MADD – Transformative Cookstove Activity in Rural Ghana

1. Activity Overview

1.1. Basic Information

Transferring Country	*Republic of Ghana*
Mitigation Activity Name	*Transformative Cookstove Activity in Rural Ghana*
Managing Entity	*ACT Commodities* *Raphael Eberle* *reberle@actcommodities.com* *+31 202 199 243*
Sector	*Improved Cookstoves (ICS)*
Summary	*The Activity will distribute 60.000 improved cookstoves (ICS) in the rural regions of Ghana, with main beneficiaries in the agricultural sector* The Envirofit cookstoves used in this Mitigation Activity reduce household biomass consumption by approximately 60%. This leads to significant emission reductions of CO2 as well as other greenhouse gases such as black carbon emissions. KliK's carbon finance enables the distribution to households at scale, due to the carbon revenue being used to subsidize the price of the ICS to end-consumers.
Estimated Volumes	*185,000 ITMOs annually over 7 years* *1,295,000 ITMOs in total over the first crediting period.*
Version of document	*2.1*
Date and place	*23.03.2022, Amsterdam, the Netherlands*

1.2. Activity Description

1.2.1. Nature

In Ghana, approximately 78% of households continue to rely on unsustainable cooking fuels such as firewood or charcoal. The purpose of this Activity is dissemination of improved cookstoves (ICS) in the Republic of Ghana. The activity will replace traditional stoves with more efficient ICS.

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 drastically reduces greenhouse gas (GHG) emissions and save 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 of the people in Ghana.

The Activity, by reducing the amount of fuel required for cooking, reduces emissions attributed to the consumption of non-renewable biomass which releases CO_2 and other greenhouse gases into the atmosphere when burned.[1] 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] "*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*." Source

1.2.2. Scope

The Activity primarily targets rural farmers in the agricultural sectors in the Western, Central, Ashanti, Eastern and Upper West regions and expects expansions 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 GHGs included are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). This is in line with the Gold Standard methodology *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* ("TPDDTEC") which will be used for this Activity and is described in more detail in section 2.5.1 of this Mitigation Activity Design Document ("MADD").

The first set of ICS proposed to be distributed as part of this Activity have a minimum lifetime of 5 years. In line with best practice, crediting on a per-stove basis will be limited to five years, even if a specific stove is still used beyond that time period.

The activity is envisaged to be implemented by 2022-23 (Phase I - distribution of 60,000 ICS) and the crediting period of the Activity shall be 7 years.

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. No other stove in the Ghanaian market can compete with the combined efficiency, durability, and the positive health impacts of these ICS. The Envirofit brand is as 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	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.

As the Activity progresses and / or the socio-economic situation of the target population improves, SmartGas services and/or other ICS models may be incorporated into the Activity.[2] 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, and distribution costs. The Mitigation Outcome Purchase Agreement (MOPA) by KliK serves as a security to the impact investor that the loan will be repaid through the sale of the mitigation outcomes.
2. The Activity targets poor, 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 still not able to afford the stove. The Activity thus involves the creation of a dedicated Fund (see Section 1.2.6), designed to provide loans to rural 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.

[2] See here for further information on Envirofit's SmartGas services: https://envirofit.org/smartgas/

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 decrease 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 3 to 5,5 months. The table below provides a breakdown of the economics around purchasing an Activity ICS on a household level:

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 3,00	GHS 90,00	GHS 52,20	GHS 37,80	3
***Firewood**	GHS 2,00	GHS 60,00	GHS 39,60	GHS 20,40	5,5

*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. The majority of ICS components are produced in China and/or India, with a handful of accessory parts such as packaging, marketing materials and certain spare fasteners being produced locally in Ghana. Assembly production of the ICS will be completed locally. Thus, 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.

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.

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 account[3].

The TTA Fund 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 self-help groups. These groups give participants the opportunity to save money and access loans. They typically consist of 25-30 members that meet on a weekly basis, with loans being given out on a rotational basis.

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 farming inputs such as fertilizers and seeds. Some distribution partners also off take the farmers' produce (such as cocoa or cashew) 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, loans may increasingly 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) 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 the MFI. Such bifurcation enables complete transparency, where cashflows and transactions with the distribution partners can be tracked & reported, while at the same time allowing for the TTA Fund's impact to be directly monitored.

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 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

[3] Clean Cooking Alliance report "*Ghana Consumer Segmentation*", 2021. The full report can be accessed here.

up front, the Fund structure is not applicable. Note that EF Ghana in Figures 1-4 below stands for Envirofit Ghana.

