Mitigation Activity Design Document (MADD) Building Pathways to Electric Cooking (BPTEC) in Ghana

Project Owner: UpEnergy Ghana 1, represented by UpEnergy Group PCC Limited

FOEN Project Reference ID: 5047

Ghana CMO Project Reference ID: 12023UEG1016BPTEC07232016

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1 Activity overview

1.1 Basic information and summary

Mitigation Activity Name	Building Pathways to Electric Cooking (BPTEC) in Ghana
Programme Owner	UpEnergy Ghana 1, represented by UpEnergy Group PCC
Transferring Country	Ghana
Project Reference ID(s)	KliK / FOEN, Switzerland – 5047
	CMO, Ghana - 12023UEG1016BPTEC07232016
Sector	Improved Cooking
Geographic boundaries	Ghana
Type of gases	CO ₂ , CH ₄ & N ₂ 0
Summary	The proposed mitigation activity over its lifetime aims to build transition pathways to Electrical Cooking Devices (Electric Pressure Cooker (EPC) and Induction Stoves (EIS), collectively represented as ECD) in Ghana. To capture the stove usage pattern accurately, UpEnergy plans to use additional digital monitoring in a share of the electric cooking devices. The programme aims to distribute high-quality Electric cooking devices to Ghanaians.
	The activity is a large-scale Mitigation Activity (MA). It will be developed and operated by UpEnergy Ghana 1, represented by UpEnergy Group PCC through its local subsidiary in Ghana (UpEnergy Ghana Limited).
	Under the MA, UpEnergy plans to distribute Electric cooking devices units over 3 years (2024-2026). The Electric Cooking Device will be distributed at a heavily subsidized rate, alleviating the financial burden for households.
	The planned mitigation activity is new (not registered under CDM/or any vol- untary standards) and has been designed based on the Gold Standard meth- odology "Methodology for metered and measured energy cooking device v.1.2", with relevant rules for Sampling/Procedures.
Volumes	tCO ₂ e till 2030
Version of document	2.1
Date and place	06.01.2025, Accra, Ghana

1.2 Activity description

1.2.1 Nature of the Activity

Objective of the programme	Build transition pathways for Electric cooking devices by replacing traditional cooking
(Outcome)	practises in Ghanaian households.
Indicator	Reduction in cooking fuel consumption (charcoal, firewood, LPG etc.)

	Description	Estimated t CO ₂ e reduced per measure
Measure	The programme is intended to pave the way for an increasing propor- tion of on-grid households to transition to improved electric cooking, through an affordable and accessible Electric cooking devices product option, with the necessary support service infrastructure.	tCO2e

Description of the Activity

The goal of this program is to reduce firewood, charcoal & LPG fuel consumption of households by distributing and using the energy- efficient cooking technology i.e., Electric Pressure Cookers (EPC) and Electric Induction Stoves (EIS), thus the programme contributes to reducing greenhouse gas (GHG) and provides a healthy environment and contributes to the sustainable development of Ghana.

The activity is implemented by UpEnergy Ghana 1, represented by UpEnergy Group PCC (UpEnergy/UpE), which is also the Programme Owner of MA. The activity will be developed and operated by UpEnergy (Ghana) Limited, collaborating with local partners, to guarantee the final distribution and installation of Electric Cooking Device to the intended beneficiaries.

Around **Control** operational Electric Pressure Cookers (EPC) and Electric Induction Stoves (EIS)¹ will be provided and installed in Ghanaian households through this initiative. The programme will source high quality Powerup Electrical cooking devices to the local community. UpEnergy Ghana Limited will oversee local engagement efforts, including various on-site activities such as capacity building, distribution, and post-purchase service.

The sample list of prospective local service providers is enumerated in the table below along with their respective supporting roles,

#	Local Partner	Supporting Activity
1	Distribution Agents	E-cooking device distribution to the end user
2	NGOs	Dissemination of awareness on E-cooking technology
3	Media	
4	Academia	Baseline study and project monitoring surveys
5	Local business such as Labs & Instrument Suppliers	Technical services like KPT, CCT etc.

