Project Design Document for BOKU Carbon Offset project

GREEN SEED

ImprovinG Rural Energy sErvices aNd building Sustainable landscapEs and livElihooDs

Table of content

Key project information

Title of the project:	GREEN SEED: ImprovinG Rural Energy sErvices aNd building Sustainable landscapEs and livElihooDs
Brief description of the project:	GREEN SEED is a climate mitigation and adaptation project aimed at reducing GHG emissions of >20.000 tCO2e over 5.5 years, while at the same time supporting local livelihoods, agricultural and natural resource management practices in their adaptation efforts to climate change.
Expected implementation date: Expected duration of the project:	01.01.2025 - 30.06.2030, 5.5 years
Project developers:	Caritas Feldkirch/Austria with support of Meki Catholic Secretariat (MCS) and University of Natural Resources and Life Sciences, Vienna (BOKU)
Project representative:	CFK: Mag. Harald Grabher, MSc; Programme Manager harald.grabher@caritas.at MCS: Solomon Kebede; Development Director solomon.kebede@mcsethio.org BOKU: n.n.
Project participants and any communities involved:	CFK, MCS, BOKU, Wondo Genet College of Forestry and Natural Resources, Melkassa Agricultural Research Center working with village communities in the districts Adami Tulu/Jido Kombolcha, Tiyo and Dugda
Host country/location:	Ethiopia, Oromia Regional State, East Shoa and Arsi Zones
Monitoring method:	GOLD STANDARD Methodology for clean and efficient cookstoves, Version: 3.0, 08/07/2022
Carbon standard: Emission savings:	GOLD STANDARD Methodology for clean and efficient cookstoves, Version: 3.0, 08/07/2022 > 25.000 tCO_2E within 5 years, ca 5.000 tCO_2e/year
SDG impacts:	SDG1 (No Poverty), SDG 5 (Gender Equality) SDG 8 (Decent Work and Economic Growth) SDG 12 (Resp. Consumption and Production) SDG 13 (Climate Action), SDG 15 (Life on Land) SDG 17 (Partnerships for the Goals)
Size of the project and planting area:	The project will target 5,750 households in 10 village communities *(kebeles)* in the target districts covering an approximate area of 250 km2
Land-use history and current status of the area:	Households will implement the project activities on their own homesteads and farmlands, for which the Ethiopian land tenure system grants usufruct rights [1]. Communal lands belonging to the 10 targeted communities will be addressed in activities on erosion control and natural resource protection.

Infrastructure (roads/houses etc.):	The project area is predominantly rural, with little social infrastructure. Some villages have health posts and simple rural schools. Nevertheless, road access is good, as a major is close to the implementation area. The next major town with adequate infrastructure is Meki.
Socio-economic history of the area:	The project area is dominated by cropland farming and livestock husbandry and offers limited other livelihood opportunities. The area has a mixed Ethnic background with the majority of the population considering themselves *Oromo.* The project sites are is far away from conflict zones of northern Ethiopia, and has remained stable and accessible throughout the conflict and the Corona pandemic. Northern Ethiopia has recently seen civil conflict that also had effects on other areas. In the past months a ceasefire has been established and peace talks are on the way.
Is the site used by indigenous people and local communities, or has its special significance for indigenous people and communities	No sites of specific spiritual significance to the local population are targeted in this project.
Forest management applied (past and future)	The project is largely covered by land used for crop production, which may be interspersed with trees. Remaining forested areas in the communities are governed by by-laws established at community levels which regulate their use (Crewett et al. 2008).
Forest characteristics (including main tree species planted)	The area is considered subtropical dryland and holds a variety of acacia species, *Cordia africana, Grevillea robusta, Faidherbia albida, Olea Africana*. In the past, different eucalyptus varieties were been planted at higher altitudes on homelands for woodfuel production.
Main social impacts (risks and benefits)	- To ensure effective use of any form of assistance and community contribution as well as the efficient management of assets built and transferred, an asset-distribution approach through saving and lending groups will be used. - To stimulate local production and market availability of the '*Mirt'* stoves, local production groups will be established in selected villages. These production groups present a rural, off-farm income opportunity, especially for interested youths and women. Major health issues like indoor air pollution (IAP), eye inflammations or skin burns have been identified as a major health burden for rural households relying on biomass energy (Fullerton et al. 2008). To reduce IAP, the project will improve access to cleaner and safer energy technologies Risks: Adoption of the ICS might meet challenges, but these are mitigated by extensive awareness raising campaigns and trainings on ICS use in the project area. In a predecessor project we

	achieved adoption rates of >90% and we are confident to repeat this success.
Main environmental impacts (risks and benefits)	Land degradation reduces the communities 'resilience to climate change and undermines food security (Hurni et al. 2015; Grabher 2020). This project ties into national efforts to curb ecosystem resource depletion and foster sustainable land management (World Bank 2019). Three major activities are combined in the GREEN SEED project to contribute to these efforts in a landscape management approach: a) by reducing biomass exploitation for household energy with the introduction of fuel-efficient technologies for the full duration of the project, b) by diffusing efficient natural resource management technologies to rural farmer households to reduce soil erosion (soil bunds, stone bunds, *fanya juu,* vegetative strips and other locally accepted NRM technologies) c) by promoting more sustainable agricultural practices to minimize soil fertility depletion and increase food security (permaculture, composting, crop rotation, intercropping and other locally accepted sustainable agricultural practices). Risks: Limited uptake of more sustainable land use practices. The risk is mitigated through a strong participatory effort in identifying acceptable NRM practices and beneficial agricultural practices.
Experiences with carbon offsetting projects	The carbon-offsetting project GREEN-RE with a similar partner structure in comparable rural settings. This project aimed at emissions savings of 24,000 tCO_2, mainly through ICS deployment, within 5.5 years. The project was accompanied & verified by BOKU and finally produced ca. 29.000 tCO_2 savings.
Financial structure:	The project is financed through contributions for the reduction of CO_2 emissions (> 90%) at a cost of Eur 34

SECTION A. Description of project

A.1. Purpose and general description of the project

This small scale project involves the distribution of energy-efficient improved cookstoves (ICS) to households in The Federal Democratic Republic of Ethiopia. The majority of households in rural areas of of Ethiopia cook over open fires, leading to a significant consumption of fuelwood, as well as a major health risk. To combat this challenge, this project will distribute low cost, high efficiency ICS that use considerably less wood than conventional open fires. Users are households who previously used inefficient, traditional open fireplaces. Deforestation and degradation have become a major concern in rural areas of Africa, as wood demand for household energy largely exceeds the available renewable woody biomass. By reducing the fuel wood consumption, the project activity hence reduces greenhouse gas (GHG) emissions stemming from the use of non-renewable biomass. Two different types of stoves will be distributed as part of the GREEN SEED project, in accordance with local cooking requirements in the program area. Monitoring data, including information collected during the distribution and installation of the ICS will be captured in an electronic database. From this data, the emissions reductions will be determined.

A.1.1. Background and Problem Statement

Three billion people in rural areas of developing countries remain dependent on biomass for their energy needs and less than a third of these people have access to improved or clean cookers (World Bank 2015). This lack of access to clean(er) energy leads to poverty and gender inequality (Rao und Reddy 2007; Reddy et al. 2013; Pueyo und Maestre 2019). Worldwide, more than 1 billion tons (Mt) of biomass are used for cooking each year (World Bank 2015). Cooking and space heating using traditional methods account for three quarters of this demand (Maes und Verbist 2012).

In Ethiopia, more than 90% of the energy consumed stems from biomass, but it accounts for 98% of the energy used in rural households (Mondal et al. 2018). Their energy carrier mix consists mainly of firewood. The availability of grid electricity remains marginal (Mondal et al. 2017). Nationally, greenhouse gas (GHG) emissions from forest degradation for fuelwood are expected to increase from 24 Mt of CO2 in 2010 to 41 Mt of CO2 in 2030 if no action is taken (CRGE, 2011). Deforestation and degradation have become a major concern in rural areas of Africa, as wood demand for household energy largely exceeds the available renewable woody biomass (Hurni et al. 2015).

