


1. Activity Overview

1.1. Basic Information

Transferring Country	<i>Republic of Ghana</i>
Managing Entity in transferring country	<i>ACT Commodities Daniel de Vries ddevries@actcommodities.com +31 20 2199211</i>
Receiving country	<i>Swiss Confederation</i>
The entity in receiving country	<i>Klik Foundation</i>
Mitigation Activity Name	<i>Transformative Cookstove Activity in Rural Ghana</i>
Sector	<i>Improved Cookstoves (ICS)</i>
Mitigation rationale	<i>To reduce GHG emissions attributed to non-renewable biomass-based cooking</i>
Summary of mitigation activity	The Activity will distribute 60,000 Envirofit ICS in the rural regions of Ghana, with main beneficiaries in the agricultural sector in phase I, followed by distribution of 60,000 ICS each in phase II and phase III. The Envirofit cookstoves used in this Mitigation Activity reduce household biomass consumption by approximately 60%. This leads to significant emission reductions of CO ₂ as well as other greenhouse gases such as black carbon. Klik's carbon finance enables the distribution to households at scale, with the carbon revenues being used to subsidize the price of the ICS to end-consumers.
Geographic coverage	<i>Geographical boundary of Republic of Ghana</i>
Estimated Volumes	<i>403,896 ITMOs annually over 8 years 3,231,171¹ ITMOs in total over the crediting period.</i>
Date and place	<i>21.12.2023, Amsterdam, the Netherlands</i>
Version of document	<i>5.2</i>
Coordinating and Managing Entity's sign-off	 <i>Bram Bastiaansen, CEO</i>

1.2. Activity Description

1.2.1. Nature

In Ghana, approximately 53% of households continue to rely on unsustainable cooking fuels such as firewood or charcoal.² The purpose of this Activity is the dissemination of improved cookstoves (ICS) in the Republic of Ghana, replacing traditional stoves with more efficient ICS.

¹ As per the ITMO_Ghana_ER_Sheet_V4 attached hereto in Annex A

² Ghana 2021 Population and Housing Census, p. 40.

<https://statsghana.gov.gh/gssmain/storage/img/infobank/2021%20PHC%20Presentation%20on%20Vol%203G%20to%203N.pdf>

These ICS result in a significantly more complete combustion of the fuel, and are more efficient in transferring heat from the fuel to the pot. This saves a significant margin of fuel as compared to that consumed in the traditional stoves or three stone fires currently used by the Ghanaian population. Furthermore, the ICS proposed for distribution are designed not only to increase heat transfer, but also to match traditional utensils and cooking habits.

The Activity, by reducing the amount of fuel required for cooking, reduces emissions attributed to the consumption of non-renewable biomass which releases CO₂ and other greenhouse gases into the atmosphere when burned.³ By replacing less efficient, traditional stoves and open fires with the Activity ICS, non-renewable biomass consumption is reduced by at least 55%. The reduction in consumption of non-renewable biomass results in equivalent reductions in GHG emissions.

1.2.2. Scope

The Activity primarily targets rural farmers in the agricultural sectors in the Western, Central, Ashanti, and Upper West regions and expects expansion to other regions over time. Since the Activity is a market-driven endeavour and incorporates a project-long learning curve, the geographical and sectoral scopes may be extended over time. The system boundary for the Activity is Ghana since both the ICS distribution and the Activity beneficiaries will be limited to this country.

The Activity is focused on targeting specific consumer segments where the carbon subsidy can have the maximum impact. Small-holder farmers and farming communities are the primary target whose profile looks like the following:

A typical Smallholder farmer



Farm related income varies year to year and farm families may take on other jobs to make ends meet. One study in Northern Ghana showed that for farming households 27.09% of total household income came from agricultural sources on average⁴. Smallholder farmers seek alternative sources of income generating activities in the rural non-farm economy to make ends meet.

³ “Non-renewable biomass means that the extraction of biomass from a land area is not sustainable and that carbon stocks on the land area decrease over time.” <https://www.oeko.de/oekodoc/327/DP-2007-004.pdf>

⁴ <https://www.tandfonline.com/doi/full/10.1080/23311886.2023.2282414>

In this case, the prospective farmer customers are already (or will be) entered into the CRM system of the distribution partner. This enables direct connectivity to the prospect. Marketing techniques will consist of a blend of voice and text messaging (direct to mobile) communications where dedicated call centre staffing communicates directly to each farmer. These communications are followed up with awareness raising and demonstration campaigns at the cooperative level within the communities themselves. Below is an image of one such farmer's cooperative meeting to provide context on the specific target market.



ICS will be staged strategically at a portion of the ~400+ agricultural inputs supply shops located regionally throughout the target market (see operational regions below). Once a farmer is confirmed to purchase, the stove can be distributed via their cooperative where the sales agent will link the farmer's customer profile with the serial number of the product. This data capture is essential for monitoring and verification efforts and ultimately issuance of verified ITMOs. Through the call centre, a post sales follow-up call will confirm acceptance and usage of the product. This linkage also provides the farmer a direct line for any potential post sales service needs.

Operational Areas

New Regions

- Western and Western North
- Volta and Oti
- Eastern

KEY

- Current operational regions
- Potential regions to scale to



The GHGs included are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). This is in line with the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption ver. 4* (“TPDDTEC”) which will be used for this Activity and is described in more detail in Section 2.6.1.

The first Phase of the Activity is envisaged to be implemented by 2023-24 (Phase I – consisting of distribution of 60,000 ICS) and the crediting period of the Activity shall be 8 years. Upon successful completion of Phase 1, the Activity will be scaled up by another 60,000 ICS in Phases II and III each.

A summary of the inclusion criteria for the project (sale of cookstoves) per the below:

Criterion	Applicability	Justification
The project takes place in Ghana	Cookstoves are only sold within the geographical boundaries of Ghana per the MADD as examined during the approval process.	Sales records
Only the cookstoves described in section 1.2.3 of the MADD are sold in the activity	Examined during the approval process and confirmed during the activity implementation	Sales records
The primary target customer (household) groups of the cookstoves sold under the activity are in peri-urban and rural areas, or households where at least 20% of income comes from agricultural sources.	Cookstoves are sold through distribution channels that target rural farmer customers as examined during the approval process. Monitoring takes place through parameter M _{rural} to ensure that the activity targets the primary target	Sales records & monitoring report.

	customer (household) groups.	
Emissions reductions achieved by the cookstoves in the activity cannot be claimed elsewhere	Each cookstove sold under the activity requires the acknowledgement and acceptance of a carbon waiver by the beneficiary per section 2.4.2.	Sales records
The emissions reductions achieved by the cookstoves in the activity are transferred to the activity supervisor outlined in section 3.1.	Contractually established between the activity developers	Signed contracts
The sale of the cookstoves sold under the activity are additional	Described throughout the MADD, and in particular in sections 2.1 and 2.7, examined at activity level during the approval process. Only the described cookstoves in the MADD shall be sold under the activity.	Sales records
The sale of cookstoves has only started after registration of the application.	The crediting period of the activity commenced after registration of the application.	Date of application for review for authorization and crediting period of the activity as described in the MADD.
The parameters necessary for calculating the emissions reductions achieved by the project can be measured and where necessary checked for plausibility.	All parameters described in the MADD for calculation of the emissions reductions are determined ex-ante or monitored during the activity's implementation. The KPTs performed for the SFS parameter are checked for plausibility through the use of sensors.	All cookstoves sold under the activity can be included in the random sampling, and used for KPT testing with sensors.

1.2.3. Technology

The ICS distributed in the first phase of the Activity are the Envirofit Super Saver Charcoal and the Envirofit Super Saver Firewood. These stoves are state of the art, industrially manufactured ICS that were designed specifically for the West-African market, taking into account cooking traditions and practices of the region. Not many other stoves in the Ghanaian market can compete with the combined efficiency, durability, and the positive health impacts of these ICS. The Envirofit brand is associated with high quality and is rooted locally due to creation of local production and skilled labour as well as sales & distribution agent employment.

ICS Model	Super Saver Wood (M5000)	Super Saver Charcoal (CH-5300)
Thermal Efficiency	38.3%	56.2%
Estimated Lifetime ⁵	Up to 7 years	Up to 7 years
% Fuel Reduction	Up to 66%	Up to 58%
% Cooking Time Reduction	Up to 50%	Up to 56%
% Toxic Emission Reduction	Up to 82%	Up to 56%

The percentage reduction in fuel, cooking time and toxic emission values are based on comparison against a traditional three stone or traditional charcoal stove, for the Super Saver Wood and Super Saver Charcoal respectively.



We estimate around 60% of ICS distributed to be the Super Saver Wood, with the Super Saver Charcoal making up for the remaining 40%. Please note that this is a current best estimate based on experience from extensive work in such communities. The actual share in uptake may differ, subject to market conditions and preferences. Current market conditions do not allow for the distribution of LPG or pellet stoves in rural areas. Long distances, and poor road infrastructure make the maintenance of a supply network for these technologies prohibitively expensive, especially when taking into account the socio-economic circumstances of rural Ghana.

1.2.4. Role of Carbon

KliK's contribution triggers the mitigation outcomes in two ways.

1. It enables the necessary pre-finance to be secured. Production, dissemination, and maintenance of the ICS require substantial amounts of upfront investment to cover material, transport, production, distribution and overhead costs. The Mitigation Outcome Purchase Agreement (MOPA) with KliK serves as a security to the investor that the loan will be repaid through the sale of the mitigation outcomes.
2. The Activity targets poor, peri-urban and rural households that do not possess sufficient funds to purchase the ICS at full market price. KliK's contribution allows for the sale of the stoves to be subsidized to an extent where purchase of the ICS becomes feasible for the Activity beneficiaries, thereby triggering the mitigation outcomes. Even at the subsidised price, some households are unable

⁵ In case of estimated life of project devices is less than the crediting period, then either these devices will be replaced after the end of their expected lifetime span or otherwise, emission reductions will be claimed only till the end-of-life span of the project devices.

to afford the stove. The Activity thus involves the creation of a dedicated Fund (see Section 1.2.6), designed to provide loans to such households that cannot pay for the stove in cash upon delivery.