Through the implementation of the mitigation activity, it is expected that significant reduction in greenhouse gas (GHG) emissions will be enabled. Residential users with improved cooking technologies will reap the benefits of using electric cooking devices by the implementation of this mitigation activity. This will not only stop Ghana's rapidly increasing deforestation (the country lost 118 kha of natural forest in 2022, which is equal to 78.0 Mt of CO₂e emissions²) but it will also lessen the risk of indoor smoke pollution to human health, free up more time for women and children to spend cooking and buying fuel. The end users will be made aware in advance that using electrical cooking appliances produces carbon financing, which is then utilized to recover programme implementation expenses and subsidize the price.

¹ UpE intends to distribute one project stove (either EPC or EIS) per family based on the current Ghanian family size and requirement ² https://www.globalforestwatch.org/dashboards/country/GHA/?category=undefined (last accessed on 21/02/2023)

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Approximately 2.3 billion³ individuals worldwide lack access to modern cooking facilities, resorting instead to solid biomass, kerosene, or coal for their cooking needs. In sub-Saharan Africa, only about 18.5%⁴ of the population has access to improved cooking solutions, underscoring the significant challenge of addressing this gap. The reliance on biomass for cooking, particularly prevalent in rural areas, severely hampers productivity and has adverse health effects. Inadequate cooking facilities contribute to household air pollution, leading to approximately 490,000 premature deaths annually⁵, with women and children disproportionately affected. Moreover, unsustainable fuelwood harvesting exacerbates forest degradation, occasionally leading to deforestation.

A significant portion of the Ghanaian population, comprising 67.4%, utilizes biomass such as fuelwood and charcoal for cooking purposes, with nearly half of households conducting their cooking activities indoors⁶. Cooking indoors, as opposed to in separate structures or outdoor spaces, can potentially exacerbate health issues more significantly than exposure to smoke from solid fuel cooking. Moreover, the baseline study conducted for the programme revealed that the majority of the population in the target areas are dependent on wood (15%), charcoal (54.44%) and LPG (30.56%). As the project technology distributes ECDs, the demand for these biomass-based fuels will be significantly reduced, UpEnergy expects that the ECD will fulfil almost 70% of the cooking demands of the target population. As biomass-based fuel such as charcoal are produced in traditional/inefficient kilns the stress on natural vegetation/forest increases which leads to widespread deforestation. Thus, due to the reduction in demand for the biomass-based cooking fuel, the MA will reduce deforestation.

Compared to conventional stoves such as three stone-fire and traditional stoves, modern improved cooking solutions like electric cooking devices demonstrate enhanced heat transfer efficiency. This results in reduced fuel consumption and lower greenhouse gas emissions from burning non-renewable woody biomass/charcoal, as well as LPG.

The distribution of ECD in this mitigation activity will significantly reduce fuel consumption, resulting in an improved living environment for recipients, and reduced pressure on local forests. By reducing fuel consumption, CO₂ emissions from combustion of non-renewable biomass will be correspondingly reduced. The MA will yield a wide range of sustainability benefits that will provide beneficiaries with economic, social and environmental improvements.

UpEnergy's initial focus will be on the areas of Greater Accra, Ashanti, Eastern and Central regions and avoiding the areas where the other existing KliK Article 6.2 programmes are operating. This will be made sure by maintaining a rigorous database of the households which have been benefited by the project technology. This will include but not limited to the geocoordinates of the beneficiary households being captured during the distribution and cross checked during the data QC process to ensure the beneficiaries are located within the designated programme boundaries / regions. There will be certain pre-qualification checks for the end user to make that they are not part of any other carbon programme to ensure that the boundary won't overlap with that of any other AR6.2 programme.

Project Technology:

This mitigation activity aims to replace traditional cooking methods such as charcoal and firewood stoves, LPG (liquefied petroleum gas) stoves, and intermediate charcoal cookstoves (ICS) with more efficient Electric Cooking Devices (EDC) for household use. In the absence of the mitigation activity, the baseline scenario would involve reliance on various cooking technologies and fuels including charcoal, firewood, LPG, to fulfil cooking needs. Electric cooking appliances offer superior energy efficiency compared to traditional, intermediate firewood, charcoal, and LPG stoves due to their enhanced heat transfer capabilities, reduced heat loss, and improved combustion efficiency.