The target area in the rural areas of the Oromia federal state of Ethiopia is characterized by dry climate and is considered drought-prone. The area has a potential for crop production, but due to the lack of sustainable agricultural practices, productivity remains low. As result, the target districts have been characterized as food insecure by the government of Ethiopia since 2005. In the target region, most households remain dependent on biomass for cooking, lighting, and heating their homes, particularly in the proposed project areas. This has led to a significant degradation of land and minimize production and productivity of farmers. Unsustainable biomass collection depletes forests and contributes to soil erosion and the loss of watersheds, placing additional pressure on agricultural productivity and food security, which indirectly affects the living standards and well-being of farmers in the area. Traditional open-fire stoves are used in most households to bake *injera*, the main staple food in Ethiopia. These stoves are made by arranging three stones (or other materials in a triangular position around the fire. In the process, 90% of the energy supplied by the heat is lost to the surrounding environment (GSF 2023). Searching for and using solid biomass fuels places women's and children's safety at risk of indoor air pollution. Children are especially vulnerable to exposure from pollutants, which can impede the

development of their organs and immune systems (WHO 2018). Exposure to biomass smoke is a significant risk factor for acute lower respiratory infections in children, including pneumonia, which remains one of the most common causes of death in children under five globally.
ICS stoves can reduce indoor air pollution with significant health benefits, save energy, reduce the time and burden of collecting firewood, and limit the associated exposure of collectors to physical attack and/or gender-based violence by providing a host of social benefits (Jewitt et al. 2020; Jürisoo et al. 2018; Kshirsagar und Kalamkar 2014; Malla und Timilsina 2014).

Deforestation and soil degradation are major environmental problems negatively affecting the food security of rural areas in Ethiopia. The increasing population has resulted in extensive forest clearing for agriculture, fuelwood, and construction materials, which has reduced the country's forest cover from 40% a century ago to 12% today. Deforestation and overgrazing are the major driving forces behind declining agricultural productivity in Ethiopia as a result of huge soil losses and deteriorating soil fertility, structure, and moisture storage capacity. In Ethiopia, fertile topsoil is lost at a rate of one billion m3/year, posing a serious threat to agriculture (Hurni et al. 2015). Increased human and livestock population growth will lead to even more intensive use of cultivable land to produce more food and feed. Sustaining agricultural production under this scenario requires building sustainable landscape and livelihood sources. Chemical fertilizer consumption increases exponentially in the target areas, causing environmental problems (soil, water & air pollutions). The use of chemical fertilizers has been linked to a reduction in natural soil fertility, the organic content of the soil and soil life in the form of microorganisms (Neal et al. 2020).

GREEN SEED has been developed to significantly contribute to carbon saving and energy efficiency, increase the sustainable use of land and natural resources and improve the livelihoods of targeted rural households in Adami Tulu Jido Kombolcha and Dugda woredas in East Shoa Zone and Tiyo Woreda of Arsi zone in Oromia Regional State, Ethiopia. The project has three strategic objectives:

a) to reduce greenhouse gases emissions by 25,000 tons of CO2e by promoting energy efficient cooking stoves (ICS) at the end of June 2030.
b) to increase the sustainable use of land, and natural resource base through promoting climate-friendly sustainable land management practices.
c) To reduce pressure on landscape through promoting sustainable alternative livelihood opportunities for poor rural households

a) Mitigation activities:

As the main planned climate mitigation activity, 5,750 rural Ethiopian households will receive and maintain the dual package of 1 *Mirt* and 1 *Tikikil* ICS each, thus 11,500 stoves in total. ICS will be put into use for a duration of 5 full years for the *Mirt* stove and at least 3 years for the *Tikikil* stoves (conservative assumptions). On average, savings of > 1.5 tCO2 per household per year will be achieved (conservative calculation). The annual total CO2 savings will amount to > 5,000 tCO2e/yr. Over 5 years of project life > 25.000 tCO2e savings will accumulate. An extension/expansion of the project scale and lifetime is possible and foreseen.

GREEN SEED will distribute low cost, energy-efficient stoves that use considerably less biomass than open fires. The improvement of the combustion process with improved cook stoves (ICS) leads to considerable efficiency gains of between 20-67% (Jetter und Kariher 2009; Dresen et al. 2014; Kshirsagar und Kalamkar 2014) and to a reduction of climate-relevant emissions (Mamuye et al. 2018). Increased use of ICS in Ethiopia can lead to significant savings in firewood (up to 233.2 PJ/year) and will thus make important contributions to human health (Pratiti et al. 2020), more sustainable food systems and ecosystem services (Tanner und Johnston 2017; Theurl et al. 2020).

GREEN SEED will provide efficient biomass stoves to target households who are entirely dependent on biomass for energy. The provision will be done through Savings and Internal Lending Community (SILC) groups which will be organized with the targeted households. The purpose of providing these efficient biomass stoves is to largely replace inefficient traditional three stone open fires and other traditional stoves that would otherwise be used in the absence of the project activity. While multiple cookstove technologies may be utilized to address the unique cooking needs, energy services requirements and fuel carrier availability and the preference of targeted households, two time-tested and highly accepted example technologies will account for more than 90% of the technologies deployed, i.e. the *Tikikil* rocket stove and the *Mirt* hearth (for details, see A. 3.)

<u>b) Adaptation activities:</u>

GREEN SEED fosters adaptation to climate change and mitigate the emissions as result of unsustainable land use practices: by protecting natural resources to increase carbon storage on degraded lands and deforested areas, as well as by promoting sustainable land management to conserve soil, create buffers against droughts and floods, maintain water tables, and conserve plant and animal diversity. These changes in land use require putting into place land governance structures and regulations, monitoring and enforcement mechanisms to transform practices and emissions patterns across the targeted landscape.
The project follows a landscape management approach by promoting sustainable interactions between land use practices, natural resource, ecology and the protection of rural livelihoods. The project aims to promote climate-friendly sustainable agricultural practices to improve agricultural livelihoods and to combat deforestation and soil erosion by introducing sustainable land management practices. To attain a more sustainable land use system, it is necessary to promote the sustainable use of biomass and minimise inefficiencies.

GREEN SEED will promote planting multipurpose trees such leguminous and forage trees on farm boundaries, homesteads and communal lands. Planted trees will help to improve soil health, forage availability for livestock and thereby contribute to climate change mitigation and adaptation. The management of tress through farmer managed natural regeneration (FMNR) practice along with implementation of soil and water conservation measures will reduce land degradation by reducing soil erosion at the same time improve crop yields and animals feed and accordingly maximizing synergies between different components. By leveraging synergies between different activities, nutrient recycling, biomass and water availability will be improved. The project focuses on planting fruit tree seedlings and nitrogen-fixing trees to promote permaculture home-gardening. The status of FMNR and fruit and multipurpose trees will be digitally monitored with a mobile application (with experience from a prior project called “Regreening Africa”) and in collaboration with a CIFOR-ICRAF.

c) Additional contributions to the SDGs and improved livelihoods:

To tackle wider community challenges aligned with the SDGs, the target households will be organized into Savings and Internal Lending Community (SILC) to improve their living conditions through diversifying income sources and access to capital. 150 HHs who have interest and can make an adequate backyard available will be provided with capacity and inputs to establish permaculture gardens; 150 households will be provided with capacity and tools to conduct sustainable natural resource management options to re-green 75 ha of farmland through (FMNR) farmer-managed natural regeneration and soil and water conservation. 10,000 tree seedlings will be produced and planted as multi-purpose and fruit trees in homesteads and farm boundaries. Existing women's and youth groups will be provided with farm tools to maintain area enclosures, and with modern bee hives and accessories for income generation. Together with each activity, the project will provide skills and capacity-building trainings so as to capacitate the technical and managerial capacities of target beneficiaries.

Innovative elements

- All technology inputs will be made available to the user households by way of locally established SILC groups. Thus, savings practices of the communities will be strengthened and access to small-scale rural financial credit will be enhanced.
- Remaining funds generated from emission savings, after recovering project costs, will be paid out to the communities participating in the project through the established SILC groups.
- GREEN SEED follows a landscape management approach by promoting sustainable interactions between land use practices, ecology and the protection of rural livelihoods.

Socio-economic approach

- The reduction in GHG emissions creates income from the voluntary carbon market. This will be used meet the costs of delivering the project.
- *Mirt* & *Tikikil* stoves are manufactured or assembled locally. *Mirt* stoves will be produced by producer groups in the local areas.
- The *Mirt* stove will come with a warranty scheme by the producer groups, so that replacements will be facilitated and lifetime is extended.

Economic incentives to adopt the new technologies:

- Reduced functional time use or costs for households that collect or purchase fuelwood.
- Scheme for payment of continuous ICS adoption at community level.
- Reduced indoor air pollution and associated health burdens.

To ensure sustainability, the knowledge and skills developed among target households and family members through various awareness-raising and capacity building training activities will contribute to a continuous change in attitudes, practices, and norms towards continues utilization of improved cooking stoves and building sustainable landscape and livelihood sources. The project has strong government policy support to influence and promote the efforts of the project beyond the project as they go along with existing national policy frameworks towards climate change impact mitigation, adaptation and building green economy.