1.2.5. Participants

The actors involved are ACT Commodities, Envirofit, as well as local implementation organizations. ACT is the managing entity and legal owner of the Activity. Envirofit is ACT’s exclusive counterparty and technology provider that will oversee local implementation as well as management support of local partners, as needed. Distribution of the ICS will be handled by local implementation partners that are active in Ghana’s agricultural sector and are thus able to deliver large quantities of ICS to their networks.

There are no state actors involved in the implementation of the Activity.

1.2.6. Sustainable operation and transformational effect

The Activity ensures a sustainable operation beyond the term of the MOPA through the creation of a positive feedback loop that is kick-started by the dissemination of the Activity ICS and reinforced via a dedicated Fund.

Beneficiaries can participate in the Activity by purchasing an Envirofit ICS. This immediately decreases biomass usage by ~60% or more, creating value for the stove users in several ways.

- ICS users that collect biomass fuel save around 2.5 hours per week, time that can now be dedicated to other economic and income generating activities. This applies mainly to firewood users, although some users purchase their firewood during rainy season.
- ICS users that purchase their biomass fuel save money that can instead be spent elsewhere, such as on higher quality seeds or farming inputs. This applies mainly to charcoal users.

Both these benefits free up resources, allowing the Activity beneficiaries to improve their socio-economic circumstances. On average, ICS users will recoup their investment over a period of 4 to 6 months. The table below provides a breakdown of the economics around purchasing an Activity ICS on a household level (as of Q3 2022):

Fuel	Baseline Stove		Envirofit ICS		
	Avg. Daily Usage	Avg. Monthly Usage	Avg. Monthly Usage	Monthly Fuel Savings	Est No. Months to pay back from fuel savings
Charcoal	GHS 3.20	GHS 96.00	GHS 55.68	GHS 40.32	4.46
*Firewood	GHS 3.00	GHS 90.00	GHS 59.40	GHS 30.60	5.88

*Assuming firewood is purchased

To conclude, the Activity strengthens the demand side of the Ghanaian ICS sector by freeing up resources that were previously tied up in the collection or purchase of biomass for cooking purposes.

On the supply side, the Activity strengthens the Ghanaian ICS sector by providing skilled labour and generating employment in various sectors. [REDACTED]

[REDACTED] a large part of value creation, including a handful of accessory parts such as packaging, marketing materials and certain spare fasteners can and will be manufactured locally as and where local industry can deliver to the required standards. More importantly, assembly production of the ICS will be completed locally. Thus, the Activity will build local capacity to produce and distribute high-quality ICS. This will also allow the continued improvement of the ICS models as needed, thereby further adapting to local market conditions. The Activity is expected to create [REDACTED] jobs in the following areas:

Entity	Portfolio	Job Creation Impact	Description	Total
Envirofit Ghana	Factory Workers	Direct	Welders, Runners, Packagers, Supervisor, Quality control	16
	Administrative		Professionals	5
	Logistics		Shipping, Freight, Distribution	12
Distribution Partners	Sales agents/Purchasing Clerks	Indirect	Marketing and demonstration of the stoves, product education and training.	180
	After Sales Service		Servicing existing stoves, warranty	5
	Microfinance Institution		Credit Officers	Loan Administration
Total Estimated Job Creation				285

By improving both the demand and supply sides, the Activity helps the Ghanaian ICS sector to mature, and to eventually sustain itself without carbon finance.

At the point of sale, each user is contacted by the distributor company with a welcome message by phone. Therefore, each end user has a direct link to their point of sale (through a hot line as specified in the message) that has a direct link to Envirofit Ghana or the supplier. The point of sale is someone who lives in the area or is close by because the stove was picked up from a physical outlet.

Whilst the cookstoves are designed to be very durable, with continued high usage and/or lack of maintenance some components can begin to deteriorate. In case repairs to the cookstove are needed, end-users can thus request these easily. This is a primary benefit of having local assembly production and thereby fosters technology and local knowledge transfer and enables capacity to ensure that repairs can be made. Experience from other programs carried out by Envirofit learns that arrangements can be made between end user and factory using this channel of communications, and issues can be easily resolved.

A paramount function of the distribution channel is that users actually become 'members' of a network. The design is such that 100% of users are in communication with the central teams. Users receive communications on upcoming sales/demo events in their area, proper maintenance procedures and tips (to re-enforce their training received at the point of sale), recipe ideas, testimonials etc. to support behavior change. In conjunction with these communications, there is a dedicated hotline number ([REDACTED]) that any and all users can dial, taking them to someone who can guide their questions to the correct resource (i.e., be it a product

question, sales referral, or service related issue). This hotline is a central and multi-purpose phone number, specific to our distribution channel, and is used to funnel all sales and service inquiries for other products and services that the distribution partner provides. Thus it is strategic to their business and as such will be ensured to be functional throughout the duration of the program.

The service procedure is ultimately very simple, if a stove has an issue, they can either call the hotline for assistance on where to go, or bring it to the point of sale. If repair is needed and/or warranted the stove would be returned to the factory, addressed and returned back to the point of sale and finally customer. Charges (if any) would be pre-agreed.

A key component and unique facet to enable the sustained positive transformation on the demand side is the dedicated *Transformative Technology Access (TTA)* Fund that will provide micro-credits to the Activity beneficiaries. This service remains unattainable for many across rural Ghana, with only 39% of rural households having access to a bank account⁶.

The TTA Fund ([REDACTED]) will support existing Village Savings and Loan Associations (VSLAs) through the provision of working capital. The lack of access to regular banking services has led to the bottom-up creation of local financial self-help groups. These groups give participants the opportunity to save money and access loans. They typically consist of 20-30 members that meet on a weekly basis, with loans being given out on a rotational basis. In case one of the members is unable to pay off their loan, the other members in the VSLA will serve as collateral for the loan to be repaid.

These funds enable VSLA groups across the agricultural sector either to give out more loans to its members, or to increase the size of loans. The existing implementation and distribution partners that will be delivering the ICS to their networks, now have the opportunity to provide loans to those beneficiaries that are unable to pay for the entire stove upfront. Distribution partners have existing relationships with such groups, and provide smallholder farmers with [REDACTED]. Some distribution partners also [REDACTED] and are thus in an ideal situation to ensure loans are repaid.

During the initial stage of the Activity, the TTA Fund will mainly be utilized to provide loans for the purchase of ICS. However, as penetration rates within the VSLAs increase, additional loans may be used for other livelihoods improvement technologies such as solar home systems and farming accessories. Since all borrowers will have to pay an interest rate on their loan, the Fund will grow over time and ensure the Activity can continue beyond the period of carbon finance. In addition to making the Activity self-sustainable, the TTA Fund serves as a vehicle to raise the conditions of local livelihoods.

To ensure effective oversight and full transparency, the funds will be distributed via an accredited Microfinance Institution (MFI) [REDACTED] with an existing track record in Ghana (as well as the West African region). Upon start of the Activity, parts of the pre-finance (driven by the carbon revenue) will be made available to the MFI as working capital. This enables the dedicated TTA Fund to be hosted via an exclusive account within

⁶ Clean Cooking Alliance report “*Ghana Consumer Segmentation*”, 2021. The full report can be accessed here.

the MFI. Such bifurcation enables complete transparency, where cashflows and transactions with the distribution partners can be tracked, while at the same time allowing for the TTA Fund's impact to be directly overseen.

The chart below outlines the structure of the dedicated TTA Fund. It is important to note that this structure only applies to those cases where the end user has insufficient funds and thus needs to take a loan in order to afford the ICS. Current estimates are that a minimum of one third of ICS users will rely on the TTAF structure. These estimates will be corrected as the program begins to scale. In cases where the user can pay for the entire stove in cash up front, the Fund structure is not applicable. EF Ghana in Figures 1-4 below stands for Envirofit Ghana.

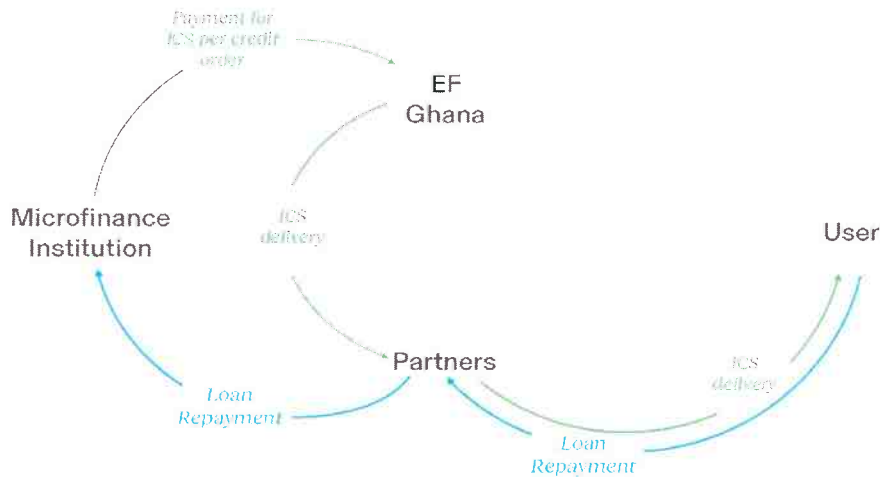


Figure 1: Consolidated Overview of the TTAF

Step-by-step breakdown of the Fund process:

1. Identification of potential ICS users: through a wide network of distribution channels, the Activity is able to reach large quantities of communities willing to purchase an ICS.

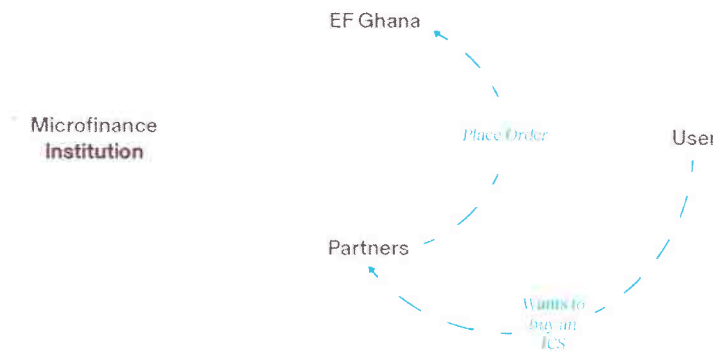


Figure 2: Placing ICS Order via the Implementation Partner

2. Delivery of the Activity ICS: The implementation partner then delivers the ICS to the end-user, who in most cases will either make payment or the MFI will pay on their behalf, which it recovers from the end user through payments over time.