(i) Electric Pressure Cooker

The PowerUp EPC revolutionizes the cooking experience, blending efficiency with sophisticated technology. This electric pressure cooker is fitted with a 6.0-liter capacity aluminium non-stick pot which accommodates meals for families up to five family members (approximately 2 kgs) with ease. The cooker is built to last, with a robust stainless-steel enclosure and a

⁶ www.statsghana.gov.gh/gssmain/fileUpload/pressrelease/GLSS7%20MAIN%20REPORT_FINAL.pdf (last accessed on 21/02/2023) MADD Template V11

³ IEA (2022), SDG7: Data and Projections, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections/access-to-improved-cooking (last accessed on 21/02/2023)

⁴ IEA (2022), SDG7: Data and Projections, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections(last accessed on 21/02/2023)

⁵ IEA (2022), SDG7: Data and Projections, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections (last accessed on 21/02/2023)

lifespan of 5-7 years. The cooker also features a built-in energy meter and usage-data storage accessible via USB A, along with being PAYGO-ready for ease of payment. The user interface is intuitively designed, displaying kWh usage on a custom LCD screen and offering multiple cooking presets (Beans, Rice, Potatoes, Meat) alongside versatile functions like frying, slow cooking, boiling water, and a delayed-start for up to 24 hours. The product may also set to become IOT enabled in future iterations, allowing for live remote monitoring. Safety is prioritized in the EPC's design, incorporating features like the button-triggered pressure release, lid detection function, an insulated body, locking pin, and advanced safety components like the thermal fuse and pressure sensor which ensure a safe cooking environment.

The Electric cooking device⁷ features a greater thermal performance, more fuel savings, a longer lifespan, a higher safety rating, an aspirational design, and a lighter structure.

Figure 1 : PowerUp Electric Pressure Cooker	Capacity	
	Technology	Electric pressure cooker
	Rated Power Consumption	
	Operating Voltage	
Dig ar	Dimensions (LxWxH)	33. 5 × 33.5 × 35.5cm
Packaging Includes:	Weight (kgs)	5.15
1 × Electric pressure cooker with power cord	Time and Power Savings	70% faster than conventional cooking
1 x 6L non-stick Aluminium inner pot	Inner pot	Non-stick aluminium pot
1 x steamer rack	Estimated Life Span	Electrical: 5 - 7 years
1 x Measuring cup		Non-Electrical: 2-5 years (may prolong with proper maintenance)
1 x Spatula	Warranty period (EPC)	5 years
1 x Instruction manual (English)	Certifications	IEC Certifications ⁸ , Verasol Certifications (Global LEAP) ⁹

Technical Specifications of Electric Pressure Cooker (EPC)

⁷ UpEnergy shall introduce few other electric cooking device models with the similar performance / efficiency level during the course of project implementation.

⁸ Lab test conducted on 12th to 16th Jan 2024 by Guangdong BODE Testing, China.

⁹ Lab test conducted on 3rd June 2023 by Kijani Testing, Kenya.

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(ii) Electric Induction Stove (EIS)

UpEnergy's Induction Cooktop is a portable single burner system designed to fit pot diameters of up to 26cm, it will feature a minimum efficiency of **100**, and a lifespan of 5 - 7 years.

The unit offers adjustable cooking power and temperature levels, allowing for versatile culinary applications. It incorporates essential safety features, including a child lock, auto shut-off, and overheating protection, alongside cool to touch surfaces to mitigate the risk of burns, making it a safe choice for households.

Functionalities for convenience, such as a manual timer, keep warm function, and delayed start. It also includes pre-set cooking modes for simplified meal preparation (yam porridge, jollof rice, chapati, etc.), pan detection, and backlit controls for easy operation. An expanded cooking guide detailing advisable settings for common meals aids adoption.