A.1.2. Purpose/ Objective of the project:

The general objective of the project is to significantly contribute to energy efficiency, increase the sustainable use of land and natural resources and improve livelihoods in rural households of 10 targeted kebeles in Adami Tulu Jido Kombolcha and Dugda woredas of East Shoa Zone and Tiyo Woreda of Arsi zone in Oromia Regional State, Ethiopia.

Specific objectives

- To reduce greenhouse gases emissions by > 25,000 tons of CO2e through promoting energy saving cooking stoves to 5,750 households by June 2030
- To increase the sustainable use of land and natural resource base by promoting climate-friendly sustainable land management practices by June 2030.
- To reduce pressure on landscape through promoting sustainable alternative livelihood opportunities for poor rural households by June 2030

A.1.3. Target Groups

The project will target 5,750 households who are dependent on biomass for energy in 10 rural kebeles of Dugda and ATJK Woredas of East Shoa Zone and Tiyo Woreda of Arsi Zone in Oromia Region. Indirectly the project will address a total of 28,750 people out of which 14,087 are female and 14,663 are males.

A.2. Location of the project.

(Host Country, Region, City/Town/Community, and Physical/Geographical location. Include information allowing the unique identification of this project)

The project will be implemented in Ethiopia, Oromia Regional State, East Shoa Zone, in Adami Tulu Jido Kombolcha, Tiyo, and Dugda woredas (districts), with Batu, Asela, and Meki as administration towns. The project will target 10 rural kebeles, 2 kebeles in Dugda, 4 kebeles in Tiyo, and 4 kebeles in ATJK, covering an approximate area of 250 km2.

The agro-ecological zone of the target woredas is categorized under low and midland climatic zones, with the annual rainfall ranging from 500mm to 750 mms and the average annual temperature of 27^0c.The altitude of the project area is within the range of 1500m to 2000m above sea level. The majority of the communities are settled around their farmland. The livelihood of the community is based on subsistence agriculture; predominantly, they produce cereal crops for their household consumption as well as for the market. Livestock also plays an important role in their livelihood, among which small ruminants are dominant.
The energy sources are mainly based on biomass. Kerosene is mainly used for lighting, and electricity is not available in rural locations. However, biomass is the most important source of domestic energy supply both in urban and rural areas (East Shoa Zone Finance Office, 2023). Intensified utilization of wood products results in deforestation in the target woredas.

Local Implementing Organization:

The Vicariate of Meki is one of the 13th dioceses of the Ethiopian Catholic Church (ECC). It administers its functions through Meki Catholic Secretariat (MCS) which has been operational since 1995. The Social and Development Commission Branch Office of Meki (SDCBOM) located in Meki town. The working area of ECC-SDCBOM covers an area of about 44,600 km2 with a population of around 3.7 million of which 88% live in rural areas. ECC-SDBOM is a faith-based organization that works to ensure holistic, integral and sustainable social development for the disadvantaged in its operation area with full collaboration and participation of different stakeholders. It stands to empower the poor, marginalized and disadvantaged communities. It promotes environmental and social harmony between groups in society and between nature and human action and aspires to see communities in its operation area provided with opportunities for all its members (male, female, poor, rich, disabled and marginalized groups) for self-development. ECC-SDCBOM's primary programmatic areas of focus are education and training; health and nutrition; agriculture and food security; water, sanitation and hygiene; women and youth empowerment, emergency humanitarian and peacebuilding. ECC-SDCBOM has been active through Social and Development Programs and Projects in 3 zones, 16 woredas and 4 towns of the East Shoa, Arsi and West Arsi Zones of Oromia. In 2023, the organization has implemented ETB 506,741,039.91 worth of programs to the benefit of 1,025,371 people through 19 projects.

ECC-SDCBOM has a long-established and good working relationship with local communities and government sector offices at all levels through the implementation of different projects for over decades which will facilitate the envisioned project implementation in the targeted area. ECC-SDCBOM has also established long years of partnership with different international donors such as CRS-Ethiopia, Norwegian Church Aid, Caritas Spain, Caritas Austria, Caritas Bozen, Caritas Germany, Caritas Switzerland, Austrian Development Agency, AECID, Biovision, Caritas Internationalis, and the various congregations, government and local institutions. ECC-SDCBOM has been working with Caritas Austria since 1992 and has built strong partnership linkages and working relationships in the implementation of various projects.

A.3. Technologies and/or measures

(Describe the technologies and measures to be employed and/or implemented by the project, including a list of the facilities, systems, and equipment that will be installed and/or modified by the project.)

GREEN SEED will provide ICS to households dependent on biomass for energy in 10 rural villages. These efficient biomass stoves will replace inefficient traditional open fireplaces that would otherwise be used in the absence of the project activity. While multiple cookstove technologies may be utilised to address the unique cooking needs, energy services requirements and fuel carrier availability and the preference of targeted households, two time-tested and highly accepted technologies will be deployed:

a) *Tikikil* Rocket Stove
This metal rocket cook stove is produced in Ethiopia by local, small-scale manufacturing workshops. The stove has been tailored and optimized for local Ethiopian cooking requirements, especially with regard to heating liquids. The *Tikikil* was originally designed by GIZ and achieves a thermal efficiency of 26% (ERG 2009). Like all rocket stove designs, it is geared towards the efficient combustion of fuel at a high temperature by ascertaining the required air draft, the controlled use of fuel, the complete combustion of volatiles, and the efficient use of the resultant heat (see Fig. 1a).

a) b)

Fig. 1: a) Tikikil rocket stove in use at a rural household in the target area of IRES project. b) Mirt hearth used for baking the Ethiopian staple sourdough flatbread Injera, made of the local cereal teff (eragrostis tef). Pictures © CFK/Harald Grabher.

The *Tikikil* is produced locally in Ethiopia and has an inner clay lining for the combustion chamber. On the outside, this clay lining is clad with sheet metal. The clay liner is produced by local potters while the metal cladding is done by local metal artisans. The fuel magazine is a tray made of 5 mm round metal. The stove is built with a robust, non-removable skirt of 32 cm diameter, which can accommodate the vast majority of pot sizes. The stove also provides a removable inner skirt that is used when smaller pots are required for cooking, such as the traditional coffee pot (8 cm in diameter), to minimize heat loss and ensure that optimal efficiency is maintained.

b) *Mirt* hearth for *injera* preparation
The *Mirt* stove (see Fig. 1b) was designed by the Ethiopian Rural Energy Development and Promotion Centre (EREDPC) in conjunction with GIZ and achieves a thermal efficiency of 31% (Yayeh et al. 2021). It

was designed in response to the need for an efficient technology that would allow the preparation the staple Ethiopian flatbread *injera*. The stove is made of cement and pumice sand (a widely-available local resource) that binds well with cement and is a very good insulating capacity. Specific moulds are used to create the components of the stove, which are then distributed to the household. There, the *Mirt* hearth is installed using locally available loam as plastering to combine all components.

A secondary energy service of the *Mirt* stove is its usage to roast grain, a widely available household snack. The *Mirt* is suitable for both domestic and industrial use. As it needs to be installed indoors to protect it from rain etc, it remains a source of IAP. Nevertheless, the hearth significantly reduces the amount of smoke within the room as opposed to the less efficient three-stone open fires due to the improved combustion process.

A.4. Local stakeholder inclusion

(Describe how stakeholders are included in the project)

The project targets a total of 5,750 households living in 10 rural kebeles directly and indirectly 28,750 family members during project life. The target groups will participate in the entire project process, from identifying challenges, needs, and existing opportunities through implementation of project activities to the final evaluation. Project stakeholders are actively engaged in project consultation meetings, forums, workshops, joint monitoring meetings, review meetings, and mid-term and final evaluations, directly or through their representatives. They also will participate in different awareness-raising events and experience-sharing and learning platforms.

The project will be implemented in strong partnership with all key stakeholders in the area. Relevant government sector offices will be capacitated through training and awareness-raising sessions to organize and systematize their efforts in planning, coordination, linkage, and influence. The project will create synergy with the efforts of the new TSLL+ and Green-Path projects in Dugda and Tiyo to minimize duplication of efforts and ensure efficient utilization of resources. In addition, the project will join the new TSLL+ multi-stakeholder platform to draw lessons from and collaborate on efforts to sustain and scale up the leanings.

The local government offices of Agriculture; Water, Mineral and Energy; Women and Children's Affairs; and Finance; of the East Shoa and Arsi zones and Tiyo, Dugda and ATJK districts will be the project's key stakeholders. Moreover, the community of Tiyo, Dugda and ATJK in 10 target kebeles will be key actors in the project.