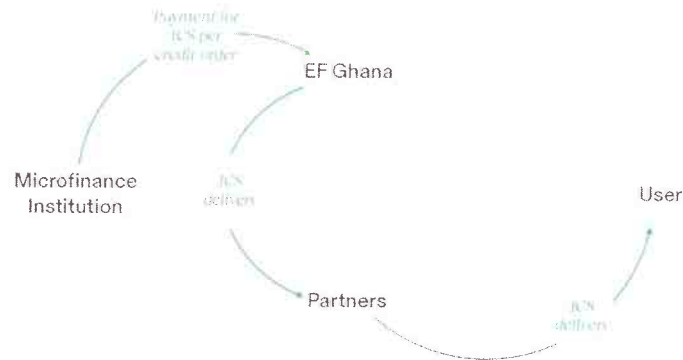


Figure 3: Delivery and Payment of the ICS

3. Thanks to their already existing relationships with farmers, these partners are in an ideal position to ensure debts are repaid by the users. The typical loan duration will be around 6-8 months. Because loanees pay an interest rate, the Fund gradually grows bigger and becomes more impactful.

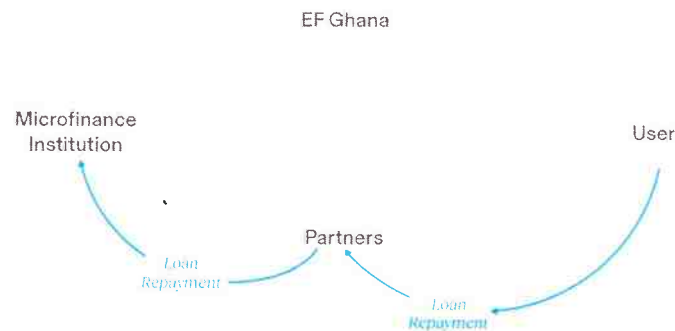


Figure 4: Loan Repayment

The purchase pricing economics can be seen below.



2. Methodological approach

2.1. Baseline for determination of mitigation outcomes

Existing and planned policies.

Ghana's Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement (Schedule 4, section 3.4.2.1) includes a whitelist of technologies that are considered additional to the NDC. Biomass ICS and LPG stoves are explicitly mentioned on this list. Thus, Ghana clearly signals that improved biomass and LPG stoves are outside the scope of its national measures to achieve its NDC during the period 2021-2030. For a full overview of existing or planned policies related to this Activity, refer to the segment Regulatory Surplus (Section 2.7).

In addition to the above, it should be noted that Ghana's population growth is above 2% per year. Like other Sub-Saharan African nations, progress towards universal adoption of clean cooking solutions risks being outgrown by population growth if progress is not fast paced enough.

2.1.1. Crediting Baseline

In absence of the Activity, smallholder farmers would continue to rely on traditional cooking tools such as the three stone fire depicted in the pictures below.



Figures 5 and 6: A traditional three-stone fire and a heap of wood in the background (left photo), and another three-stone fire (right photo).

According to the Clean Cooking Alliance, only 5% of Ghana's rural population primarily use clean cooking fuels with vast majority continuing to rely on biomass such as wood (73%) and charcoal (20%).⁷

⁷ Clean Cooking Alliance report "*Ghana Consumer Segmentation*", 2021.
<https://cleancooking.org/wp-content/uploads/2021/08/Ghana-Consumer-Segmentation-Fraym-for-Clean-Cooking-Alliance.pdf>

	National	Urban	Rural
Primarily use clean cooking fuel ¹	22%	32%	5%
Primarily use LPG to cook	22%	31%	5%
Primarily use natural gas or biogas to cook	0%	0%	0%
Primarily use electricity to cook	<1%	<1%	<1%
Primarily use wood to cook	35%	14%	73%
Primarily use charcoal to cook	41%	53%	20%

This high reliance on biomass fuels for cooking purposes is not sustainable with Ghana having lost over 60% of its forest cover from 1950 to the turn of the last century (2.7 million hectares). The Activity will reduce demand in biomass fuels, thus contributing to the cause of reducing deforestation in Ghana. Baseline surveys specific to the targeted communities in the context of this Activity will be carried out in accordance with international best practice.

2.2. Crediting period

The start date of the implementation of mitigation activity is 1st April 2023 (expected date of distribution of first ICS) which is also the start date of the crediting period of the mitigation activity. In line with *Ghana's Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement*, the Activity's crediting period is eight years and will run from Q2 2023 until 2030. This is necessary for two reasons.

- First, the Activity seeks to strengthen domestic markets and is thus sales-driven. With progressive sales and distribution, the crediting period must be long enough to allow for carbon finance to build a foundation to support the ICS that are distributed in later years of the Activity. In other words, if the crediting period was shorter, ICS distributed in a later year would not generate the full potential of mitigation outcomes. This would negatively affect the carbon revenue needed to carry out the Activity.
- Second, in line with Section 1.2.6 of this MADD, the Activity takes a project-long learning approach. Leveraging upon the initial impact of the ICS to the beneficiary households, the aim is to gradually move beneficiaries upwards the energy ladder. For this learning curve to take place, the Activity requires a sufficiently long-time window.

2.3. System boundary and Emission sources

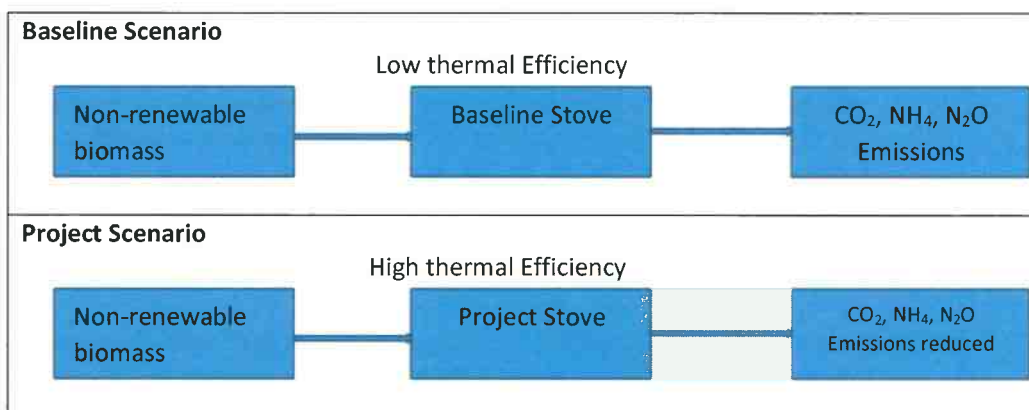
The project boundary is the physical, geographical location of all equipment and systems affected by the project activity. As the activity involves distribution of ICS (Improved

Cookstove), the project boundary is the physical, geographical location of each household where the ICS (Improved Cookstove) is distributed to replace the traditional stove.

All the direct and indirect emissions sources for the mitigation activity are outlined in the following table.

Direct and Indirect Emissions Sources	Gas	Included ?	Justification/Explanation	
Baseline Scenario	Emission from use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Important Source of emissions
		CH ₄	Yes	Important Source of emissions
		N ₂ O	Yes	Important Source of emissions
		Other	No	No other source identified
Project Scenario	Emission from use of non-renewable biomass/Fossil fuel	CO ₂	Yes	Important Source of emissions
		CH ₄	Yes	Important Source of emissions
		N ₂ O	Yes	Important Source of emissions
		Other	No	No other source identified

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



2.4. Avoiding double claiming

2.4.1. Climate finance and governmental support

There are no direct contributions to the Activity from climate finance sources or through governmental support. The Activity receives none of the following sources of financial assistance:

- Development assistance contributions from Switzerland or another donor country,
- Climate finance under Article 9 of the Paris Agreement
- Public funding from the partner country (i.e Ghana)
- Other non-refundable payments.

All emission reductions generated come from ICS sales that are part of the Activity and are monitored in a digital sales database. Climate finance contributions or governmental support would immediately be detected via this procedure. More detail on the monitoring procedures is provided in Section 2.6. Regarding potential climate finance resources in the MFI, the TTA Fund will be funded solely via pre-finance obtained through this Activity. This allows for the exclusion of any support from climate finance.

The SDGs that the Activity contributes to, as well as the indicators used to monitor the impact are listed below:

Goal 1: No Poverty	
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.	<p>Relevance: The Activity by installation and dissemination of ICS avoids cooking on traditional baseline stoves. Thus, the Activity results in increased access to basic services (clean cooking), new technology (ICS) as well as reduces poverty by reducing expenses on purchased fuel consumption</p> <p>Target Indicator - 1.4.1 Proportion of population living in households with access to basic services.</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> • SDG Parameter 1.1 (MP 1) – ABS - Number of project users using ICS as primary stove under the Activity. • SDG Parameter 1.2 (MP 2) – MS - Average Household Money saving (GHC) due to reduction in purchased fuel consumption in the Activity.