Constructed with a plastic shell and a hardened glass burner surface, the cooktop is designed for both durability and ease of cooking.

Enhancing its functionality, the cooktop will feature built-in usage data storage, accessible via USB A, enabling users to monitor and manage their cooking habits effectively. Furthermore, it is set to incorporate IoT capabilities, allowing for live remote monitoring.

Specification	Details		
No. of Burners	One (Single burner system)		
Burner Sizing	For pot diameter – 26cm		
Power Rating			
Target Lifespan	5 - 7 Years		
Housing Material	ABS Plastic		
Burner Surface Material	Hardened Glass		
Chord Length	1.2m		
Plug Type	3 Pin - UK		
Operating Voltage			
Dimensions (L x W x H)	400 x 300 x 70mm		
Compatible Pan Material	Stainless Steel, Cast Iron		
Compatible Pan Type	Flat Bottom		
Functional Features	Adjustable Cooking Power		
	Adjustable Temperature		
	Manual Timer		
Functional Features	Keep Warm Function		
	Delayed start		
Safety Features	Pre-set cooking modes/menu		
	Pan Detection		

Technical Specifications of Induction Cooktop

Specification	Details
	Backlit UI
	Overheat Protection
	Cool to Touch Surfaces
	Child Lock
Warranty period (EIS)	5 years
Packaging Includes:	1 x Induction cooktop 1 cooking guide
	1 x 5 litre SS saucepan 1 instruction manual
	1 x 3 litre SS saucepan
	1 x SS bottom frying pan

1.2.2 Type of gases

	Source	GHG	Included? (Yes / No)	Justification/Explanation
Baseline	Combustion of non-renewable biomass for cooking	CO ₂	Yes	Main source of emission in the baseline
Sechario		CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Important source of emissions
Project Scenario	Consumption of electricity for cooking	CO ₂	Yes	Main source of emission in the project scenario
		CH ₄	No	Excluded
		N ₂ O	No	Excluded

1.2.3 System boundaries

Host Party: Ghana

Region/State/Province: Greater Accra, Ashanti (Kumasi), Central & Eastern regions Targeted Admirative Regions: All across the above four regions

The programme boundary for the proposed mitigation activity is across Greater Accra, Ashanti, Central & Eastern regions, which lies in southern part of Ghana. The boundary of Ghana is depicted by a dotted line in the map below in Figure 2.

The programme area is located in Ghana, only a few degrees north of the Equator between latitudes 7.9465° N and longitudes 1.0232° W. The table below enumerates the geo-coordinates of the programme implementation regions.

S No	Region	Latitude	Longitude
1	Greater Accra	5° 48' 51.421'' N	0° 4' 28.836'' E
2	Ashanti	6° 44' 49.357 N	-1° 31' 15.105 E
3	Central Region	5° 30' 0'' N	-1° 0' 0 E
4	Eastern Region	6° 30' 0'' N	-0° 30' 0 E

UpEnergy has identified the specific districts/municipality where the residing population has more than 60% electricity access. Out of the total of 134 districts which fall under the programme's targeted regions are the Greater Accra, Ashanti (Kumasi), Central, and Eastern Regions, 114 have more than 60% of electricity access. UpEnergy will aim to distribute to MADD Template V11 8/81

these localities/districts to ensure that the end user can make maximum use of the project technology. The list of the specific districts is as follows:



Figure 2: Geographical boundary of Ghana for the activity

1.2.4 Participants: State and non-state actors involved in the implementation of the Activity

	Name	Roles (can be multiple for one entity)
Buyer of the Mitigation Out-	Klik Foundation	KliK Foundation will act as an offtake buyer of the Mit-
comes	KIIK FOUIIUALIOII	igation Outcomes.
Owner	UpEnergy Ghana 1, represented by UpEn- ergy Group PCC	UpEnergy Ghana 1, represented by UpEnergy Group PCC will act as the proprietor of the activity, receiving funding and allocating financial resources to execute the designated mitigation activity.
Project Management UpEnergy	UpEnergy Ghana 1, represented by UpEn- ergy Group PCC	UpEnergy Ghana 1, represented by UpEnergy Group PCC will serve as the Coordinating and Managing En- tity, overseeing the operational aspects of the activity.
MRV	UpEnergy Ghana 1, represented by UpEn- ergy Group PCC	UpEnergy Ghana 1, represented by UpEnergy Group PCC is tasked with overseeing the Monitoring, Report- ing, and Verification processes for the activity to gen- erate emission reduction credits that buyers can trust, ensuring their legitimacy and responsibility.