Formal discussions have been conducted with all of the stakeholders. All stakeholders agree that there is a real need for the project and that it will be provided with the necessary support. Stakeholders feel responsible for tackling the challenges GREEN SEED seeks to address. All stakeholders appreciate the project’s approach, which is holistic, innovative and inclusive. The project was also commended for addressing the most vulnerable groups of the community, its participatory approach, integrated strategy, and its efforts towards collaboration among stakeholders. Stakeholders have pledged to officially join the effort and are ready to collaborate to bring about tangible and long-term change.

Target groups and key stakeholders have been and will remain fully involved in the identification and planning of the project. They will also be engaged in the development of beneficiary selection criteria for interventions, selecting appropriate target groups, and validating selected community members for approval. Moreover, they will play a vital role in implementation, monitoring, and disseminating lessons from the project to other non-beneficiary stakeholders. The project will provide support in filling technical, and material capacity gaps and play a facilitation role.

A.5. Funding requirements of the project

Costs per tonne of CO_2 equivalents (net)	34	Eur/tCO2e

		ICS installed	*ICS adopted****	
Year	**Quarter**	**Target HHs**	**Target HHs**	**Target ERs**
2025	Q1	900	810	-
2025	Q2	1.800	1.620	261
2025	Q3	2.800	2.520	522
2025	Q4	3.800	3.420	812
2026	Q1	4.800	4.320	1.103
2026	Q2	5.750	5.175	1.393
2026	Q3	5.750	5.175	1.668
2026	Q4	5.750	5.175	1.668
2027	Q1	5.750	5.175	1.668
2027	Q2	5.750	5.175	1.668
2027	Q3	5.750	5.175	1.668
2027	Q4	5.750	5.175	1.668
2028*	Q1	5.300	4.770	1.668
2028	Q2	4.850	4.365	1.538
2028	Q3	4.350	3.915	1.407
2028	Q4	3.850	3.465	1.262
2029	Q1	3.350	3.015	1.117
2029	Q2	2.875	2.588	972
2029	Q3	2.875	2.588	834
2029	Q4	2.875	2.588	834
2030**	Q1	1.975	1.778	834
2030	Q2	1.075	968	573
				25.140,25

*	
**	
***	additional Buffer 10%

Table 1: Targeted emission reductions per year and which relates to the agreed sales price of emission reductions in the voluntary carbon market.

A.6. Demonstration of additionality

The project has been designed specifically as a climate mitigation project to reduce CO2 and other relevant GHG emissions. Without the investment, this project would not exist, and no GHG reduction would be achieved. Furthermore, without the reduction of GHG emission, there is no added value in context with mitigation (additionality), and therefore it would not be able to contribute to the BOKU compensation scheme.

A.7. Start date and expected operational lifetime of the project

(Specify also the start and length of crediting period) of the project *start date, in the format of DD/MM/YYYY.)*

1.1.2025 – 30.06.2030

SECTION B. Carbon mitigation/sequestration calculation

B.1. Reference and applicability of the methodology

This project is based on Gold Standard (GS) method for calculating emission reductions and monitoring for fuel-efficient cookstoves in its current form, i.e., the *Simplified methodology for clean and efficient cookstoves* (Vers. 3.0, 2022)[1]

B.1.1. Data and parameters fixed ex-ante for monitoring contribution

(Include a compilation of information on the data and parameters that are not monitored during the crediting period but are determined before the design certification and remain fixed throughout the crediting period, like IPCC defaults and other methodology defaults. Copy this table for each piece of data and parameter.)

Data/parameter	$EF_{b,fuel,CO2\_fuelwood}$
Unit	tCO_2/tonne of fuel
Description	CO_2 emission factor arising from the use of fuelwood in the baseline scenario (see also section A.1.1)
Source of data	Simplified methodology for clean and efficient cookstoves (Vers. 3.0)
Value(s) applied	1.747 tCO_2/tonne of fuel
Choice of data or Measurement methods and procedures	This is a default value
Purpose of data	Calculation of ERs
Additional comment	

[1] https://globalgoals.goldstandard.org/408-ee-ics-simplified-methodology-for-efficient-cookstoves/

Data/parameter	$EF_{fuel,non-CO2\_fuelwood}$
Unit	tCO_2/tonne of fuel
Description	Non-CO_2 emission factor arising from the use of firewood in the baseline scenario (see also section A.1.1)
Source of data	Simplified methodology for clean and efficient cookstoves (Vers. 3.0)
Value(s) applied	0.148 tCO_2/tonne of fuel
Choice of data or Measurement methods and procedures	This is a default value
Purpose of data	Calculation of ERs
Additional comment	

Data/parameter	$n_{b\_stove\_3\text{-}stone}$
Unit	Fraction
Description	The efficiency of the cookstove being used in the baseline scenario (see also section A.1.1)
Source of data	Simplified methodology for clean and efficient cookstoves (Vers. 3.0)
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	This is a default value
Purpose of data	Calculation of reduction of fuelwood consumption and thus ERs
Additional comment	People in the target area of the project in rural areas of Oromia, Ethiopia procure a large part of household energy services such as cooking from inefficient conversion technologies such as open three-stone fires.

Data/parameter	f_{NRB}
Unit	Fraction
Description	Fraction of biomass used during year y for the considered scenario that can be established as non-renewable biomass
Source of data	CDM Standardized baseline: Improved Institutional Cookstoves in Ethiopia (UNFCCC 2019)
Value(s) applied	0.76

Choice of data or Measurement methods and procedures	The NRB is assessed by one of the approaches given in the methodology; here, the default country-specific fraction available on the CDM website is used. CDM gives the value of 0.76 for ICS used in institutional settings. The CDM standard is value for individual households remains at 0.88. We decided to use the conservative value of 0.76 as a buffer, but may consider applying the value for individual households if assessments in the target area point to the fact that a larger fraction of biomass must be considered as non-renewable.
Purpose of data	Calculation of ERs
Additional comment	This value is fixed for the entire crediting period, although the project proponent may choose to re-examine the assessment at any time. For a possible renewal of the crediting period this value must be reassessed.

B.1.2. Ex-ante estimation of carbon mitigation/sequestration

(Provide a transparent ex-ante calculation of baseline and project outcomes (or, where applicable, direct calculation of net benefit) during the crediting period, applying all relevant equations provided in the selected methodology(ies) or as per the proposed approach.

Data/parameter	$B_{b,y\_fuelwood}$
Unit	t/HH/y
Description	Quantity of fuelwood that is consumed in baseline scenario b (see also section A.1.1) during year y per household
Source of data	Baseline survey with 148 randomly selected households in the target region using weighed bundles of firewood per household
Value(s) applied	2.39
Choice of data or Measurement methods and procedures	The baseline survey was conducted in Jan/Feb 2022. 148 households in the target area were randomly selected and a household questionnaire was administered. At the same time, households were asked to prepare reference bundles of energy carriers used. These bundles were weighed in each household individually and the household were then asked to estimate consumption in relation to the prepared reference bundle.
Purpose of data	The average biomass energy consumption per surveyed household with no ICS is the basis for calculating fuel savings and thus ER calculations on a per household basis.
Additional comment	The baseline data is derived from a comprehensive household survey in the target area.

B.1.3. Summary of ex-ante estimates

Data/parameter	$P_{b,y\_fuelwood}$
Unit	t/HH/day
Description	Specific fuel consumption of fuelwood for an individual technology in baseline scenario b during year y converted to tons/day
Source of data	Calculations
Value(s) applied	0.0066
Choice of data or Measurement methods and procedures	This value is calculated on the basis of values and parameters stated above divided by 365. This value will be multiplied by the number of days the proposed technologies will be in used.
Purpose of data	Calculation of ERs
Additional comment	The value was established with a comprehensive baseline survey.

Data/parameter	n_{p_Mirt}
Unit	Fraction
Description	The efficiency of the *Mirt* efficient cookstove at the start of the project (%)
Source of data	This value was taken from a certified Gold Standard project
Value(s) applied	31
Choice of data or Measurement methods and procedures	Controlled Cooking Test protocol (CCT) (Yayeh et al. 2021)
Purpose of data	Calculations of savings in fuelwood consumption and emission reductions.
Additional comment	This value is multiplied with a discount factor DF_n

Data/parameter	$n_{p\_Tikikil}$
Unit	Fraction
Description	The efficiency of the *Tikikil* efficient cookstove at the start of the project (%)
Source of data	This value was taken from a certified Gold Standard project
Value(s) applied	26
Choice of data or Measurement methods and procedures	Water Boiling Test protocol (WBT) (ERG 2009)

Purpose of data	Calculations of savings in fuelwood consumption and emission reductions.
Additional comment	This value is multiplied with a discount factor DF_n

Data/parameter	DF_{n_Mirt}
Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves.
Source of data	[Simplified methodology for clean and efficient cookstoves (Vers. 3.0)]
Value(s) applied	0.975
Choice of data or Measurement methods and procedures	Default value. Since the project runs for 5.5 years and an efficiency loss of 1% per year is the default value suggested by the methodology, an average efficiency over the 5.5 years of 97.5% is applied. This value will be adapted according to monitoring or test results.
Purpose of data	Calculation of the efficiency of the project cookstove and emission reductions.
Additional comment	According to GS methodology (1.0, 2020), an efficiency decrease of 1% can be assumed. GS methodology (3.0, 2022) states that efficiency decreases should to be evidenced by the project developer. Until project data on inoperable technologies becomes available, we adopt a discount factor of 1% per year. During annual monitoring surveys, this factor will be adapted proportionate to the project cookstoves that are found inoperable to align with GS methodology 3.0. Households will be excluded from the project database until the respective technology is replaced or maintained.