Goal 3: Good Health and Well-being	
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	<p>Relevance: The Activity by installation and dissemination of ICS results in reduction in exposure to indoor air pollutants (CO, polycyclic aromatic hydrocarbons, PM etc.) associated with biomass fuel based traditional cooking.</p> <p>Target Indicator - 3.9.1 Mortality rate attributed to household and ambient air pollution</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> • SDG Parameter 3.1 (MP 3) – RSPM - Number of users reporting reduction in smoke/PM after shifting to ICS in Activity • SDG Parameter 3.2 (MP 4) - RVMF - Number of households reporting reduction in visits to medical facilities/dispensary for treatment of respiratory issues etc. such as cough, shortness in breath, pneumonia and other respiratory issues

Goal 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	<p>Relevance: In the poorest communities, the burden of collecting and/or purchasing fuel, often falls on women and children. By reducing fuel collection and cooking time, the Activity provides women in beneficiary households with more time to invest in other productive, economic development activities thereby aiding gender equality.</p>

<p>of shared responsibility within the household and the family as nationally appropriate.</p>	<p>Thus, the Activity directly results in reduction of time spend in unpaid domestic work by the women who are mainly responsible for cooking and arranging fuel for cooking.</p> <p>Target Indicator – 5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> • SDG Parameter 5.1 (MP 5) – TS - Average Time saved per day (hrs) due to reduction in time spent in collecting fuel / cooking in Activity. • SDG Parameter 5.2 (MP 6) – (TSPW) – Utilization of time saved from fuel collection / reduced cooking into paid / economic / revenue generating work (hrs).
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<p>Goal 7: Affordable and Clean Energy</p>	
<p>7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services</p>	<p>Relevance: The Activity involves the installation and dissemination of clean technology for cooking, by using available energy sources more efficiently.</p> <p>Target Indicator – 7.1.2 Proportion of population with primary reliance on clean fuels and technology</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> • SDG Parameter 7.1 (MP 7 – OICS - % users reporting an operational ICS in the Activity

<p>Goal 8: Decent Work and Economic Growth</p>	
<p>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</p>	<p>Relevance: The Activity results in generating employment for marketing / sales and distribution / technical employees.</p> <p>Target Indicator - 8.5.1 Average hourly earnings of female and male employees, by occupation, age, and persons with disabilities</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> • SDG Parameter 8.1 (MP 8) – ECP - Number of male / female employment created by project • SDG Parameter 8.2 (MP 9) – EAMW -Total number of employees earning above local minimum wage

Goal 12: Sustainable Consumption and Production	
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	<p>Relevance: ICS included in the Activity will reduce the consumption of non-renewable biomass in participant households by 60% or more, depending on the ICS model. Thus, the Activity results in a direct reduction in domestic material consumption (woody biomass) by replacing the traditional baseline stoves with biomass-based and/or LPG-based improved project stoves.</p> <p>Target Indicator – 12.2.2 - Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> SDG Parameter 12.1 (MP 10) – FCH - Average Fuel Consumption per household (tonnes/HH/year)

Goal 13: Climate Action	
13.2 Integrate climate change measures into national policies, strategies, and planning	<p>Relevance: The Project is directly related to the target as it contributes towards avoidance of GHG emissions from replaced of fossil fuel / non-renewable biomass-based cooking.</p> <p>Target Indicator – 13.2.2 - Total greenhouse gas emissions per year</p> <p>Monitoring parameter:</p> <ul style="list-style-type: none"> Amount of GHG emissions Avoided or sequestered by the project per year (tCO₂eq).

	SDG	Monitoring Parameter	Parameter Description	Unit	ex-ante/ex-post	Justification
1	1	SDG Parameter 1.1 – ABS	Number of project users using ICS as primary stove under the Activity.	Number	ep	The use of ICS as primary stove in the sampled household directly indicates a shift from traditional inefficient cooking to efficient clean cooking, thereby confirming the project's contribution towards creating access to basic services.
2	1	SDG Parameter 1.2 – MS	Average Household Money saving due to reduction in purchased fuel consumption in the Activity.	GHC	ep	Reduced consumption of fuel due to efficient cooking will reduce the economic burden of purchasing fuel in project households. The money saved thus, will help access other basic services.

3	3	SDG Parameter 3.1 – RSPM	Number of users reporting reduction in smoke/PM after shifting to ICS in Activity	Number	ep	<p>This parameter checks if a sampled user has experienced visible / noticeable reduction in smoke and PM while cooking on project stove.</p> <p>Smoke and PM exposure are the primary hazards associated with inefficient cooking in baseline and reason for increased morbidity / mortality to those exposed.</p> <p>With reduction of smoke / PM exposure, the reduction in mortality / morbidity is automatically substantiated.</p>
4	3	SDG Parameter 3.2 - RVMF	Number of households reporting reduction in visits to medical facilities/dispensary for treatment of respiratory issues etc. such as cough, shortness in breath, pneumonia and other respiratory issues	Number	ep	Reduced number of visits to the medical facilities is deemed a direct reflection of reduced morbidity / mortality attributed to emission exposure from traditional cooking using solid biomass fuel.
5	5	SDG Parameter 5.1 – TS	Average Time saved per day due to reduction in time spent in collecting fuel / cooking in Activity.	Hrs	ep	Fuel collection and cooking are unpaid domestic work. Reduction in fuel collection / cooking time, therefore indicates reduction in proportion of time spent on unpaid domestic work.
6	5	SDG Parameter 5.2 – (TSPW)	Utilization of time saved from fuel collection / reduced cooking into paid / economic / revenue generating work	Hrs	ep	There is some risk that the time savings from reduced fuel collection / cooking gets utilized in other unpaid domestic work and does not contribute to Gender Equality. As a safeguard to this risk, the proposed parameter shall determine if time saved is indeed used in paid / revenue generating / skill development tasks contributing towards gender equality.

7	7	SDG Parameter 7.1 – OICS	% users reporting an operational ICS in the Activity	%	ep	Having an operational ICS is deemed a direct indicator of reliance on clean cooking technology.
8	8	SDG Parameter 8.1 – ECP	Number of male / female employment created by project	Number	ep	The number of male / female employment created by project is direct indicator of creating positive employment
9	8	SDG Parameter 8.2 – EAMW	Total number of employees earning above local minimum wage	Number	ep	Employees earning above local minimum wage rate indicates standardization in wages in line with the local regulations
10	12	SDG Parameter 12.1 – FCH	Average Fuel Consumption per household	(tonnes/HH/year)	ea+ep	Cooking fuel remains one of the key materials being consumed in project households. Measurement of fuel consumption per household is therefore a direct parameter against domestic material consumption.

Once ICS reaches their end life, it is recommended for end users to return them to purchasing clerks (PC) or sales agents. The scrap dealers from the Scrap Dealers Association of Ghana will then pickup these stoves from the PC's/Sales agent when a given number of ICS are received. These will be transported to regional centres for recycling. Scrap dealers will pay a token to the PC/sales agent for collection and temporary storage for the discarded ICS. They in turn will liaise with their members in the various regions we are targeting for the project. Through advocacy, it is ensured that stove users are aware of the fact that they can return their stove with their PC/sales agent to avoid any negative environmental impact.

2.5.2. Compliance with environmental and social requirements and standards

Ghana has been working on a Standard and Labelling scheme for ICS since 2014. It will follow an existing concept of star-ratings of efficient appliances for easy identification by consumers. Technologies with a positive impact on health, based on their emissions performances are to be distinguished by a unique feature on their performance label. In practice, the Scheme will set minimum performance requirements for thermal efficiency of “improved” cookstoves. The draft policy has proposed 36% and 25% for charcoal and biomass stoves respectively. The Activity ICS surpass both these performance requirements. The scheme also introduces minimum safety requirements which the Activity ICS are also expected to meet. Once the testing processes are available, all Activity stoves will be tested per the approved Ghanaian Test method ensuring performance that meets the Ghanaian Standard and Labelling Scheme. A transition period of 24 months will be granted once these regulations have entered into force. The further development of this framework will be closely monitored and will be taken into account throughout the further development of this Activity.

2.5.3. Respect of human rights

Ghana has signed and ratified all major international human rights instruments, including the First Optional Protocol to the ICCPR that establishes a complaints mechanism for individuals in case of alleged human rights abuses.

The technology disseminated in the MA does not entail an intrinsic risk of violating any international human rights treaties. While the Activity itself does not discriminate against any potential beneficiary based on any grounds, all partner organizations that are targeted in the context of this Activity have included human rights and employee protection in their organizational structures. Moreover, the safeguarding of human rights will be incorporated into the rules of conduct of all legal agreements that are concluded during the implementation process.

In addition, a grievance mechanism for stakeholders to voice concerns, if any, will be established under the Activity. Local offices will have feedback registers (Grievance Expression Book), and all products come with a customer care number. Stakeholders are free to voice their concerns via a Grievance Expression Book or via email under info@envirofit.org. Currently, the Book is available at the following address:

Envirofit Ghana:
GE-129-5542
Watermelon Close Ashongman Estate - Accra

This ensures that stakeholders that don't have access to electronic media for expressing concerns or grievances are also able to share their concerns or provide feedback. Because most end users will not be located in Kumasi they will have an additional option to revert to the salesperson (representative of distribution/retail partners etc.) in case of any feedback or complaints which will get escalated to Envirofit. This applies to human right concerns as well as the ICS itself post distribution/installation.

Alternatively, stakeholders can voice their concerns to the Compensation Office of Switzerland directly:

carbonoffset@bafu.admin.ch

2.5.4. Avoidance of corruption and bad governance.

Given the overall transparency of the project, there is no intrinsic risk of corruption or bad governance with this Activity. Should such events occur, beneficiaries can voice their concerns via the grievance mechanism detailed in section 2.5.3 of this MADD. Both ACT and Envirofit have a zero-tolerance policy against corruption in place.

2.5.5. Stakeholder engagement

Prior to the Activity start, two types of stakeholders will be consulted: the various ministries and authorities involved in Article 6 cooperation in Ghana, as well as the future Activity beneficiaries.

Relevant ministries and authorities involved in Article 6 Cooperation in Ghana have been consulted as substantiated via the approval letter received from EPA dated 21 April 2022.

Future activity beneficiaries (on a sampling basis) shall be provided with non-technical summary of the Activity and a feedback form will be provided to relevant stakeholders, giving them an opportunity to share feedback on this Activity.

Throughout the Activity lifetime, relevant stakeholders' feedback will be assessed on an ongoing basis. As mentioned in Section 2.5.3, the Activity establishes a grievance mechanism that encourages stakeholders to voice any concerns or feedback they may have, and to protect their fundamentals rights.

2.6. Determination, monitoring and reporting of mitigation outcomes

2.6.1. Mitigation outcomes

The mitigation outcomes are calculated and monitored in accordance with the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption ver. 4* (TPDDTEC), published on 7 October 2021.⁸ More specifically, Method 1 and Equation 1 of this methodology are used.

The below gives a non-technical summary of how the mitigation outcomes are calculated in line with the Gold Standard methodology TPDDTEC:

1. Determining the baseline scenario: This is done by calculating how much biomass is used per households prior to purchasing an ICS. The exact biomass type (i.e wood or charcoal), and quantity can be determined ex ante via baseline surveys.
2. Determining the fuel savings per ICS per households: Two methods exist to establish this value. One option is to use the improved efficiency of the ICS and the average fuel usage per household. Another option is to sample directly in the field, carrying out Kitchen Performance Tests. The activity will carry out Kitchen Performance Tests.
3. Once the fuel savings of the ICS per household per year have been established via comparison of project and non-project KPT data, they are multiplied by the number of operational ICS distributed. Stove stacking, or the existence of several stoves is taken into account via the KPT testing which captures all fuel used in the household (for improved stove and continued use of other stoves).