Technology Provider ¹⁰	UpEnergy Ghana 1, represented by UpEn- ergy Group PCC	UpEnergy Ghana 1, represented by UpEnergy Group PCC aims to distribute a minimum of Electrical cooking units ¹¹ over 3 years (2025-2027) to the Ghana- ians households.
Main government agency in Transferring Country	Carbon Markets Office (CMO), Environment Protection Agency, Re- public of Ghana	CMO will act as the main government agency repre- senting Ghana to provide policy support, implement the rules and requirement, including authorisation, corresponding adjustment and reporting for Article 6.2 transactions, support mitigation activity sourcing and development and Registry services.
Other government agency in Transferring Country	Ministry of Environ- ment, Science, Tech- nology and Innovation (MESTI), Ghana	MESTI will coordinate and implement NDC with the support of Environmental Protection Agency (EPA) and CMO.
Main government agency in Purchasing Country	Federal Office for the Environment, FOEN,	The FOEN is responsible for enforcing the provisions concerning attestations for emission reductions in Switzerland and abroad. FOEN plays a key role in au- thorization of the mitigation activity and approving the realized ITMOs.
UpEnergy's local Entity	UpEnergy Ghana Ltd	UpEnergy Ghana Ltd. a local entity in Ghana, which will function as a subsidiary of UpEnergy Ghana 1, repre- sented by UpEnergy Group PCC. UpEnergy Ghana Ltd will be entrusted with the man- agement of local operations, including tasks such as providing capacity support, overseeing distribution, and managing after-sales services.

The organization structures and operational processes to adhered by the UpEnergy in context to this proposed mitigation activity are detailed out hereunder:

I. Management Responsibility

a) Our commitment to managing this activity

UpEnergy management team will set the process for how the programme will be developed, managed, and evaluated. Moreover, UpEnergy is responsible for guiding the approaches and work of service providers and other stakeholders so that the activity complies with referred methodological requirements. UpEnergy is committed to the following management responsibilities:

- Continuous communication with internal personnel, operating partners and other stakeholders. This will be done through frequent check-ins, clearly defined paths of communication, and mechanisms for feedback,
- A high standard of quality for all activities. This is expected both from the UpEnergy and the service providers involved in the programme. This will be upheld through regular quality control checks conducted by third parties,
- In addition to quality control checks, clear objectives will be set for all parties. UpEnergy will continuously evaluate the performance towards these goals, and implement management and procedural changes if necessary.

UpEnergy is committed to ensuring that all parties involved have adequate resources to perform the tasks required. UpE will ensure that sufficient internal resources are dedicated to the programme such that they can enable the partners to successfully deliver the expected outcome

¹⁰ The agreement of UpEnergy with the technology provider is contractual and the technology provider made aware of the carbon credits generated through the project to avoid double counting

 $^{^{\}rm 11}$ Including both Electric Pressure Cooker and Electric Induction Stove MADD Template V11

b) Our Mitigation Activity policy

UpEnergy will partner with service providers to develop and implement the activity to disseminate Electric Cooking Device and develop carbon credits. As part of our policy, UpEnergy is committed to the following:

- Monitoring the activity in accordance with the approved monitoring plan,
- Treating all of our personal stakeholders fairly and equitably,
- Reviewing and continually improving our performance.