Data/parameter	$DF_{n\_Tikikil}$
Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves.
Source of data	[Simplified methodology for clean and efficient cookstoves (Vers. 3.0)]
Value(s) applied	0.975
Choice of data or Measurement methods and procedures	Default value. Since the project runs for 5.5 years and an efficiency loss of 1% per year is the default value suggested by the methodology, an average efficiency over the 5.5 years of 97.5% is applied. This value will be adapted according to monitoring or test results.
Purpose of data	Calculation of the efficiency of the project cookstove and emission reductions.

Additional comment	According to GS methodology (1.0, 2020), an efficiency decreases of 1% can be assumed. GS methodology (3.0, 2022) states that efficiency decreases should to be evidenced by the project developer. Until project data on efficiency losses of technologies becomes available, we adopt a discount factor of 1% per year. During monitoring surveys, this factor may be adapted proportionate to the project cookstoves efficiency losses. (Inoperable stoves are accounted for with the $U_{\_stove}$ factor, see further below. Households will be excluded from the project database until the respective technology is replaced or maintained.)

Data/parameter	n_{p,y_Mirt}
Unit	Fraction
Description	The average efficiency of the efficient cookstove while being used in the project scenario p (%)
Source of data	Calculations of n_p * DF_n
Value(s) applied	31 (but conservative value of 26% taken for both stoves)
Choice of data or Measurement methods and procedures	CCT protocol
Purpose of data	Calculation of reduction of fuelwood consumption and thus ERs
Additional comment	Controlled cooking tests are administered in a standardized protocol. According to the GS methodology applied, this value is discounted with $DF_{n.}$

Data/parameter	$n_{p,y\_Tikikil}$
Unit	Fraction
Description	The average efficiency of the efficient cookstove while being used in the project scenario p (%)
Source of data	Calculations of n_p * DF_n
Value(s) applied	26
Choice of data or Measurement methods and procedures	WBT protocol
Purpose of data	Calculation of reduction of fuelwood consumption and thus ERs
Additional comment	Water Boiling Tests administered in a standardized protocol. According to the GS methodology applied, this value was discounted with $DF_{n.}$

Data/parameter	U_{p,y_Mirt}
Unit	Fraction
Description	Usage rate in project scenario p (see also section A.1.3) during year y
Source of data	Assumed value
Value(s) applied	0.90
Choice of data or Measurement methods and procedures	Annual monitoring and a midterm survey will be conducted according to GS methodologies.
Purpose of data	Calculation of emission reductions.
Additional comment	This value will change with regular monitoring and survey data. In a predecessor project (GREEN-RE) adoption rates > 90% were achieved so that this value is deemed conservative. The factor is also used to monitor and report on operability of the ICS. The ICS will not be considered in ER calculations as long as it remains inoperable.

Data/parameter	$U_{p,y\_Tikikil}$
Unit	Fraction
Description	Usage rate in project scenario p (see also section A.1.3) during year y
Source of data	Assumed value
Value(s) applied	0.90
Choice of data or Measurement methods and procedures	Annual monitoring and a midterm survey will be conducted according to GS methodologies
Purpose of data	Calculation of emission reductions.
Additional comment	This value will change with regular monitoring and survey data. In a predecessor project (GREEN-RE) adoption rates > 90% were achieved so that this value is deemed conservative. The factor is also used to monitor and report on operability of the ICS. The ICS will not be considered in ER calculations as long as it remains inoperable.

Data/parameter	$N_{p,y\_Mirt;}$ $N_{p,y\_Tikikil;}$
Unit	Number of project cookstoves credited (units)
Description	Cookstove for project scenario p (see also section A.1.3) through year y
Source of data	Total distribution record
Value(s) applied	11,500 units (for 5,750 households)
Choice of data or Measurement methods and procedures	Delivery, installation and utilization of the 2 technologies, based on transparent reporting and data analysis

Purpose of data	Calculation of ERs
Additional comment	The number of households addressed or the number of cookstoves delivered per household may change during the project. It is envisaged that tach household will get two fuel-efficient cookstove technologies (Mirt, Tikikil stoves)

Data/parameter	$DF_{b,stove\_3\text{-}stone,y}$
Unit	Fraction
Description	Discount factor to account for the three-stone stove use in project scenario p (see also section A.1.3) during the year y
Source of data	Survey data on 76 households using 2 ICS compared to 148 households with no ICS reveals that stove use frequency for the 3-stone stove is significantly reduced. The assessed value is a reduction of 91.6 %. To assume a conservative factor, we assume a reduction in 3-stone stove use of 85 %.
Value(s) applied	0.15
Choice of data or Measurement methods and procedures	Annual survey with transparent data analysis and reporting
Purpose of data	Calculation of ERs
Additional comment	The discount factor for additional baseline-stove use was determined at the same time as the baseline survey. We gathered data on the rate of use of baseline technologies in households already using ICS. A sample of 76 households using one or two fuel efficient technologies was used to establish the factor based on the frequency of stove use. The factor may be adapted if project monitoring and survey data reveals that the ratio of baseline technology use decreases.

Data/parameter	LE_y
Unit	Fraction
Description	Leakage
Source of data	Assumed value
Value(s) applied	0.05
Choice of data or Measurement methods and procedures	Even though the GS Simplified methodology for clean and efficient cookstoves (Vers. 3.0) does allow for the neglect of leakages, for conservative calculations, 5% leakage of all emission reductions will be deducted.
Purpose of data	
Additional comment	This value may be close to zero.

Data/parameter	$ER_{y, fuelwood}$
Unit	tCO_2e
Description	Emission reductions of project device during year y in tCO_2e for firewood
Source of data	Calculation
Value(s) applied	1.54 tCO2e/HH/yr
Choice of data or Measurement methods and procedures	see detailed calculation below
Purpose of data	Establish reliable emission reductions based on the outlined methodology.
Additional comment	Emission reductions will change with monitoring data collected and the following update of parameters. However, the currently used values are considered to be conservative.

Emission reductions ($ER_{y, fuelwood}$) are calculated as follows:

Step 1:
$n_{p,y} = n_p * (DF_n)$

Step 2:
$B_{b,y\_fuelwood} = N_{p,y} * P_{b,y\_fuelwood}$

Step 3:
$P_{y\_fuelwood} = B_{b,y\_fuelwood} * (1-n_b/n_{p,y})$

Step 4:
$ER_{y\_fulewood} = (\sum N_{p,y} * P_y * U_{p,y} * (f_{NRB} * EF_{b,fuel\ CO2\_fuelwood} + EF_{b,fuel\ non\_CO2}) * (1-DF_{b,Stove,y})) - (LE_y * ER_y)$

$\boldsymbol{ER_{y\_fuelwood} = 1.29\ tCO_2e/HH/year}$

B.2. Establishment and description of a baseline scenario

According to the GS Simplified methodology for clean and efficient cookstoves (Vers. 3.0.), it is necessary for projects with target population of >1,000 households to have a minimum sample size of 100 households. As GREEN-PATH targets 3,890 households, the project conducted a baseline survey on 224 households in total in January and February 2022 in the target region. From the total sample population, 148 households did not possess an ICS while 76 households used one or both technologies supported by this project, the *Tikikil* and *Mirt* stoves. The latter group was included in the baseline survey to assess utilization and leakage. Below are relevant data used for ER calculations from the survey effort.

Households without ICS	Mean consumption kg/HH/yr	SE/Mean	Valid N
Total HH Fuelwood consumption/year	2,001.47	170.94	182

Table 2: Data from the baseline survey on 148 rural households with no access to ICS in the project target region. For gross calorific values (GCV) energy consumption calculations, charcoal was converted into fuelwood equivalents at a conversion ratio of 1:6.