[REDACTED]

⁸ The full methodology on reduced emissions from cooking and heating *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* is available here: <https://globalgoals.goldstandard.org/407-ee-ics-technologies-and-practices-to-displace-decentralized-thermal-energy-tpddtec-consumption/>



4. Taking into account both the energy value of the biomass, as well as the associated emissions factor of biomass, the GHG emissions that would have been emitted in absence of the Activity can be established. This is expressed in tonnes of carbon dioxide equivalents.
5. Lastly, the methodology accounts for the share of biomass that is considered non-renewable. The trees cut for fuel wood and charcoal regrow over time, and so only the share that is harvested unsustainably is accounted for when calculating the mitigation outcomes. "Carbon leakage", which is described in more detail in section 2.6.2 is also discounted.

Combining all of the factors and variables allows for a conservative estimation of the mitigation outcomes achieved by the Activity.

In technical terms, the mitigation outcomes are calculated as follows:

$$ER_y = \sum_{b,p} (N_{b,p,y} \times U_{p,y} \times SFS_{p,b,y} \times NCV_{b,fuel} \times (f_{NRB,b,y} \times EF_{b,f,CO2} + EF_{b,f,nonCO2})) - \sum LE_{p,y} \times (1 - (0.97 - M_{rural}))$$

Where:

ER_y = Emission reduction for total project activity in year y (tCO₂e/yr)

$\sum_{b,p}$ = Sum over all relevant baseline b /project p pairs

$N_{b,p,y}$ = Number of project technology-days included in the project database for baseline b /project p pair in year y (days)

$U_{p,y}$ = Cumulative Usage rate for technologies in project scenario p in year y (fraction)

$SFS_{p,b,y}$ = Specific fuel savings for an individual project technology of baseline b /project p pair in year y (mass or volume units/technology*day)

⁹ <https://climateknowledgeportal.worldbank.org/country/ghana/climate-data-historical>

$NCV_{b,fuel}$ = Net calorific value of the fuel(s) that is substituted or reduced in baseline b (TJ/mass or volume units)

$f_{NRB,b,y}$ = Fraction non-renewability status of woody biomass fuel during year y (fraction). For biomass, it is the fraction of woody biomass that can be established as non-renewable. This parameter is omitted when f is a fossil fuel.

$EF_{b,f,CO2}$ = CO₂ emission factor from use of fuel f (tCO₂/TJ)

$EF_{b,f,nonCO2}$ = Non-CO₂ emission factor arising from use of fuel f , when the baseline fuel f is biomass or charcoal (tCO_{2e}/TJ). This parameter is omitted when f is a fossil fuel

$LE_{p,y}$ = Leakage for project scenario p in year y (tCO_{2e}/yr)

M_{rural} = Percentage of customers in rural and peri-urban areas in the KPT sample size during the monitored period (%). This value shall be 0.97 unless the monitored value of M_{rural} is below 0.97 for the monitored period.

Values determined ex ante:

Parameter	$NCV_{b,fuel}$
Unit	TJ/t
Description	Net-calorific value of fuels used in the baseline
Source of data	Methodology default value
Value applied	Wood: 0.0156 Charcoal: 0.0295

Parameter	$EF_{b,f,CO2}$
Unit	tCO _{2e} /TJ
Description	CO ₂ emissions factor of fuels used in the baseline
Source of data	Methodology default value
Value applied	Wood: 112 Charcoal: 165.22

Parameter	$EF_{b,f,nonCO2}$
Unit	tCO _{2e} /TJ
Description	Non-CO ₂ emissions factor of fuels used in the baseline
Source of data	Methodology default value
Value applied	Wood: 9.46 Charcoal: 44.83

Parameter	$LE_{p,y}$
Unit	Fraction (%)
Description	Leakage
Source of data	Default value deemed conservative by methodology. Also, refer to section 2.6.2 of the MADD
Value applied	95

Parameter	HHS
Unit	Persons/household
Description	Average household size in Ghana
Source of data	Baseline Surveys
Value applied	TBD

Values monitored ex-post

Monitoring will be carried out in line with the CDM-EB67-A06-GUID *Guideline Sampling and surveys for CDM project activities and programmes of activities (Version 4.0).*¹⁰ More details on the organizational set-up can be found in Sections 2.6.3 and 2.6.4 below.

Surveys will occur per the TPDDTEC 4.0 methodology with the following modifications: Prior to the first verification, surveys will be conducted to reach the prescribed 90% confidence interval and a 10% margin of error requirement outlined in the methodology (section 4.4, with reference to CDM-EB50-A30-STAN¹¹ which refers to CDM-EB67-A06-GUID as also mentioned as the applicable monitoring guideline per the above paragraph) with a minimum sample size of 100. To reach the 90/10 rule, the standard deviation needs to be less than or equal to 60.6% of the mean.

Based on the variability of the data over time in the actual monitoring, the survey sample size of minimum 100 may be increased or decreased for the next monitoring period to meet the 90% confidence interval and a 10% margin of error requirement.

Parameter	$f_{NRB,b,y}$
Unit	Fraction
Description	Fraction of biomass that is considered non-renewable.
Measurement procedures (if any)	Determination of fNRB value(s) by Ghana and Switzerland
Source of data	These value(s) is/are to be set by Ghana and Switzerland. Until such first fNRB value is available 0.30 shall apply.
Value applied	The fNRB value(s) set by Ghana and Switzerland, until such fNRB value is available, 0.3 shall apply.
Comment	This value is dynamic and changes every time a new fNRB value is set by Ghana and Switzerland.
Frequency	To be updated continuously every time a new fNRB value set by Ghana and Switzerland is available.

Parameter	$SFS_{p,b,y}$
Unit	Mass or volume units/technology * days
Description	Fuel savings per stove per year

¹⁰ The full document can be accessed here: https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023152925068/Meth_GC48_%28ver04.0%29.pdf

¹¹ https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20191129115244256/Meth_stan05.pdf

	<p>If statistically significant differences in usage are found [REDACTED] this difference will be accounted for in the $SFS_{p,b,y}$ parameter.</p>
Value applied	<p>The program will use the lower bound of the 90% confidence interval of the KPT data to calculate the emission reductions.</p>
Monitoring frequency	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>Monitoring will occur per the TPDDTEC 4.0 methodology with the following modifications:</p> <p>Prior to the first verification, KPT's will be conducted with a target of 90/10 and by minimum the prescribed 90/30 rule outlined in the methodology (section 4.4, with reference to CDM-EB50-A30-STAN¹² which refers to CDM-EB67-A06-GUID, the same guide as mentioned on page 22 above). Based on baseline survey data a mean value of 0.55 tonnes of fuel per year per capita and a standard deviation of 0.1731 was observed. For conservancy, the observed mean was used and the standard deviation was multiplied by 1.5x for a standard deviation of 0.2597. These values (0.55 mean and 0.2597 standard deviation) were used in the sample size calculator based on CDM-EB67-A06-GUID to reach the 90/10 target. Using this calculator the expected ex-ante sample size is [REDACTED]. Using the mentioned dropout rate per annex IV of TPDDTEC of 10%, that number is increased to [REDACTED]. The sample size may be increased or decreased for the monitoring period and for subsequent monitoring periods based on the actual variation seen in the KPT data in the actual monitoring period.</p> <p>Prior to the first verification, a minimum of the ex-ante estimated [REDACTED] KPTs will be done.</p> <p>After the first verification KPT's will be conducted quarterly at a sample size of ~1/8 the sample size determined in the first verification KPT testing.</p> <p>For illustrative purposes, this will thus look per Annex D. For avoidance of doubt, the sample size shall not go below the [REDACTED] as mentioned in this annex.</p> <p>Based on the variability of the data over time the above mentioned ex-ante calculated sample size of [REDACTED] may be increased or decreased to meet the 90/10 target, and by minimum the 90/30 rule. [REDACTED]</p>

¹² https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20191129115244256/Meth_stan05.pdf

	<p>Given the 90/10 target outcome, the calculated emissions reductions will be reduced by 10% for conservancy to avoid over crediting. For illustrative purposes, if the outcome is 90/30, the calculated emissions reductions will be reduced by 30%.</p>
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Parameter	$N_{b,p,y}$
Unit	days
Description	Number of project technology-days
Source of data	Sales and Distribution database
Value applied	TBD
Additional Comment	<p>Number of days in a year shall be considered as 365 in case of domestic usage.</p> <p>If during ex-post sampling surveys, sampled households are found to use more than one activity ICS, the value of $N_{b,p,y}$ shall be discounted accordingly to ensure that only one ICS per household (having HHS size) is accounted in ER calculations. If the sampled household is sized larger than HHS, the applicable discount shall be adjusted accordingly.</p>
Monitoring frequency	For the first monitoring period (2023), surveys will be completed one time. [REDACTED]

Parameter	$U_{p,y}$
Unit	Fraction (%)
Description	Cumulative usage rate for Activity ICS in year y
Source of data	Ex-post Sampling Surveys. The Gold Standard <i>Requirements and Guidelines: Usage Rate Monitoring</i> will be applied. ¹³
Value applied	90% (This value is used for ex-ante calculations only is capped at 90%, in line with the Gold Standard Requirements and Guidelines.)
Monitoring frequency	For the first monitoring period (2023), surveys will be completed one time. [REDACTED]

Parameter	M_{rural}
Unit	Percentage

¹³ The Guidelines can be accessed here: <https://globalgoals.goldstandard.org/407g-ee-ics-tpddtec-usage-guidelines>

Source of data	[REDACTED]
Value applied	[REDACTED]
Monitoring frequency	[REDACTED]
Parameter	[REDACTED]
Unit	[REDACTED]
Description	[REDACTED]
Source of data	[REDACTED]
Value applied	[REDACTED]
Monitoring frequency	[REDACTED]

Parameter	TTAF _{purchase_share}
Unit	Percentage
Description	Percentage of cookstoves sold during the monitoring period where users make use of the MFI structure per figures 2-4 of the MADD.
Source of data	Lending records for the period
Value applied	TBD
Monitoring frequency	Annual

The functioning of the hotline number (customers dial 399 when in Ghana) for end-users will be tested by dialling its number at each annual verification.