II. Organizational Structure

All of the below UpEnergy staff are based in African continent and India.

a) Management Team

Title	Reporting to	Responsibilities
VP of Carbon Programme	CEO	Oversees budgetary decisions involved in the
		Activity.
Head of Carbon Technical	VP of Carbon Programme	Oversees implementation and monitoring activi-
		ties, internal review and finalization of pro-
		gramme documents for certification.
Carbon Operations Lead	VP of Carbon Programme	Manages all field level Monitoring, Enumerator
		training, Evidence records, implementation of
		changes to ensure compliance.
Global Data Team	Carbon Operations Lead	Monthly data finalizations and project allocation.
Project Team Lead	Head of Carbon Technical	VV/ Authorization Body co-ordination and Prepa-
		ration of documents for certification / issuance.

b) Operational Team

Title	Reporting to	Responsibilities
Carbon Operations Manager	Carbon Operations Lead	Supports programme documentation, analysis,
		research of relevant technologies and logistics
Finance Manager	Country Director	Oversees financial balance from the implementa-
		tion of the programme
Business Development Manager	Country Director	Manages development, implementation, quality
		and continuous improvement of the activity
Distribution Manager	Country Director	Plan the last mile distribution route and imple-
		mentation
Procurement and Supply chain	Country Director	Maintaining the stocks, management of ware-
manager		house, assists in on the ground field work such as
		monitoring and implementation such as the sale
		and dissemination of appliances, in the case when
		UpEnergy resources are unavailable or additional
		local support is needed
Data Manager	Carbon Operations Lead	Overseas the Data collection and QA/QC
		procedures
Associate-Enumerator	Carbon Operations Manager	Data Collection, Surveying, Handling field test
		equipment

III. Management Representative

Contact information for UpEnergy and the proposed activity: Email: anantha@upenergygroup.com URL: www.upenergygroup.com

IV. Internal Communication

All UpEnergy and service provider personnel are required to notify their superior of any issues that may inhibit the proper operation of the activity. Likewise, UpEnergy management is responsible for updating all personnel with information relevant to their respective tasks, including general information related to the development of the activity.

UpEnergy has clearly defined multiple communication channels between management and personnel. These include email, Skype[™], Slack[™], phone and in person meetings. All contact information for everyone working in the program is made available across the organization for each of these communication channels. In addition, all contact information for the management team is made available to service providers.

V. Legal Agreements

The following legal agreements outline the relationships with and responsibilities of the service providers and other entities that contribute to the proposed activity:

a) Service Contracts

These contracts are developed for specific one-off hiring needs. This will often include local employees doing work in the geographical boundary of the activity, such as product distribution and survey work. This may also include applied methodological testing requirements.

b) Validator & Verifier (VV) contracts

These refer to any contracts developed with a VV over the course of the programme lifetime, including those related to programme validation and verification.

c) ITMOs Purchase Agreement

An agreement has been already signed with KliK Foundation for sale of ITMOs.

d) Carbon Rights Waiver (CRW)

A CRW will be communicated and signed by all programme end users for the transfer of carbon rights on receipt of the product.

VI. Management Review

UpEnergy management will conduct a structured review of the operations on a bi-annual basis. This review will evaluate the current status of operations and determine what is needed to improve operational efficiencies. The VP of Carbon Programme will oversee the review while the Country Directors and Carbon Technical head in consultation with their staff, are responsible of preparing, coordinating, implementing and documenting the process. In addition, the Country Director will communicate the results of the review to the programme personnel as well as manage the implementation and determine a timeline for all outcomes.

Information to be considered during the review includes:

- Internal audits of the implementation of the UpEnergy management system
- Corrective and preventive action developed by the UpEnergy
- Nonconforming product
- Supplier performance equipment
- Supplier performance verifier
- Results of external audits

- Results of KliK Foundation / FOEN, Swiss / CMO Ghana Executive Board reviews

Outputs from the review should be related to the following:

- Suitability of UpEnergy manual, SOPs, forms and templates
- New performance objectives
- Changes to the UpEnergy management system
- Resource requirements
- Resource plans

These conclusions will help inform what will continue to be measured and monitored as well as changes to improve operations.