Annual stove use frequency	No ICS (N=148)	2 ICS (N=42)	DFb_stove_ 3-stone,y
Total stove use frequency	1,010	866	
3-stone use frequency	1,009	85	0.084

Table 3: Baseline survey data on the continued use of traditional technologies in ICS-adopting households. In contrast to standard procedures our baseline data shows that usage of traditional technologies remains substantial in ICS-adopting households, as energy services such as room heating, insect repulsion or cooking for social events can more easily be carried out with traditional technologies.

B.2.1. Data and parameters to be monitored

There will be a midterm- and an end-term survey. These survey efforts will comprise data collection with a representative number of targeted households. Continuous monitoring and quarterly reporting will collect and present the essential data about ongoing project activities to allow for active and flexible project management, and keep adoption rates the project technologies above the foreseen threshold.

The following parameters will be monitored continuously during this project:

Data/parameter	$B_{b,y\_fuelwood}$
Unit	t/HH/y
Description	Quantity of fuelwood that is consumed in baseline scenario b (see also section A.1.1) during year y per household
Source of data	Baseline survey with 148 randomly selected households in the target region using weighed bundles of firewood per household
Value(s) applied	2.39
Choice of data or Measurement methods and procedures	The baseline survey was conducted in Jan/Feb 2022. 148 households in the target area were randomly selected and a household questionnaire was administered. At the same time, households were asked to prepare reference bundles of energy carriers used. These bundles were weighed in each household individually and the household were then asked to estimate consumption in relation to the prepared reference bundle.

Purpose of data	The average biomass energy consumption per surveyed household with no ICS is the basis for calculating fuel savings and thus ER calculations on a per household basis.
Additional comment	The baseline data is derived from a comprehensive household survey in the target area.

Data/parameter	$P_{b,y\_fuelwood}$
Unit	t/HH/day
Description	Specific fuel consumption of fuelwood for an individual technology in baseline scenario b during year y converted to tons/day
Source of data	Calculations
Value(s) applied	0.0066
Choice of data or Measurement methods and procedures	This value is calculated on the basis of values and parameters stated above divided by 365. This value will be multiplied by the number of days the proposed technologies will be in used.
Purpose of data	Calculation of ERs
Additional comment	The value was established with a comprehensive baseline survey.

Data/parameter	n_{p_Mirt}
Unit	Fraction
Description	The efficiency of the *Mirt* efficient cookstove at the start of the project (%)
Source of data	This value was taken from a certified Gold Standard project
Value(s) applied	31
Choice of data or Measurement methods and procedures	Controlled Cooking Test protocol (CCT) (Yayeh et al. 2021)
Purpose of data	Calculations of savings in fuelwood consumption and emission reductions.
Additional comment	This value is multiplied with a discount factor DF_n

Data/parameter	$n_{p\_Tikikil}$
Unit	Fraction
Description	The efficiency of the *Tikikil* efficient cookstove at the start of the project (%)
Source of data	This value was taken from a certified Gold Standard project

Value(s) applied	26
Choice of data or Measurement methods and procedures	Water Boiling Test protocol (WBT) (ERG 2009)
Purpose of data	Calculations of savings in fuelwood consumption and emission reductions.
Additional comment	This value is multiplied with a discount factor DF_n

Data/parameter	DF_{n_Mirt}
Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves.
Source of data	Simplified methodology for clean and efficient cookstoves (Vers. 3.0)
Value(s) applied	0.975
Choice of data or Measurement methods and procedures	Default value. Since the project runs for 5.5 years and an efficiency loss of 1% per year is the default value suggested by the methodology, an average efficiency over the 5.5 years of 97.5% is applied. This value will be adapted according to monitoring or test results.
Purpose of data	Calculation of the efficiency of the project cookstove and emission reductions.
Additional comment	According to GS methodology (1.0, 2020), an efficiency decrease of 1% can be assumed. GS methodology (3.0, 2022) states that efficiency decreases should to be evidenced by the project developer. Until project data on inoperable technologies becomes available, we adopt a discount factor of 1% per year. During annual monitoring surveys, this factor will be adapted proportionate to the project cookstoves that are found inoperable to align with GS methodology 3.0. Households will be excluded from the project database until the respective technology is replaced or maintained.

Data/parameter	$DF_{n\_Tikikil}$
Unit	Fraction
Description	Discount factor to account for efficiency loss of project cookstoves.
Source of data	Simplified methodology for clean and efficient cookstoves (Vers. 3.0)
Value(s) applied	0.975
Choice of data or Measurement methods and procedures	Default value. Since the project runs for 5.5 years and an efficiency loss of 1% per year is the default value suggested by the methodology, an average efficiency over the 5.5 years of 97.5% is applied. This value will be adapted according to monitoring or test results.

Purpose of data	Calculation of the efficiency of the project cookstove and emission reductions.
Additional comment	According to GS methodology (1.0, 2020), an efficiency decreases of 1% can be assumed. GS methodology (3.0, 2022) states that efficiency decreases should to be evidenced by the project developer. Until project data on inoperable technologies becomes available, we adopt a discount factor of 1% per year. During annual monitoring surveys, this factor will be adapted proportionate to the project cookstoves that are found inoperable to align with GS methodology 3.0. Households will be excluded from the project database until the respective technology is replaced or maintained.

Data/parameter	n_{p,y_Mirt}
Unit	Fraction
Description	The average efficiency of the efficient cookstove while being used in the project scenario p (%)
Source of data	Calculations of n_p * DF_n
Value(s) applied	31
Choice of data or Measurement methods and procedures	CCT protocol
Purpose of data	Calculation of reduction of fuelwood consumption and thus ERs
Additional comment	Controlled cooking tests are administered in a standardized protocol. According to the GS methodology applied, this value is discounted with DF_n.

Data/parameter	$n_{p,y\_Tikikil}$
Unit	Fraction
Description	The average efficiency of the efficient cookstove while being used in the project scenario p (%)
Source of data	Calculations of n_p * DF_n
Value(s) applied	26
Choice of data or Measurement methods and procedures	WBT protocol
Purpose of data	Calculation of reduction of fuelwood consumption and thus ERs
Additional comment	Water Boiling Tests administered in a standardized protocol. According to the GS methodology applied, this value was discounted with DF_n.

Data/parameter	U_{p,y_Mirt}
Unit	Fraction
Description	Usage rate in project scenario p (see also section A.1.3) during year y
Source of data	Assumed value
Value(s) applied	0.90
Choice of data or Measurement methods and procedures	Annual monitoring and a midterm survey will be conducted according to GS methodologies
Purpose of data	Calculation of emission reductions.
Additional comment	This value will change with regular monitoring and survey data. In a predecessor project (GREEN-RE) adoption rates >90% were achieved so that this value is deemed conservative.

Data/parameter	$U_{p,y\_Tikikil}$
Unit	Fraction
Description	Usage rate in project scenario p (see also section A.1.3) during year y
Source of data	Assumed value
Value(s) applied	0.90
Choice of data or Measurement methods and procedures	Annual monitoring and a midterm survey will be conducted according to GS methodologies
Purpose of data	Calculation of emission reductions.
Additional comment	This value will change with regular monitoring and survey data. In a predecessor project (GREEN-RE) adoption rates >90% were achieved so that this value is deemed conservative.

Data/parameter	$N_{p,y\_Mirt;}$ $N_{p,y\_Tikikil;}$
Unit	Number of project cookstoves credited (units)
Description	Cookstove for project scenario p (see also section A.1.3) through year y
Source of data	Total distribution record
Value(s) applied	7.780 (for 3.890 households)
Choice of data or Measurement methods and procedures	Delivery, installation and utilization of the 2 technologies, based on transparent reporting and data analysis
Purpose of data	Calculation of ERs
Additional comment	The number of households addressed or the number of cookstoves delivered per household may change during the project. It is envisaged that tach household will get two fuel-efficient cookstove technologies (Mirt, Tikikil stoves)

Data/parameter	$DF_{b,stove\_3-stone,y}$
Unit	Fraction
Description	Discount factor to account for the three-stone stove use in project scenario p (see also section A.1.3) during the year y
Source of data	Survey data on 76 households using 2 ICS compared to 148 households with no ICS reveals that stove use frequency for the 3-stone stove is significantly reduced. The assessed value is a reduction of 91.6 %. To establish a conservative basis, we assume a reduction in 3-stone stove use of 85 %.
Value(s) applied	0.15
Choice of data or Measurement methods and procedures	Annual survey with transparent data analysis and reporting
Purpose of data	Calculation of ERs
Additional comment	The discount factor for additional baseline-stove use was determined at the same time as the baseline survey. We gathered data on the rate of use of baseline technologies in households already using ICS. A sample of 76 households using one or two fuel efficient technologies was used to establish the factor based on the frequency of stove use. The factor may be adapted if project monitoring and survey data reveals that the ratio of baseline technology use decreases.