The monitoring survey questionnaires used will be included in the monitoring report.

Once the transfer of the initial deposit has been made to the MFI (as referred to in section 1.2.6), evidence of this shall be provided in the monitoring report covering the relevant monitoring period during which the amount was transferred.

2.6.2. Carbon Leakage: Discuss, if appropriate, the avoidance of carbon leakage and the permanence of mitigation outcomes achieved.

Carbon leakage refers to a scenario where the emissions saved from the Activity are shifted elsewhere. Any such leakage must be accounted for when calculating the mitigation outcomes.

In general, cookstove projects have low leakage risks because there are low risks of displacing services or people due to the project. This means that the risks of pushing the reduced or avoided emissions outside the project boundary are very low.

TPDDTEC identifies the following sources of leakage:

- The inefficient, traditional cookstoves displaced by the Activity ICS are used elsewhere.
This scenario is not realistic, as the most traditional form of cooking in Ghana is the three stone fire. As the name implies, this form of cooking consists of arranging three stones in a way that a pot can be placed directly above the fire. Such a stove does not cost anything and does not require any specific skills to build. It is unrealistic to assume that the stones displaced by an ICS would be transported to be used elsewhere.
- Non-project users who previously used clean cooking technology switch to the non-renewable biomass saved in the Activity scenario.
As described in section 2.1.1, only 5% of households in rural Ghana currently use clean cooking technology, which is mainly LPG. Once a stove user has access to LPG, it is highly unlikely that they will switch back to non-renewable biomass for several reasons. Collecting biomass is time intensive and physically demanding. It also has to be done much more frequently, while an LPG cylinder (the only prevalent clean cooking solution in the region) lasts for several weeks. Purchasing biomass is more expensive than LPG, though it does not require the upfront investment into the LPG cylinder and the entire fuel does not be paid at once. However, in case a household switches back from LPG to biomass, this would be as a result of a deterioration in their socio-economic situation rather than as a result of the Activity.
- The Activity significantly impacts the fractions of non-renewable biomass within an area of other carbon projects, that consider the NRB for their emission reductions calculations.
While making a significant impact, the Activity is not at a scale where it would significantly influence the fraction of non-renewable biomass on a regional or national level.
- The beneficiaries of the Activity compensate for loss of the space heating effect of the inefficient traditional cookstoves by adopting some other form of heating or by retaining some use of inefficient technology. This could also include protection from insects and domestic lighting.
Ghana's tropical climate does not warrant the need of space heating effect for most of the year. Further, the use of baseline stoves after ICS intervention has been addressed above in the monitoring plan.

- The technology promoted by the Activity leads to substitution of already existing clean cooking technology to efficient stoves that rely on non-renewable biomass.

At the point of sale of the ICS, a brief survey will be recorded from each beneficiary on their current fuel consumption and cooking habits. Specific questions are included regarding already existing clean cooking technology. Beneficiaries that already use clean cooking technology are excluded from the mitigation outcome calculation. This is reinforced by the usage surveys that are carried out per monitoring frequency outlined in section 2.6.1. Statistically significant usage samples will be taken, and households that have access to clean cooking technology are also excluded from generating mitigation outcomes. This also applies to households that purchased clean cooking technology after the ICS. In practice, if 10 out of 100 households were found to use other ICS or clean cooking technology other than the Activity ICS, the Activity's issuance would decrease by 10%. This has been provisioned in the monitoring plan above.

To monitor accounting boundaries for possible overlaps with other projects that reduce emissions from deforestation and forest degradation, ACT will monitor any carbon program in Ghana including the voluntary carbon market (particularly REDD+), Article 6 and other schemes. If new projects become visible in the pipeline of any registry where there is potential for an overlap of accounting boundaries, ACT will get in touch with the respective project proponents to address these. At the time of writing, there are no registered REDD+ voluntary carbon projects in Ghana. Furthermore, the project has identified that so far the only REDD+ carbon program implemented in Ghana is a Carbon Fund Program in which results-based payments by the World Bank are paid to Ghana to reduce emissions on cocoa farming, this is not a carbon credit program. Also this program is not based on voluntary carbon cookstove methodologies, and therefore it did not assess permanence, additionality or leakage.

As illustrated above, the leakage risks of the Activity are low. Yet, as a conservative measure, a leakage adjustment factor of 0.95 has been considered in the ER calculations as per the provisions in the applied methodology that are aligned with international best practice.

2.6.3. Data acquisition

For each monitoring period per the monitoring frequency outlined in section 2.6.1, and prior to generating the mitigation outcomes, trained specialists will carry out monitoring surveys using specially designed monitoring survey questionnaires to monitor the Activity impact. This includes attribution, as well as sustainable development, the safeguarding of good governance, tracking of transformational change, and fuel prices.

2.6.4. Reporting of mitigation outcomes

The Activity will have the following governance structure with regards to the reporting of the mitigation outcomes:

1. Envirofit Ghana and / or select partners will instruct and train sales and distribution staff / partners to collect the end user information at the time of ICS distribution to make the ICS eligible under the Activity.
2. Making sales and distribution staff / partners aware of requirements of end user data collection. Guidance will be provided on the correct procedures to be followed during distribution.
3. Envirofit will maintain a distribution and sales database that includes a list of ICS distributed, based on following information, and received from users at the time of distribution [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
4. Performance of cross-checks on the ICS distribution information received from the sales and distribution staff / partners. [REDACTED]
5. The Activity will obtain the customer's approval during distribution to exclusively assign carbon rights as per the disclaimer specified on distribution records / ICS boxes.
6. Coordination of ex-post monitoring activities in the Activity is carried out as follows:
 1. Implementation of the monitoring plan,
 2. Determination of the sample size as per sampling plan and identification of the samples that are to be monitored
 3. Ensuring the quality of monitoring data (QA/QC)
 4. Utilization of this data for the calculation of the mitigation outcomes
7. The monitoring team will check and record the following key parameters in the ICS Monitoring Record. Key monitored parameters will be:
 1. Efficiency of project stoves ($eff_{new,y}$) in case of WBT, otherwise Baseline and project KPTs to determine fuel savings directly.
 2. Check if project stoves are operational and in use ($U_{p,y}$)
 3. Check if end users continue to use replaced/baseline stoves ($U_{b,y}$). If replaced/baseline stoves are being used, the consumption accounted for by them will be excluded from generating mitigation outcomes.
8. Calculation of mitigation outcomes based on monitoring data collected and preparation of monitoring report.

2.6.5. Transformational change

The Activity is expected to transition to a self-sustaining mode. First, due to the beneficiary having to collect or purchase less than half of the biomass previously used to cooking purposes. This frees up additional resources that can now be dedicated to improving their socio-economic circumstances. Second, the VSLA ensure that this development is reinforced and sustained, by providing access to banking solutions. These two aspects were described in more detail in Section 1.2.6.

2.7. Financial additionality of activity and individual projects

The Activity is deemed financially additional as the upfront investment in the Activity is conditional upon the project receiving carbon finance.

a) Economic feasibility analysis

There are three hypothetical alternative scenarios to the Activity that would comply with mandatory laws and regulations in the Republic of Ghana:

1. The program is undertaken without carbon finance.
2. A similar program, with the same scope, technology and scale is undertaken by another entity.
3. The program is not implemented.

However, due to the reasons outlined below, options 1 and 2 are not feasible.

Economic feasibility analysis: financial viability without carbon revenues

In addition to providing a financing mechanism for households that cannot purchase a stove upfront in the form of the TTAF, the Activity also subsidizes the end price to consumers. [REDACTED]

As part of the Activity, stoves are significantly subsidized, and sold to end consumers at a discount of approximately two thirds. Even under these conditions, poor rural households require several months to repay. [REDACTED]

At the program level:

Without the revenues from carbon credits, the Activity ICS, at full price, will be rendered outside the reach of potential beneficiaries. Given the sales price needed to allow purchase and adoption to take place the program would not be financially viable without carbon revenues. As can be seen below program costs far exceed revenues from cookstove sales.

	Without ITMO Revenue
Cookstove Sales Revenue (% of Program Cost)	█
Program Cost	█
Net Revenue	█
IRR	█

At the project (household/end-user) level:

The program implements high quality and highly efficient cookstove models. As such, these come at a significant price differential over the inefficient, traditional cookstoves customers are accustomed to. While the project (stoves) do provide a financial incentive to the end customer via fuel savings, the payback timing based on a direct purchase with no carbon finance subsidy, █. As indicated in section 1.2.3, the stove's lifetime is up to seven years, so this makes economic sense. However, it is highly unlikely that customers would purchase the stove initially at an unsubsidized price due to the long payback timing and lack of personal experience with the fuel savings presented to them. █

█
 █
 █
 █
 █
 █

	Customer Economics
Unsubsidized Price	█
Fuel Cost Savings (per Month)	█
Customer Payback Timing Unfinanced (Months)	█
Customer Payback Timing Financed (Months)	█

Benchmark analysis: carbon revenue impact

As outlined above, the carbon revenue allows for the end price to Activity beneficiaries to be subsidized by █. Together with the financing mechanism that funds local Village Savings and Loan Associations, this enables the Activity to distribute ICS at scale. Moreover, the Mitigation Outcome Purchase Agreement (MOPA), and thus the predictable income from the sale of the ITMOs is what allows for upfront

¹⁴ Prices, peers, and perceptions (P3): study protocol for improved biomass cookstove project in northern Ghana, Dickenson et.al

¹⁵ http://catalog.cleancookstoves.org/stove_details.html?stove_id=stove_0CBX51V

finance to be taken out. In other words, the MOPA serves as the security to the investor, and without carbon revenue there would be no upfront finance to fund the manufacturing, production and assembly of the stoves, transport costs, tariffs and duties, set-up of a local assembly facility and distribution channels, or the training of staff. The working capital made available to the TTAF is also taken out of pre-finance, so that it is available at project start of the Activity. Thus, carbon revenues are imperative to initiate and operationalize the Activity and the Activity is deemed unviable without the carbon revenue support. As can be seen in the table below, carbon revenue increases the return to a level slightly above the benchmark reference rate of the government bond rate in Ghana of [REDACTED].