VII. Planning the Implementation of the Activity

UpEnergy will partner with contractual service providers to develop and implement the mitigation activity that disseminate the technologies and develop carbon assets in accordance to the validated programme requirements after the bilateral authorization. The following operation and implementation framework has been outlined in the proposed mitigation activity and should be considered when planning the activity:

a) Monitoring

The monitoring plan for the activity refers to following guidelines, methodologies, or procedures:

- 1. Gold Standard "Gold Standard Methodology for metered and measured energy cooking device v.1.2".
- 2. Gold Standard "Requirements and Guidelines: Usage Rate Monitoring" version 2.0
- 3. CDM -EB67-A06-GUID Guideline Sampling and surveys for CDM project activities and programmes of activities version 4.0.
- 4. CDM "Tool for the demonstration and assessment of additionality" version 7.0.

The specific requirements for monitoring listed in the authorized MADD supersede the guidance in the other documents. The monitoring plan is outlined in the section 2.5.3 (Data acquisition, metering, data quality, aggregation, and reporting) of this document. The plan clearly outlines the parameters to be monitored, the frequency at which they will be monitored, a description of how this will be monitored / measured, and the parameter value (if known). UpEnergy will ensure that project device distribution records are tracked and stored appropriately by service provider organizations. The amount of energy used will be measured by UpEnergy/service providers with guidance from the UpEnergy as per the monitoring procedures.

The monitoring process draws on information from the electronic data management system. UpEnergy will operate and manage an electronic data management system that will store information on and track all distributions under the activity. The Office Manager will ensure this system is accurate and up to date, with data submitted by local partners. The system will contain the following information:

- Volume of Electric Cooking Device disseminated under the activity
- Unique Identification Number for each Electric Cooking Device along with its model
- Name, address, and contact information of the end-user
- Date of purchase by the end-user
- End users details captured a per the prequalification checklist

This information will be recorded at point of distribution by the local partner for each unit distributed where possible. The monitoring plan will be validated and verified by a Validator & Verifier.

b) Sampling

Each regional distribution team maintains a list of all Electric Cooking Device distributed which will then be entered into the Electronic Data Management System by the UpEnergy. This database is used to select a sample population required for the monitoring. A sufficient number of samples will be taken for each monitoring parameter in order to meet the quality requirements outlined for that parameter in the activity. Sampling procedures are clearly documented in the section 2.5.3 of this document. Samples will be representative and all samples will be monitored as per the sampling plan detailed in section 2.5.3.

The sampling method is determined for the activity as the sampling guidelines in: "Gold Standard Methodology for metered and measured energy cooking device v.1.2".

VIII. Implementation of the Mitigation Activity

UpEnergy will partner with service providers to develop and implement the activity that disseminate the project technologies and develop carbon assets in accordance to the validated project requirements after the bilateral authorization.

a) Avoidance of double counting

In order to avoid double-counting, each electric cooking device distributed in this MA, will be assigned a unique identification number linked to individual end users. The transfer of project ownership from the end user to the project proponent is facilitated through a voluntary and binding agreement, typically in the form of a warranty card signed by the end user for each unit distributed. This agreement also facilitates the transfer of Internationally Transferred Mitigation Outcome (ITMO) rights from the end user to UpEnergy. At the time of delivery, customers will sign distribution receipts confirming their non-participation in any other carbon programs. This condition is communicated to customers before they sign the receipts. Surveys conducted during the project implementation phase include questions regarding participants' involvement in other programs. If it is found during this phase that an end user is engaged in another project activity, that individual will be excluded from the ITMO calculation and any subsequent surveys related to the project activity.

At the time of registering the activity, UpEnergy will ensure that the mitigation activity is not part of another project activity or program through the following mechanisms:

- UpEnergy will secure the legal title to the ITMOs by means of a contract between UpEnergy and the organization managing the activity or end user participants.

- UpEnergy will ensure that each product has a unique identifier that is recorded in the Electronic Data Management System maintained by UpEnergy. UpEnergy will also record the location and name of the recipient associated with each product in this database.

IX. Project Data Management

UpEnergy's Electronic Data Management System will be used to maintain records for the activity. The Sales Database is used to collect and store the information related to the unique identification number, model name, end user name, address, location, installation date, and usage status of each Electric Cooking Device —making it easy to identify, locate and verify any or all of the installations that pertain to the proposed activity.