Data/parameter	LE_y
Unit	Fraction
Description	Leakage
Source of data	Assumed value
Value(s) applied	0.05
Choice of data or Measurement methods and procedures	Even though the GS Simplified methodology for clean and efficient cookstoves (Vers. 3.0) does allow for the neglect of leakages, for conservative calculations, 5% leakage of all emission reductions will be deducted.
Purpose of data	
Additional comment	This value may be close to zero.

SECTION C: Safeguarding principles assessment

C.1. Analysis of social, economic, and environmental impacts

(If possible refer to the Gold Standard Safeguarding Principles and Requirements document for detailed guidance on carrying out this assessment.)

ECC-SDCBOM requires all employees to sign a code of conduct on safeguarding in order to protect both employees and beneficiaries from sexual exploitation and abuse. Every project beneficiary will receive information through different channels on exploitation and harassment, as well as information on how to report such incidents if they occur. This experience will be shared with Green Seed project beneficiaries and staff.

ECC-SDCBOM will provide beneficiaries with information on the prevention of sexual exploitation and abuse, as well as point them in the direction of feedback channels for reporting cases in the Green Seed project. Every beneficiary gathering is also used by staff to disseminate information about safeguarding and reporting channels.
MCS has started implementing a new safeguarding policy (Policy for Protection Against Violence, Abuse, Exploitation, Neglect, and Discrimination of Vulnerable Adults and Children) since 2020, based on the Caritas Internationalis Safeguarding Policy, which is part of all partnership agreements. The Policy was created to ensure that the rights of children, young people, and vulnerable adults are protected during MCS activities, projects, and programs, and that they are protected from all forms of violence, abuse, exploitation, neglect, and discrimination. This Policy applies to all staff, volunteers, partners, and other relevant stakeholders, and it includes a complaints mechanism, a code of conduct for all staff members, and guidelines for safe recruitment and safe visibility.

ECC-SDCBOM has previous experience implementing feedback mechanisms for beneficiaries. The feedback mechanism was established after consultation with beneficiaries on the best channels for feedback. As a result, a suggestion box, phone, feedback focused FGD, complaint committee, end use survey, individual interview, monitoring through community score cards, help desks at food distribution points, interactive voice recording (IVR) and walk the talk in the case of children were established to collect feedback from beneficiaries, and a response mechanism was established to respond to reported cases in a timely manner. This experience will be repeated for the GREEN SEED project to keep people safe.

C.2. Sustainable Development Goals (SDGs) outcomes

(Specify relevant SDGs targets and how they could be measured) Explanation of methodological choices/approaches for estimating the SDG outcome

Outcome (OC) 1: Reduced GHG emissions by > 20,000 tons of CO2e through promoting energy saving cooking stoves to 5,750 households at the end of June 2030. The outcome will contribute directly to SDG 13 and SDG 12 through reduced carbon emission (CO_2e) using ICS. Main activities under this outcome are:

- Provide 5,750 households with 2 ICS (*Mirt, Tikikil*) to reduce energy consumption and GHG emissions.
- Train 5,750 Households on installation, use and maintenance of ICS.
- Train staffs and Gov't experts on climate change mitigation, adaptation and CO2 emission calculator
- Follow up the functionality of ICS at household on monthly base

Outcome (OC) 2: Improved sustainable use of land, and natural resource base through promoting climate-friendly sustainable land management practices at the end of June 2030. This outcome is aligned and will contribute directly to SGD15 "Protected, restored & promoted sustainable use of natural resources (SDG 15) and indirectly to SGD 17 "Strengthened the Global Partnership for Sustainable Development" through applying sustainable land scape management practices. Main activities under this outcome are:

- Support 150 small-holder farmer HHs with tools to conduct sustainable natural resource management options to re-green 75 ha of farmland (FMNR - farmer- managed natural regeneration, SWC - soil and water conservation).
- Train 150 small-holder farmer HHs on FMNR - Farmer-managed natural regeneration and SWC, soil and water conservation, sustainable agricultural practices (composting, crop rotation, intercropping, as identified), and climate change adaption, mitigation and resilience building.
- Organize experience sharing visit to other ECC-SDCBOM model woredas on FMNR practice and Sustainable Landscape Management
- Train farmers on sustainable agricultural practices (including intercropping, crop rotation, contour farming, composting or manure utilization)
- Sensitize communities on gender equality, climate change mitigation, and adaptation
- Conducted participatory multi-stakeholders dialogue & reflection forums

Outcome (OC) 3: Reduce pressure on landscape by poor rural households through the sustainable diversification of livelihood opportunities by the end June 2030. This outcome is aligned with and will directly contribute to SDG 5 "Achieve gender equality and empower all women and girls", SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" and SDG 1 "End poverty in all its forms everywhere." Main activities under this outcome are:

- Establish and equip Savings and Internal Lending Communities (SILC) to improve living conditions of 5,750 rural households through diversifying income sources and access to capital.
- Provide trainings on Savings and Internal Lending Community (SILC) group management and administration
- Produce, distribute and plant 10,000 tree seedlings as multi-purpose & fruit trees in homesteads. 150 HHs

- Facilitate and distribute vegetative strip seeds (pigeon pea & rhodes grass) around homestead to support animal fattening of their own. 150 HHs
- Train farmer households on permaculture gardening. 150 HHs
- Provide 150 households with modern beehives with accessories and integrate with permaculture for income generation and train 150 households on apiculture.
- Reach 1,610 persons (mainly women) with adult literacy courses.

SECTION D Inclusion of BOKU research and teaching

An interdisciplinary project is planned and will be further elaborated, in collaboration with BOKU researchers **BEd Dipl.-Ing. Dr Christine Altenbuchner (InWe)** and **Univ.Ass. Dr Christoph Rosinger (IBF):**

<u>InWe Work package (1):</u>
Climate change poses significant challenges for agricultural communities around the world, particularly in regions like Ethiopia and Senegal. Agricultural communities are expected to be particularly affected, as their livelihoods usually directly rely on natural resources (Adhikari et al. 2018, Bryan et al. 2009, Leary et al. 2006). The concept of climate change adaptive capacity (AC) is a crucial lens through which to understand how these communities are coping and adapting. Adaptive capacity refers to the ability of a system, in this case, agricultural communities, to adjust to changing climate conditions while minimizing adverse impacts. It defines a system's ability to *"mobilize resources to respond to, recover from, and maintain functions in response to stresses and shocks"* (Choden et al. 2020).

According to the IPCC working definition, besides the system's sensitivity to climate change and its exposure to climate variations, AC is another aspect of vulnerability and resilience (Pandey and Bardsley 2015) (see Figure 1). Hence, AC is regularly applied in the context of system vulnerability in socioecological settings (McCarthy et al. 2001, Adger 2006, Smit and Wandel 2006, Abdul-Razak and Kruse 2017). In both Ethiopia and Senegal, building adaptive capacity (AC) among agricultural communities is critical for ensuring food security and livelihood sustainability in the face of climate change. Research on factors influencing the AC of agricultural communities continues to inform policy and development strategies to bolster the resilience of these communities.

The guiding **research questions** therefore are:
To which degree is climate change adaptive capacity of local agricultural communities in Ethiopia and Senegal influenced by sustainable agricultural initiatives with specific regard to gender aspects?

- What are the specific differences in regard to gender aspects when evaluating the AC to climate change in Ethiopia and Senegal?
- To what degree and how can sustainable agricultural initiatives trigger community transformation? (How can we track that transformation? Are there 'social' tipping points? Which measures are positively influencing AC?)
- To what degree are sustainable agricultural initiatives supporting (able to support) the Scaling up, Scaling out and Scaling deep of social innovations?
- Potentially, questions on environmental justice aspect may also be tackled (Decision making, representation, empowerment)

This research project presents an approach for **evaluating community capital-based adaptive capacity to climate change recognising the Community Capitals Framework (CCF)**. For households and communities, AC is a critical element in the process of adapting to future challenges serving as asset base and resource pool (Adger 2003, Adger and Vincent 2005, Cassidy and Barnes 2012, Chepkoech et al. 2020, Wall and Marzall 2006). In comparison to the coping capacity, which is short-term, the concept of AC refers to long-term development (Abdul-Razak and Kruse 2017, Gallopín 2006, Smit and Wandel 2006). AC fundamentally depends on the **access to social, human, institutional, natural and economic**

entitlements (Adger 2003, Cassidy and Barnes 2012, Chepkoech et al. 2020, Wall and Marzall 2006), and the importance of capacity, organization, and learning has been highlighted (Eakin and Luers 2006, Choden et al. 2020).