	Without ITMO Revenue	With ITMO Revenue
Cookstoves Sales Revenue (% of Program Cost)	[REDACTED]	[REDACTED]
ITMO Revenue (% of Program Cost)	[REDACTED]	[REDACTED]
Program Cost	[REDACTED]	[REDACTED]
Net Revenue	[REDACTED]	[REDACTED]
IRR	[REDACTED]	[REDACTED]

At the project (household/end-user) level:

As set out in the economic feasibility analysis above, the payback period of the customers is [REDACTED] for a financed cookstove.

However, due to a lack of trust and knowledge in the product as identified in the barrier analysis below, customers are not willing to take that risk. To overcome this barrier of “lack of knowledge and trust among customers”, carbon finance revenues are utilized in two ways. First, the customer purchase price is subsidized to a level around [REDACTED]. Per literature and market tests evidenced in the economic feasibility ‘at the household level’ above, that pricing would be near the maximum acceptable price for customers of a newly introduced cookstove within the Ghanaian context. Second, [REDACTED]

[REDACTED]. Therefore, the table below compares the project scenario without the carbon finance with the project scenario with the carbon finance.

	Customer economics without carbon finance revenues included	Customer economics with carbon finance revenues included
Unsubsidized Stove Sale Price	[REDACTED]	[REDACTED]
Carbon Finance Covered Costs		
Stove Subsidy		[REDACTED]

¹⁶ <https://www.bog.gov.gh/treasury-and-the-markets/treasury-bill-rates/>

████████████████████		█
Stove Sale Price (subsidized)	█	█
Fuel Cost Savings (per Month)	█	█
Customer Payback Timing Unfinanced (Months)	████	█
Customer Payback Timing Financed (Months)	█	█
% of Costs Covered by Carbon Finance	█	█

Whilst the economic feasibility analysis shows that the cookstoves make sense from an economic perspective to the user, the barriers listed in the barrier analysis section below indicate why the carbon finance is still additional. The table above compares the project scenario without carbon finance with the project scenario with carbon finance, and that taking into account the identified barriers, demonstrates that the carbon finance is the key financial incentive without which the project would not be implemented.

Over time as the product becomes better known to customers and the benefits are realized, the subsidy can be reduced and eventually eliminated. As seen in the chart below, the sales price can rise slowly as volumes and awareness in the market increase. The total cost of the stove will also come down through economies of scale and reduced channel margins as the product moves from a 'push' product to a 'pull' product to help further close the subsidy gap. Initial operations, working capital and program initiation and ██████████ are highest in Phase 1, whereas these are reduced and / or eliminated in subsequent phases, bringing down the cost of the product. It can also be seen that for the duration of the program, the carbon finance will continue to provide >10% of the program costs.

	Phase I	Phase II	Phase III	Post Program
Unsubsidized Stove Sale Price	█	█	█	█
Carbon Finance Covered Costs				
Stove Subsidy	█	█	█	█
████████████████████	█	█	█	█
Stove sale price (subsidized)	█	█	█	█
Fuel Cost Savings (per Month)	█	█	█	█

As per the **National Energy Policy, 2010**¹⁹ the Government of Ghana will promote the use of improved wood fuel burning equipment for cooking in households and other commercial activities and using an ICS for cooking is not a mandatory requirement in the host country.

As per the **Ghana NREAP**²⁰ (**National Renewable Energy Action Plan, 2015-2020**) and **NEEAP**²¹ (**National Energy Efficiency Action Plan, 2015- 2020**) the Government has been promoting the use of improved cookstoves and other cleaner alternative cooking fuels. To that end, it is estimated that about 1 million cookstoves are being used currently (2015), and the goal is to ensure that by 2020, 2 million households will be using improved cookstoves. There is no law that binds the households to use only clean cookstoves or clean fuel for cooking.

Some of the other plans and programs on Energy Efficiency are mentioned below:

¹⁹ Ministry of Energy, *National Energy Policy, 2010*

<https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/GHANA%29%20National%20Energy%20Policy.pdf>

²⁰ Ministry of Power, *National Renewable Energy Action Plans (NREAPs), 2015*

https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANER/Ghana_National_Renewable_Energy_Action_Plans.pdf

²¹ Ministry of Power, *National Energy Efficiency Action Plan, 2015*

https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANEE/Ghana_National_Energy_Efficiency_Action_Plan.pdf

Table 1: National policies ² , plans and programmes on Energy Efficiency			
Name	Law, Act, Regulation Year	Description	Implementing Government Body
Electricity Demand Management Fund (EDMF)	Policy 2011	Provides funding for energy efficiency activities in the industrial, commercial, and residential sectors	Energy Commission
Value Added Tax (VAT) Act 546, Act 870	Act 1998, 2013	Tax applied to goods and services at each stage of the production and distribution chain but exemptions for petrol, diesel and kerosene	Ghana Revenue Authority
Legislative Instrument (LI) 1815, LI 1958, 1970	Regulation, (2005), (2008)	Labelling for standardization (refrigeration, air-conditioning and lighting)	GSA, EC
Legislative Instrument (LI) 1815, LI 1958, 1970	Regulation, (2005), (2008)	Minimum energy performance standards (refrigeration, lighting and air-conditioning)	GSA, EC
Legislative Instrument (LI) 1815, LI 1958, 1970	Regulation, (2005), (2008)	Comparison labeling (refrigeration, air-conditioning and lighting)	GSA, EC
Legislative Instrument (LI) 1815, LI 1958, 1970	Regulation, (2005), (2008)	Endorsement labeling (refrigeration, air-conditioning and lighting)	GSA, EC
Refrigerator rebate scheme	Policy 2012	Promotion of energy efficient refrigerators for domestic use	Energy Commission
Promotion of EE in public buildings	Policy 2009	Installation of capacitor banks in public institutions	
Legislative Instrument (LI) 1815	Regulation (2005)	Energy efficiency standards and labeling (Refrigeration, lighting and air-conditioning)	EC, GSA
Energy efficiency regulation LI 1932	Regulation (2008)	Prohibition of the sale of incandescent lamps	EC
Energy Efficiency standards and labelling LI 1958, 1970	Regulation (2008)	Household refrigeration appliances conforming to energy efficiency standards for imports and locally made goods	EC
The National Building Regulations LI 1630	Regulation (1996)	Ensuring improvements in housing durability and habitability	MWRWH
Ghana Building Code, 1970 & Revised (Draft) 2011	Regulation	Establishing standards in terms of material within the built environment	MWRWH, EC
Ghana Green Building Council (est. 2009)	Energy certification and labelling	Promoting the use of energy efficient building materials	EC, GGBC

Barrier Analysis

Within the program two key barriers exist that prevent the program from being viable without carbon revenue.

- *the benefits accrue to the user and not to the investor (landlord/tenant dilemma).*

While the use of the more efficient cookstove provides a financial incentive for its use, these savings are accrued the end user and not the program. The monetary benefits from reduced fuel usage therefore do not accrue to the program proponent and therefore does not change the economics of the program implementation.

- *lack of knowledge and trust among customers;*

Within the target customer groups high efficiency cookstoves are not known. The traditional cookstoves used are typically sold for [REDACTED]. While the cookstoves implemented in the program provide significant financial savings to customers via fuel savings, due to the novelty of high performing cookstoves the benefits associated with them are not yet trusted as being realizable. While the program design envisions the sales price of the stove being increased incrementally over time as its performance and benefits become realized and accepted, initially customers are highly unlikely to pay [REDACTED] the price for a new technology, versus the business-as-usual scenario. [REDACTED]

[REDACTED]

Sensitivity Analysis

At the program level:

Four scenarios were evaluated at the 10% sensitivity threshold to evaluate if the program became viable without carbon finance. The four scenarios chosen were based on the variables that have the highest impact on program economics:

- [REDACTED]
- [REDACTED]
- [REDACTED]

- Best Case Scenario where the three variables above were all varied in the favourable direction to program economics

[REDACTED]

	Reference Case Without Carbon Revenue				
Cookstoves Sales Revenue (% of Program Cost)					
Program Cost					
Net Revenue					
IRR					

As can be seen from the table, under no scenario did the program economics become positive in the absence of carbon revenue.

At the project (household/end-user) level:

Four scenarios were evaluated at the 10% sensitivity threshold to evaluate if the program became viable without carbon finance. The four scenarios chosen were based on the variables that have the highest impact on program economics:

- [Redacted]
- [Redacted]
- [Redacted]

- Best Case Scenario where the three variables above were all varied in the favorable direction to program economics

	Baseline	[REDACTED]	[REDACTED]	[REDACTED]	Best Case Scenario [REDACTED]
Unsubsidized Price	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Carbon Finance Covered Costs					
Stove Subsidy	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Stove sale price (subsidized)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Fuel Cost Savings (per Month)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Customer Payback Timing Unfinanced (Months)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Customer Payback Timing Financed (Months)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
% of Costs Covered by Carbon Finance	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

As can be seen from the table, under no scenario did the program not require significant ITMO revenue to be viable.

Common practice analysis

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

	2019	2020	2021	2022	2023	2024
Revenue	1000	1000	1000	1000	1000	1000
Expenses	800	800	800	800	800	800
Profit	200	200	200	200	200	200

[Redacted text block]

	2019	2020	2021	2022	2023	2024
Revenue	1000	1000	1000	1000	1000	1000
Expenses	800	800	800	800	800	800
Profit	200	200	200	200	200	200

	2019	2020	2021	2022	2023	2024
Revenue	1000	1000	1000	1000	1000	1000
Expenses	800	800	800	800	800	800
Profit	200	200	200	200	200	200

[Redacted text block]

[Redacted text block]



[Redacted]
[Redacted]

Lastly, the Activity proponents are not aware of any activities that distribute improved cookstoves at scale without the support of carbon finance.²⁵ Moreover, the technology used in these projects does not meet the same thermal efficiency specifications as the stoves distributed in this Activity. [Redacted]

[Redacted] In addition, to the best of our knowledge, none of the other improved cookstove activities in Ghana incorporate a financing structure such as the one employed by this Activity.