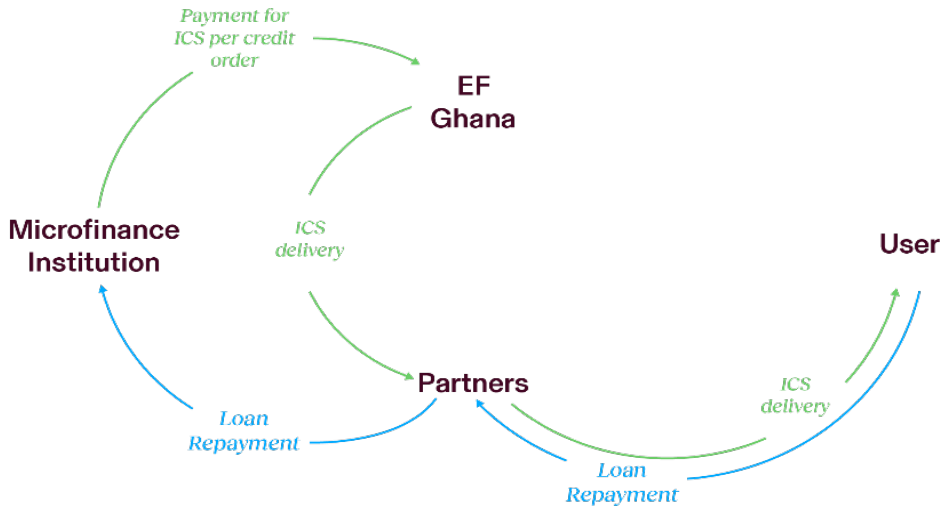


Figure 1: Consolidated Overview of the TTAF

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.

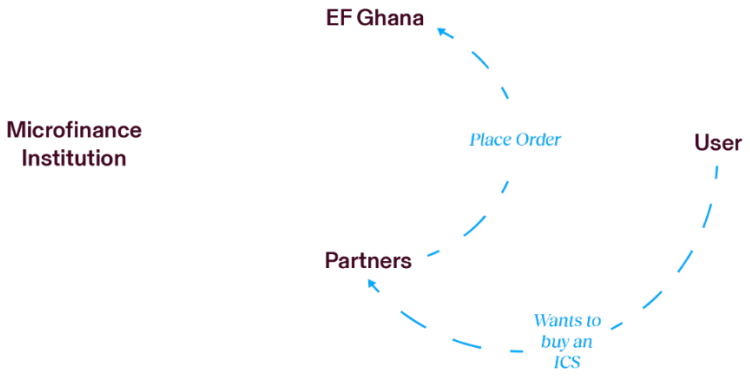


Figure 2: Placing ICS Order via the Implementation Partner

2. Delivery of the Activity ICS: as the ICS leaves the local distribution center, EF Ghana receives the payment for the ICS. The implementation partner then delivers the ICS to the end-user, who in most cases will make a small down payment. The implementation partner now has a debt towards the MFI, which it recovers from the end user.

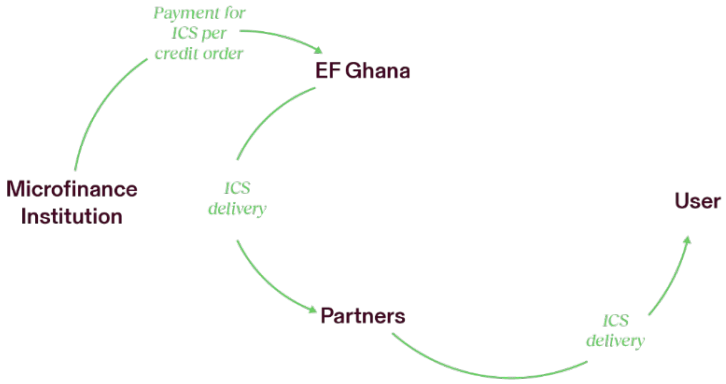


Figure 3: Delivery and Payment of the ICS

3. Implementation partner receives loan repayment from the end user and pays off its debt with the MFI: 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.