Gender-related aspects:
Previous research showed a great variability of AC to climate change not only between different communities (Antwi-Agyei et al. 2013, Piya et al. 2016) but also within them (Westerhoff and Smit 2009), particularly with respect to gender aspects (Eriksen et al. 2005, Ibrahim 2014). Gender inequalities have a strong impact on AC (Garcia et al. 2021). Hence, this research puts special emphasis on AC of women and gender related differences of AC levels. This will enable gender sensitive results and will allow to draw conclusions on the role of women in agricultural communities.

Most AC assessments carried out so far (Chepkoech et al. 2020, Choden et al. 2020, Defiesta and Rapera 2014, Nelson et al. 2010, Williges et al. 2017) and the respective indicators are based on the Sustainable Livelihood Framework (SLF) (Ellis 2000) which differentiates between five different community capitals (human, social, financial, physical and natural capital) being seen as the basis of people's livelihoods (Serrat 2008). According to the Community Capitals Framework (CCF) (see Figure 2), this research will extend indicators to seven different community capitals (including also cultural and political capital) drawing the focus from a household to a community perspective. This creates a more holistic approach and enables a better comparison of different regional, cultural and political contexts in the agricultural sector in Ethiopia and Senegal.

CCF provides a helpful tool (Emery and Flora 2006) to grasp the complexity of community development and its role in developing adaptive capacities from a system perspective (Pigg et al. 2013, Stone and Nyaupane 2018). Social and human factors (Donohue and Biggs 2015, Pretty 2003, Svendsen and Sørensen 2007) as well as cultural and political aspects (Altenbuchner et al. 2017, 2021) are increasingly in the focus of community change analyses. By use of CCF, variations in the climate change induced impacts depending on the access and dependency to certain capital assets can be revealed (Ziervogel et al. 2006) and the AC of communities to withstand both current and future conflicts as well as climatic and non-climatic stressors assessed (Antwi-Agyei et al. 2013, Reid and Vogel 2006).

Survey design
Before field research we derive determinants and factors influencing the AC of local agricultural communities in Ethiopia and Senegal based on a systematic literature review in recognition of the CCF. Afterwards, field research will be done in the following steps:

- First, **key informant interviews** with farmer group leadership, local agricultural extension officers and other local knowledge carriers will be carried out. This helps to understand the context of the surveyed agricultural communities in the respective case study area. The information is used as specific reference and benchmark to check the plausibility of factors when conducting the qualitative interviews with farmers and elaborate the survey questionnaire.
- Second, **qualitative interviews** with female and male farmers will be carried out, as well as **workshops** organised to present and discuss the findings. [To evaluate the natural capital aspects of the CCF, soil parameters will be measured. – see Christoph]

- [In addition, for the **quantitative household survey** a questionnaire with closed questions may be elaborated to measure each capital type, depending on resources.]

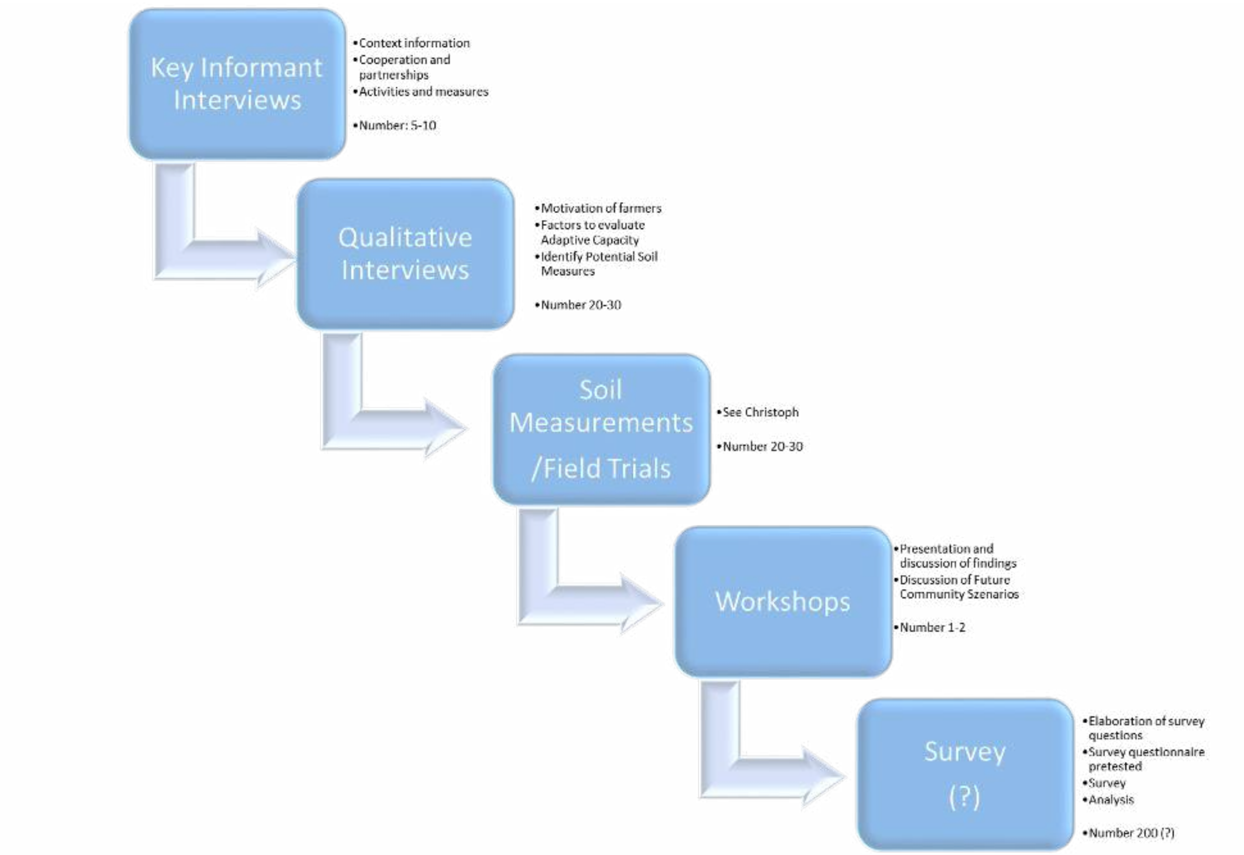

Fig. 2: Proposed research process (to be further elaborated between all stakeholders).

<u>IBF work packages (2):</u>
Evaluating the effect of sustainable agricultural measures on soil health and crop nutrition/food security

Introduction

- Globally, soils are threatened by erosion, salinization, acidification and loss of organic matter and biodiversity
- This has strong effects on crop production and nutrition and subsequently on food security
- There is also a strong dependency on energy-intensive resources such as mineral fertilizer and pesticides, which undergo strong volatilities on the global market
- A transition towards sustainable agricultural production is thus unavoidable
- Sustainable agricultural measures such as cover and intercropping, organic fertilization, more diverse crop rotations and erosion prevention measures
- Such measures are tackled by several sustainable development goals (e.g., SDG 2, 12 and 15)

- While the effect of such conservation management measures has been studied intensively in temperate and boreal biomes in the global North, we still lack a comprehensive understanding of the effect of these measures in tropical and subtropical biomes

WP 2.1: Evaluating the effect of 5-10 years of sustainable agricultural management on soil health (and crop nutrition) in Ethiopia and Senegal

- Several sites (comprising cropland, community gardens,…) will be analysed in a pairwise comparison of sustainably managed and conventionally managed agricultural systems towards soil health advances
    - Soil organic carbon and nitrogen stocks
    - Available nutrients
    - Microbial biomass and necromass
    - Microbial activity (potential exo-enzymatic activity, bacterial and fungal growth)
    - Microbial community composition and diversity
- If sites with comparable crops are available, the nutrient status of crops will be compared (macro and micro nutrients, protein content)
- Interviews with farmers will be held in order to discover their motivations, obstacles etc. (SWOT analysis, other adequate methods)

This can already be done within the first two years.

WP 2.2: Evaluating the effect of sustainable agricultural management on food security (crop yield), crop nutrition and soil health advances

- Ahead of this evaluation, interviews will be conducted to evaluate the potential of common conservation agricultural measures in Ethiopia and Senegal
- The best suitable approaches will then be tested in field trials
- Field trials (using randomized block design) will be setup at available institutions and by farmers (so-called 'mother and baby trials'), where conventional and conservation management measures will be applied (at comparable soil conditions, same crops to be grown,…) over the course of 3-4 years (if possible)
- Measurement of parameters as above, but with focus on crop yield and nutrition
- Trial setup in the first two years, measurements in the last two years

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