.g. break of cookstoves).

Replacement of low performance stoves:

After its 3 years of use, MUTINA will assess whether the project stove will go through a complete overhaul for continued use under same ID or will be completely replaced. The project proponents MUTINA and OffridSun will assure that either the replaced low efficiency appliances are disposed of and are not used or found in the kitchen environment within the boundary or within the region.

Monitoring:

Annual/biennial household survey will be performed to collect data related about the use of the stoves. Data will be collected and stored in a database managed by OffgridSun. MUTINA will support on the ground for the collection of the data. All staff involved in Household Surveys will be trained on conduction of interviews and inspection of the project stoves.

SDG 8. Total number of jobs : The project will create 140 jobs for distributors, promoters and maintenance. This will be monitored through project database and training records to the employees.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

01/03/2023 (Distribution and sale of the stoves is estimated to start on March 2023)

C.1.2 Expected operational lifetime of project

15 years

C.2. Crediting period of project

C.2.1 Start date of crediting period

01/03/2023

C.2.2 Total length of crediting period

5 years, renewable twice

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in Appendix 1, ongoing monitoring is summarised below.

Principles	Mitigation Measures added to the Monitoring Plan
Principle x.y	N/A

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The project is gender sensitive and considers gender aspect in all phases. Women and young girls are responsible for cooking and fetching firewood in rural Tanzania. The project will lessen time spent for cooking activities for women and girls.
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	National Strategy for Gender Development- Tanzania (2000) states poverty and work overload for girls and women at household level continue to be major obstacles which cause drop-out of both girls and boys in school and training institutions. The women also has limited participation to economic activities due

	to work overload particularly in rural areas[19].
	Women and girls being the main energy producers in a family; they are burdened with the responsibility to source energy options for the daily needs of their families. The project cookstoves will save time for women to join educational or economic activities.
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	Gender issues raised by Gold Standard Safeguarding principles are all addressed under the Safeguarding Principles Assessment in Appendix.1. No risks have been foreseen by the stakeholders and project developer.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	As per Stakeholder Consultation Requirements, the project developer invites all stakeholders to give feedback on the design and the implementation of the project. During the consultation process, particular importance is given to the equal participation of women. Gender related organizations who actively work in rural areas have been invited to the meeting.

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[19] https://www.tanzania.go.tz/egov_uploads/documents/Tanzania_-_National_Strategy_for_Gender_Development_sw.pdf

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

The stakeholders confirmed that the project will provide net SDG benefits and will not pose any risks towards safeguarding principles. Therefore, no alterations are foreseen based on the comments received.

There were comments to include institutions as project beneficiaries. This will be considered if there is demand from schools. Stoves in bigger sizes would be needed to be produced for their use.

There is another comment for promotion tree planting. Deforestation will be explained and tree planting will be encouraged during the trainings.

E.2 Final continuous input / grievance mechanism

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.
Continuous Input / Grievance Expression Process Book (mandatory)	A process book will be placed in chief's office in each village.
GS Contact (mandatory)	help@goldstandard.org
Telephone access (optional)	For Tanzania: 0755 086462 For Italy:+39 3516142230
Internet/email access (optional)	projects@offgridsun.com

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into SECTION D above. Please refer to the instructions in the Guide to Completing this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights 2. The Project shall not discriminate with	**No**	1. The United Republic of Tanzania is a member of the United Nations and the African Union. It has ratified many UN Human Rights Conventions and thus has made binding international commitments to adhere to the standards laid down in these universal	N/A

regards to participation and inclusion		human rights documents.[20] The project will be implemented under the national laws and will not lead to violations of human rights in any kind. 2. There is no limitation to the participation to the project.	
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender	**No**	1. The project aims to decrease the burden on women in the most vulnerable communities	N/A

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[20] http://www.claiminghumanrights.org/urtanzania.html?&L=ofefghqitmbv%2F%25

equality and/or the situation of women 2. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)		by reducing fuel wood consumption. The time spending for fuel wood collection and cooking will reduce. The women will have more time for other activities. The risk of being exposed to gender-based violence will decrease as well. 2. Both women and men will have equal access to the project stoves and other benefits. The project will provide job opportunities. Principles of equal treatment, equal pay for equal work will be strictly followed. 3. The Project respects the country's gender	

		policy. The project addresses gender issues related with energy by installing improved cookstove technologies for households. Women and girls, being the main beneficiaries of the project are actively involved in all phases of the project and participating stakeholder consultation. 4. N/A	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks	**No**	The cookstoves will be produced by EnvoTec Services Limited, established in 1998	

and shall not adversely affect the health of the workers and the community		and has been working on stove technologies to date. The company works in collaboration with various institutions, including Ministry of Energy and Minerals, Rural Energy Agency, Tanzania Bureau of Standards, ISO and Global Alliance for Clean Cookstoves. The company follows the requirements in The Occupational Health and Safety Act 2003[21] and assures safe workplace during manufacturing of the stoves.	
Principle 4.1 Sites of Cultural and Historical Heritage			

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[21] https://procedures.tic.go.tz/media/OSHA%20ACT,%202003.pdf

Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	No	The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage.	
>>			
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	The project does not require or cause the involuntary relocation of people.	
>>			
Principle 4.3 Land Tenure and Other Rights			
Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or	No	The project does not require any change to land tenure arrangements and/or other rights such as resource access	

access rights, usage rights or land ownership? >>		rights, community-based property rights and customary rights.	
Principle 4.4 Indigeneous people			
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	**No**	No indigenous people will be affected by the project implementation.	
Principle 5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or	**No**	The Prevention and Combating of Corruption Act [22] describes corruption and related offences. The project participants will act in line	

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[22] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj8_Y-YtqL3AhXXSvEDHQNVCDQQFnoECAMQAQ&url=https%3A%2F%2Fwww.fiu.go.tz%2Fpcca.pdf&usg=AOvVaw0Udwcn7cTfFaLzQk7QsA4Z

reinforce corruption or corrupt Projects		with the provisions and not be involved, complicit or contribute towards corruption.	
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions 2. Workers shall be able to establish and join labour organisations	**No**	1. Tanzania ratified ILO N°87 Freedom of Association and Protection of the Right to organize convention in 2000[23]. The project participants will employ all workers in accordance with all applicable national laws. 2. Tanzania ratified ILO N°98 Right to organise	

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[23] https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:103476

3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision for voluntary		and collective bargaining convention in 1962. The project participants will not restrict any workers from establishing and joining labour organisations. 3. Tanzania ratified ILO N°29 Forced Labour Convention in 1962. All permanent workers will be provided with individual work agreements, including working hours, description of duties and tasks, remuneration, health insurance, termination of the contract, annual leave.	

resignation by employee, AND f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave. 4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) 5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency		4. Tanzania ratified ILO N°182 Worst Form of Child Labour Convention in 2001 and ILO N°138 Minimum Age Convention in 1998. The project participants do not engage in any form of child labour. 5. The project participants will assure safe working environment, machinery and appropriate equipment used during the manufacturing.	

preparedness and response measures			
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic consequences during and after project implementation? >>	**No**	No risks are foreseen in terms of negative consequences for local economy. The project will be financially sustainable through the sale of cookstoves and carbon finance. The project will also create jobs for local people.	
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario? >>	**No**	The project will not lead to any increase in greenhouse gas emissions. The project stoves will rather reduce emissions due to the increased thermal efficiency compared to the baseline stoves.	

Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users? >>	**No**	The project does not utilize any form of energy supply that is also being used by other users.	
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity? >>	**No**	The project does not use any water.	
Principle 8.2 Erosion and/or Water Body Instability			

Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	**No**	The project will disseminate efficient cookstoves to households. No damage is foreseen for nature of soil or water bodies.	
Is the Project's area of influence susceptible to excessive erosion and/or water body instability?		No, the project's area of influence is limited to households and their cooking practices. No excessive erosion and/or water body instability expected.	
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	**No**	The project will disseminate efficient cookstoves to households. No use of land or soil is applicable.	
>>			
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased	**No**	The project will disseminate efficient cookstoves to	

vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?		households. No such risk is foreseen.	
>>			
Principle 9.3 Genetic Resources			
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	**No**	Not relevant	
>>			
Principle 9.4 Release of pollutants			

Could the Project potentially result in the release of pollutants to the environment? >>	**No**	The project will disseminate efficient cookstoves to households. Indoor air pollution in houses will be reduced compared to the baseline stoves.	
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials? >>	**No**	Not relevant	
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers? >>	**No**	Not relevant	
Principle 9.7 Harvesting of Forests			

Will the Project involve the harvesting of forests? >>	**No**	The project aims to reduce firewood consumption by installing highly efficient cookstoves. This will reduce the harvest rate of forests.	
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives? >>	**No**	Not relevant	
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry? >>	**No**	Not relevant	
Principle 9.10 High Conservation Value Areas and Critical Habitats			

Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified? >>	**No**	Implementation of the project will have a positive impact on forests; thus, to conservation of HCV ecosystems, critical habitats, landscapes, key biodiversity areas or other sites, by reducing the firewood harvesting.	
Principle 9.11 Endangered Species			
Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? AND/OR Does the Project potentially impact other areas where endangered species may be	**No**	Not relevant.	

present through transboundary affects?			
>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Offgridsun
Registration number with relevant authority	05013960280
Street/P.O. Box	Via Verdi 45
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Organization name	Mutina Group

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Direct tel.	
Personal e-mail	george@sunsweetsolarltd.com

APPENDIX 3- LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	N/A
Risk of change to the Project activities during Project Certification Period:	N/A
Land-use history and current status of Project Area:	N/A
Socio-Economic history:	N/A
Forest management applied (past and future)	N/A
Forest characteristics (including main tree species planted)	N/A
Main social impacts (risks and benefits)	N/A
Main environmental impacts (risks and benefits)	N/A
Financial structure	N/A
Infrastructure (roads/houses etc):	N/A
Water bodies:	N/A
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	N/A
Where indigenous people and local communities are situated:	N/A
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	N/A

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

N/A