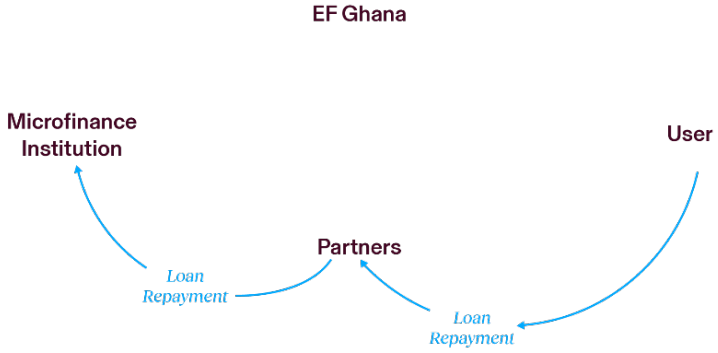


Figure 4: Loan Repayment

2. Methodological approach

2.1. Baseline for determination of mitigation outcomes

Existing and planned policies.

Ghana's Draft Policy Framework on Cooperative Approaches under Article 6(2) of the Paris Agreement include a whitelist of technologies that are considered additional to the NDC. Under this Framework, biomass ICS are deemed automatically approved. Through these two instruments, 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. There are no existing or planned policies related to this Activity.

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).

Only 5% of Ghana's rural population primarily use clean cooking fuels.[4] The vast majority continues to rely on biomass such as wood (73%) and charcoal (20%).

[4] Clean Cooking Alliance report "*Ghana Consumer Segmentation*", 2021. The full report can be accessed here.

	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%
Primarily use kerosene to cook	0%	0%	0%
Primarily use other solid fuels to cook[2]	1%	<1%	1%

This high reliance on biomass fuels for cooking purposes is not sustainable. Having lost over 60% of its forest cover from 1950 to the turn of the last century (2,7 million hectares), Ghana's deforestation rate has been approximately 3% per year (320.803 ha/year) since 2000. Recent years have also seen a marked increase in the deforestation rate. From 2013 to 2015, the annual deforestation rate in Ghana rose to 794.214 ha per annum.[5]

The Activity shall contribute to reduction in demand for 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

In line with *Ghana's Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement*, the Activity's crediting period is seven years and will run from 01 July 2022 until 31 June 2029. 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.

[5] Ghana's national FREL submitted to the UNFCCC can be found under https://redd.unfccc.int/files/ghana_national_reference__level_01.01_2017_for_unfccc-yaw_kwakye.pdf

- 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.

It is for these reasons that under all major carbon standards, Programmes of Activity have significantly longer lifetimes than single Component Project Activities.

2.3. Avoiding double claiming

2.3.1. Climate finance and governmental support

There are no direct contributions to the Activity from climate finance sources or through governmental support. 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 2.5.4 of this MADD. Regarding potential climate finance resources in the MFI, the TTAF will be funded solely via pre-finance obtained through this project. This allows for the exclusion of any support from climate finance.

2.3.2. Carbon finance

There are no other carbon finance contributions to the project and KliK's carbon finance is the sole enabler of the Activity.

The Activity set-up ensures that no double claiming occurs at any point of the value chain. Activity beneficiaries sign a carbon waiver upon receipt of the Activity ICS, transferring the claim over the mitigation outcomes to the Managing Entity. Each Activity ICS has a unique identifier which is entered into a comprehensive sales & distribution database to avoid any double claiming.

In addition, the beneficiaries fill out a form that collects necessary personal data such as name, address, and phone number, as well as data on the baseline fuel type and stoves that they already possess. This enables unique mapping of each ICS to its user to allow subsequent monitoring ex-post. As part of the ex-post monitoring surveys, more data on Activity ICS performance is collected on a sampling basis.

Sampled beneficiaries found to own another improved stove (outside this program) are accordingly accounted for in the determination of mitigation outcomes. This overview of all ICS distributed as part of this Activity ensures a direct link between KliK's carbon finance and the impact on the ground, including the mitigation outcomes.

In addition, other ICS activities that may penetrate Activity ICS beneficiary households during the project lifetime will be monitored on sampling basis.

To summarize, the Activity includes double safeguards against double claiming. First, no other carbon finance contributions form part of the Activity. Second, the Activity is set up and monitored in a manner that ensures all impact and claims can be attributed to KliK alone.

2.3.3. Attribution of mitigation outcomes

The Activity is not the result of a blended financing structure, and all mitigation outcomes are attributed directly and solely to KliK.