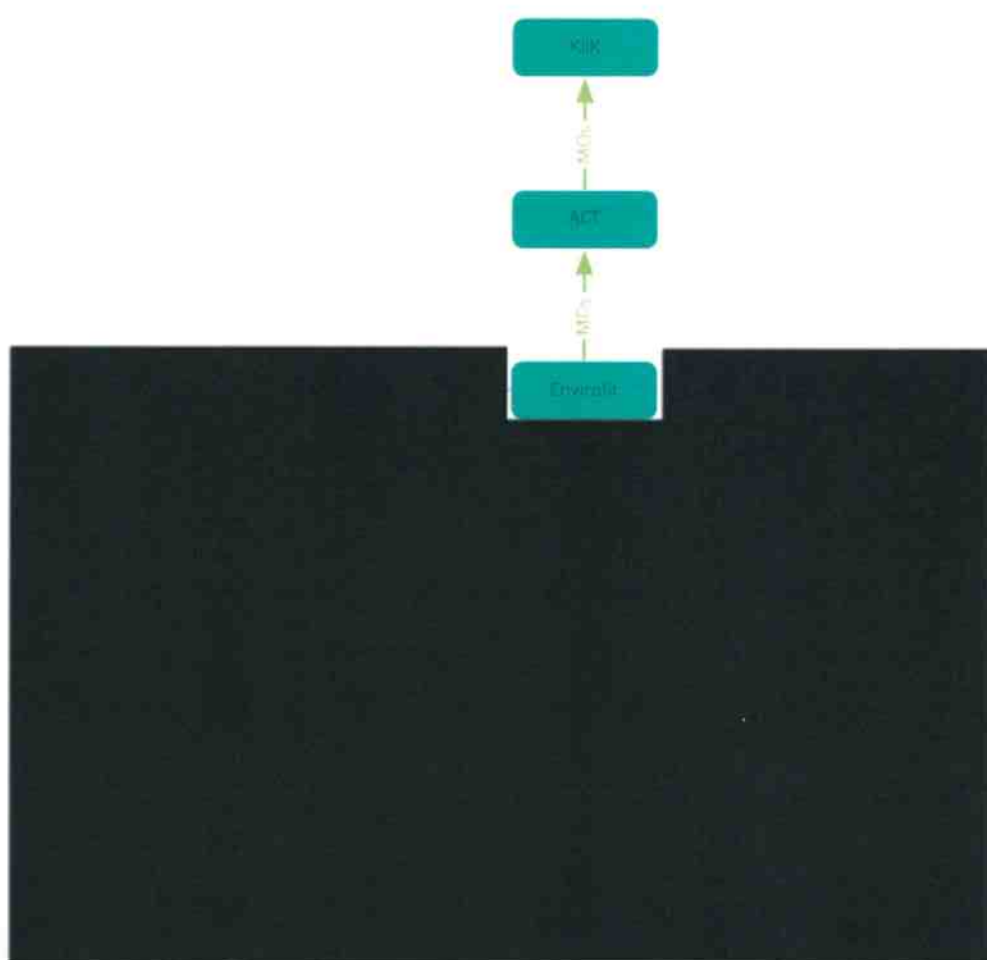
²⁵ Other examples that rely on carbon finance includes:
Man & Man Enterprise: <https://registry.goldstandard.org/projects/details/306>
Relief International: <https://registry.goldstandard.org/projects/details/1>

[Redacted]

3. Institutional setup

3.1. Activity governance

Governance structure



ACT is the Activity supervisor and co-developer. This involves keeping KliK updated on progress made, and coordination with the national focal points of Switzerland and Ghana. In addition, ACT is responsible for obtaining official authorization under Article 6(3) of the Paris Agreement and completion of the MADD.

Envirofit is the project co-developer and implementer responsible for the day-to-day operation of the Activity on the ground and the technology provider. This involves coordinating with the various implementing organizations that are responsible for ICS distribution, as well as the assembly of the stoves in Ghana. Envirofit will also be responsible for validation, monitoring, and verification of the mitigation outcomes. This includes monitoring and reporting of sustainable development benefits and operation of the database to track this data. Being the technology provider and implementer locally, Envirofit will oversee the grievance mechanism and coordinate with the TTA Fund, the MFI and VSLAs. Having been active on the Ghanaian market for over a decade, Envirofit has sold more than 100,000 ICS.

Activity supervisor

ACT Commodities will be the Activity supervisor, legal owner of the environmental attributes and Klik's counterparty in the MOPA.

3.1.1. Lead institutions and participants

The lead institutions are ACT Commodities and Envirofit International.

3.1.2. Designated representatives

Company	ACT Commodities
Address	Strawinskylaan 3127 1077 ZX Amsterdam The Netherlands
Name	Daniel de Vries
Phone	+31 20 2199211
Email	ddevries@actcommodities.com

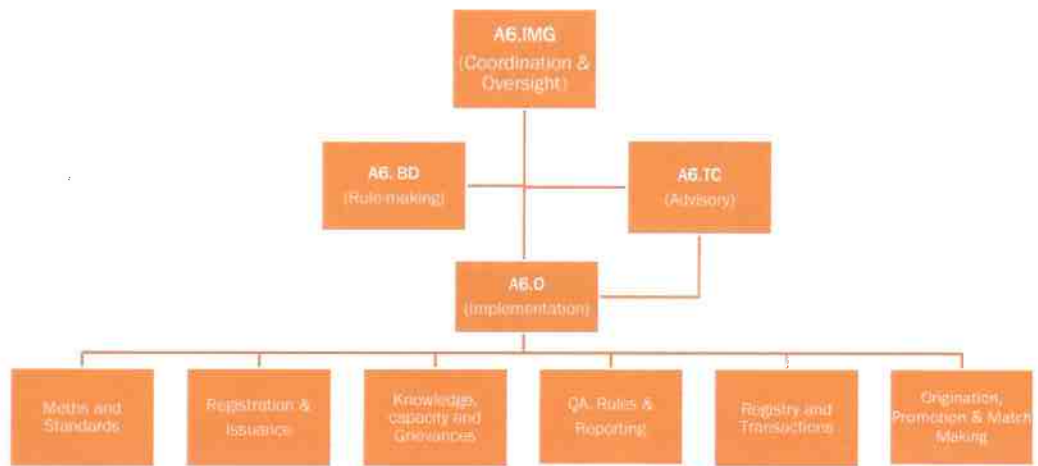
Company	ACT Commodities
Address	Strawinskylaan 3127 1077 ZX Amsterdam The Netherlands
Name	Jonathan Grassiano
Phone	+31 20 8911255
Email	jgrassiano@actcommodities.com

3.2. Interaction with transferring country

3.2.1. Coordination structure and interaction

Ghana's Article 6 Office will be the direct point of contact between the Activity proponents and the Ghanaian authorities.

According to section 4.1.4 of *Ghana's Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement*, the Ministry of Environment, Science, Technology & Innovation (MESTI) serves as the supervising Ministry and works through the Environmental Protection Agency (EPA) as the host of the Article 6 Office (A6.O) as the Designated Article 6 Authority (DAA). The A6.O will support the Article 6 inter-ministerial group (A6.IMG), Article 6 Board (A6.BD), and Article 6 technical committee (A6.TC) to oversee the coordination, approval, rulemaking, and technical advice functions.



3.2.2. Interaction between the transferring country and the Activity.

The structure outlined in section 3.2.1 ensures proper interaction between the Ghana and the Activity. Ghana's dedicated Article 6 Office is responsible for the implementation of activities, and thus the best suited to be the direct point of contact.

3.2.3. Organisational set-up

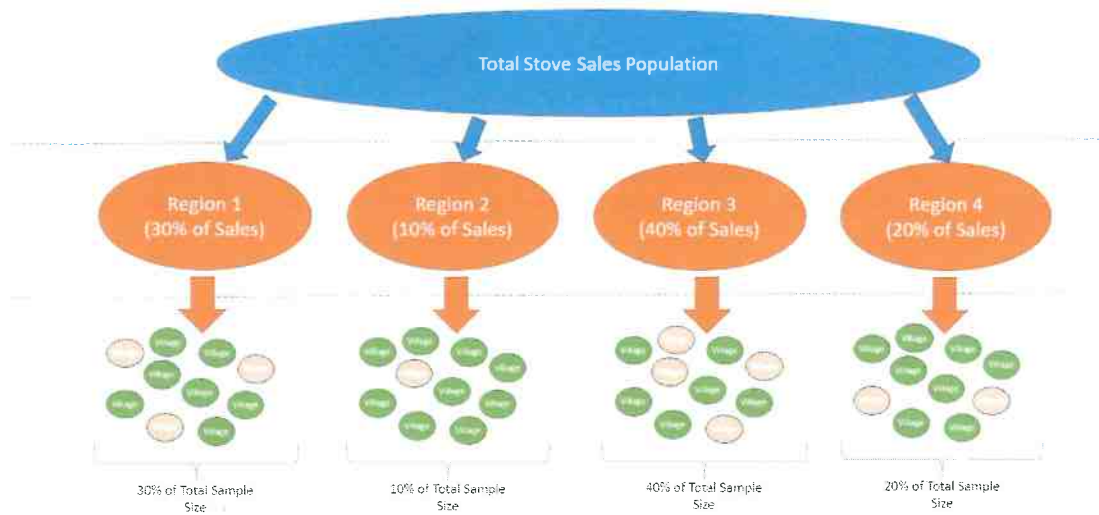
Ghana's Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement constitutes the organisational set-up which governs and anchors the Activity within the governmental structure. Prior to official authorization of the Activity, the Technical Committee will review the proposed Activity, and provide elaborate feedback.


Annexes

Annex A: Excel file: ITMO_Ghana_ER_Sheet_V4.2

Annex B: CREEC_SuperSaver Performance Report

Annex C: sampling



 Randomly Selected Villages

The villages are grouped in regions based on sales records of the program’s cookstoves, and the KPTs are performed on random sampling basis with villagers within these villages.

Annex D: KPT sampling illustrative overview

	██████████ ██████████ ██████████	██████████ ██████████ ██████████	██████████████████ ██████████████ ██████████████	██████████████████ ██████████████ ██████████████
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██████████ ██████████████ ██████████	█	█	██████████	██████████
██████████ ██████████████ ██████████	█	█	██████████	██████████