2.4. Promotion of sustainable development

2.4.1. Consistency with Ghana's SDG priorities

Schedule 3 of Ghana's Draft Framework for Cooperative Approaches under Article 6.2 of the Paris Agreement stipulates the criteria on sustainable development. It does not list any SDG priorities per se, but instead requires the documentation of sustainable development co-benefits. The documentation of impact is carried out in accordance with the Gold Standard SDG Impact Tool.[6]

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.	**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 Target Indicator - 1.4.1 Proportion of population living in households with access to basic services. Monitoring parameter: • 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.	**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. Target Indicator - 3.9.1 Mortality rate attributed to household and ambient air pollution

[6] The Gold Standard SDG Impact Tool can be accessed under: https://globalgoals.goldstandard.org/430-iq-sdg-impact-tool/

	Monitoring parameter: • 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 of shared responsibility within the household and the family as nationally appropriate.	**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. 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. Target Indicator – 5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location Monitoring parameter: • 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).

Goal 7: Affordable and Clean Energy	
7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services	**Relevance:** The Activity involves the installation and dissemination of clean technology for cooking, by using available energy sources more efficiently. Target Indicator – 7.1.2 Proportion of population with primary reliance on clean fuels and technology Monitoring parameter: • SDG Parameter 7.1 (MP 7 – OICS - % users reporting an operational ICS in the Activity

Goal 8: Decent Work and Economic Growth	
8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	**Relevance:** The Activity results in generating employment for marketing / sales and distribution / technical employees. Target Indicator - 8.5.1 Average hourly earnings of female and male employees, by occupation, age, and persons with disabilities Monitoring parameter: • 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	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. Target Indicator – 12.2.2 - Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP Monitoring parameter: • 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	**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. Target Indicator – 13.2.2 - Total greenhouse gas emissions per year Monitoring parameter: • Amount of GHG emissions Avoided or sequestered by the project per year (tCO_2eq).

An overview of all SDG monitoring parameters can be found in the table below:

	SDG	Monitoring Parameter	Parameter Description	Unit	ex-ante/ex-post	Justification
1	1	SDG Parameter 1.1 – ABS	Number of project participants 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	This parameter checks if a sampled user has experienced visible / noticeable reduction in smoke and PM while cooking on project stove. Smoke and PM exposure are the primary hazards associated with inefficient cooking in baseline and reason for increased morbidity / mortality to those exposed. With reduction of smoke / PM exposure, the reduction in mortality / morbidity is automatically substantiated.
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		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 a 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.

2.4.2. 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.
A transition period of 24 months will be granted for 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.

2.4.3. 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:
Apraku, AT40
Kumasi
Ashanti Region, Ghana

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.

2.4.4. 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 2.4.3 of this MADD. Both ACT and Envirofit have a zero-tolerance policy against corruption in place.

2.4.5. 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.

A non-technical summary of the Activity and a feedback form will be provided to relevant stakeholders, giving them an opportunity to share feedback and shape the design of this Activity. Moreover, the writing process of this MADD is conducted in close cooperation with both the Ghanaian and Swiss authorities, prior to their official approval.

Throughout the Activity lifetime, relevant stakeholders will be assessed on an ongoing basis and their feedback taken into account. As mentioned in section 2.4.3, the Activity establishes a grievance mechanism that encourages stakeholders to voice any concerns or feedback they may have, and to protect their fundamentals rights.

2.5. Determination, monitoring and reporting of mitigation outcomes

2.5.1. 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.[7]

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.
3. Once the fuel savings of the ICS per household per year have been established, they are multiplied by the number of operational ICS distributed. Stove stacking, or the existence of several stoves is taken into account. The result is the amount of biomass (measured in tons) saved by the Activity.
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 2.5.2 is also discounted.

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

[7] The full methodology on reduced emissions from cooking and heating *Technologies and Practices to Displace Decentralized Thermal Energy Consumption* is available here.

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

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

Values determined ex ante:

Parameter	$NCV_{b,fuel}$
Unit	TJ/t
Description	Net-calorific value of firewood, or energy of firewood per unit of mass.
Source of data	IPPC default value
Value applied	0.0156

Parameter	$f_{NRB,b,y}$
Unit	Fraction (%)
Description	Percentage of biomass that is considered non-renewable.
Source of data	PoA 10576 – the latest PoA registered in Ghana. The fNRB was validated by an independent auditor on 31 October 2020.
Value applied	79.80

Parameter	$EF_{b,f,CO2}$
Unit	tCO_2e/TJ
Description	CO2 emissions factor of firewood
Source of data	IPCC default value
Value applied	112

Parameter	$EF_{b,f,nonCO2}$
Unit	tCO_2e/TJ
Description	Non-CO_2 emissions factor of firewood
Source of data	IPCC default value
Value applied	9.46

Parameter	$LE_{p,y}$
Unit	Fraction (%)
Description	Leakage
Source of data	Default value deemed conservative by methodology
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

Parameter	$SFS_{p,b,y}$
Unit	Tonnes/year

Description	Fuel savings per stove per year
Source of data	TBD. Will be established either via ex-post Kitchen Performance Tests or Water Boiling Tests, in accordance with the TPDDTEC methodology.
Value applied	TBD

Parameter	$N_{b,p,y}$
Unit	Stoves * days
Description	Number of project technology-days
Source of data	Sales and Distribution database
Value applied	TBD
Additional Comment	Number of days in a year shall be considered as 365 in case of domestic usage. 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.

Parameter	$U_{p,y}$
Unit	Fraction (%)
Description	Cumulative usage rate for Activity ICS in year y
Source of data	Ex-post Sampling Surveys
Value applied	90% (This value is used for ex-ante calculations only)

Parameter	U_y
Unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Ex-post Sampling Surveys
Value applied	TBD
Additional Comment	The sampled users will be checked for presence of baseline stove and whether it is used along with project stove for cooking. For samples where baseline stove is found not being used, $U_y = 1.0$ For samples where the baseline stove is found to be in use, U_y shall be determined as: • ratio of frequency of usage (i.e. number of meals cooked on ICS vs total number of meals cooked on ICS and baseline stove) For example, if during the survey it was found that total average use of project ICS is 3 times per day and that of baseline stove is 5 times per week, $U_y = 3*7 / (3*7 + 5)$.

	In case data of relative usage of ICS and baseline stove is not available, $U_y = 0.5$ for that sample This is applicable in case of WBT based approach. In case of KPT based approach, this parameter is deemed subsumed in the KPTs.

2.5.2. 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. 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 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 2.1.2, 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.
  The Activity aims to distribute a minimum of 60,000 ICS in several of Ghana's rural regions. While making a significant impact, it is not at a scale where it would significantly influence the national fraction of non-renewable biomass.

- 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 at time of verification. 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 are found to use other ICS or clean cooking technology other than the Activity ICS, the Activity's issuance decreases by 10%. This has been provisioned in the monitoring plan above.

  As illustrated above, the leakage risks of the Activity are not significant. In line with common best practice and to be conservative, a leakage factor of 5% is applied.

2.5.3. Data acquisition

For each monitoring period, 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 and tracking of transformational change.

2.5.4. 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 (in the ICS distribution record, which may be collected physically or electronically):
    1. Name of customer
    2. Address / location of the customer
    3. ICS unique serial ID number
    4. ICS Model
    5. ICS distribution date

6. Type of old / baseline stove replaced by ICS and the fuel type used in the old / baseline stove.

4. Performance of cross-checks on the ICS distribution information received from the sales and distribution staff / partners. A unique ICS ID is punched on each stove and the same ID is mentioned on the ICS distribution record.

5. The Activity will obtain the customer's approval during distribution to exclusively assign carbon rights as per the disclaimer specified on CPA 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 ($eff_{new,y}$)
    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 monitoring report.

2.5.5. 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 above.

2.6. 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.

3. Institutional setup

3.1. Activity governance

Governance structure

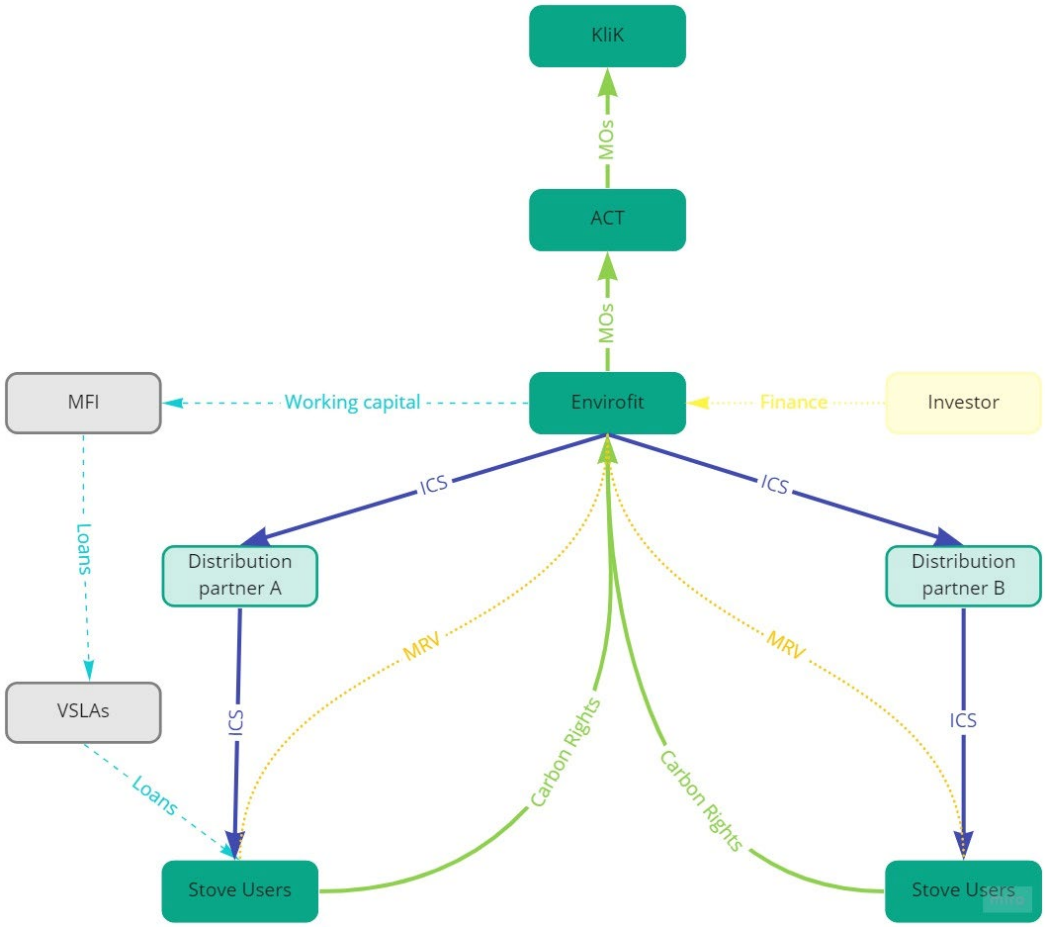


Figure 6: Organogram of the Activity participants, including flows of capital, stoves and MRV data. For the sake of simplicity, the TTAF structure is not shown in its full complexity. Please refer to section 1.2.6 for a coherent overview.

ACT is the Activity supervisor. 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.

Envirofit is the project developer 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.

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	Raphael Eberle
Phone	+31 202 199 243
Email	reberle@actcommodities.com

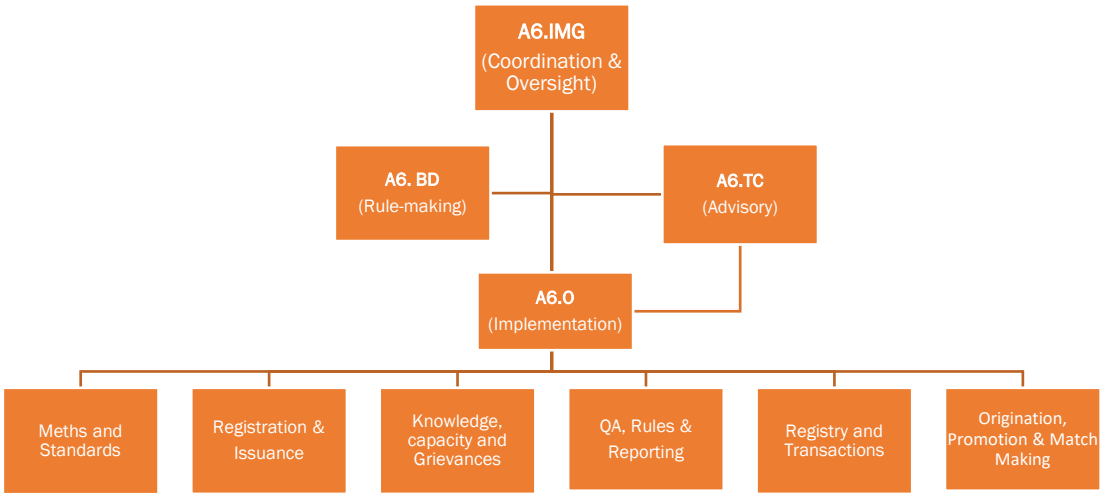
Company	ACT Commodities
Address	Strawinskylaan 3127 1077 ZX Amsterdam The Netherlands
Name	Daniel de Vries
Phone	+31 6 25 44 1304
Email	ddevries@actcommodities.com

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.