The project distribution database finalization shall involve the following process,

- Raw distribution data collected from the field will undergo different phases of data cleaning before use in the project (see image below)
- Multiple Quality Checks: Every month global data team will analyse data and shares its finding for corrective action to the country team in addition to the QA & QC analysis by the country data team.
- Data finalization runway: Data for the preceding month will be finalized before the end of next month and allocated to MA. All the data for the monitoring period after cleaning process is consolidated with historic dataset to arrive at the sampling frame and will be represented in the emission reduction sheets.

In addition to the above steps UpEnergy will ensure the following to enable a secure and protected data compilation

- UpEnergy's data protection approach adheres to privacy principles through a secure, structured system. Data storage will include strict access controls, end-to-end encryption, and audit logging to ensure that sensitive information remains accessible only to authorized personnel.
- UpEnergy will provide the guest access to the external stakeholders to facilitate audit/verification process of demonstrating our data processes & database system on need basis.
- On the Data Protection, UpEnergy has applied for the data protection certificate from the agency and will share feedback on timelines with CMO shortly.
- All practices are aligned with industry compliance standards, preserving data confidentiality. We further protect data through measures such as Information Security Awareness programs, Standard Operating Procedures (SOPs), regular Internal Audits, and established Data Protection Policies. These ensure data management and storage meet stringent security and privacy requirements.

Raw Data / Data Export	Data Wrangling / Analysis	Data QC	Data Finalization	Allocation in to projects
Data must be exported from online data collection tools such as salesforce and tableau for anlaysis Initial checks are done to identify any errors, missing fields, any potential synchronization issues.	Duplicate checks Data completeness checks Data Errors and validations Reconciliation with distribution numbers	Min 15% - 100% of distribution (randomly) must be called for data quality check Errors must be logged in google sheet for corrective action Some data points that do not pass the QC will be removed from the database.	Data to be finalized incorporating QC and Wrangling analysis Current month/ monitoring period data to be merged with historic dataset Household duplication and stacking check must be performed on entire dataset and deleted from database	Clean data to be allocated to different projects Sampling frame to be decided for monitoring after allocation. Clean database must be warehoused for future use

X. Resources Management

a) Our people

The UpEnergy has clearly defined organization structures and roles for managing personnel. Section 'b' below outlines the required competencies for each role and procedures for deployment of personnel, use of contracted personnel and personnel records. Section 'c' outlines the development, maintenance and review of competencies.

b) Management and personnel

As aforementioned in part II (Our Management Team) above, the management team is clearly laid out and roles are defined. The competencies required for each role are detailed in the table below.

As the mitigation activity expands and additional resources as on when needed, the Carbon Operations Lead will bring on additional resources, either from within the existing organization or hire externally. The Carbon Operations Lead will approve all additional hires to ensure they are in line with organizational needs. All personnel records will be kept on file within the UpEnergy internal file sharing system.

c) Development, maintenance and review of competencies

The UpEnergy management will be responsible for ensuring that the activity personnel have the knowledge and skills to effectively carry out the project activities and achieve set goals. Accordingly, the Carbon Operations Lead has analysed the competence requirements for each critical role and task and identified the knowledge and skills required for these competences and how personnel will be evaluated with respect to these standards. It is the responsibility of the Carbon Operations Manager to ensure that these knowledge and skills are maintained through reviews, evaluations, and training.

1.2.5 Beneficiaries / Target group

The goal of this mitigation activity is to promote the introduction and widespread adoption of enhanced cooking appliances and technology. The project involves ECD distribution to the beneficiaries. By aiming at reducing pollution resulting from the inefficient use of biomass.

The primary target group of this programme is the population residing in the specified regions of Ghana, as outlined in section 1.2.3. Particularly, the project targets households heavily reliant on traditional/intermediate stoves. This targeting will be ensured by recording data on the baseline technology in the Electric Cooking Device (ECD) sale receipt during distribution. To achieve this objective, UpE has 4 folds of Pre-Qualification Criteria's (PQC) to select the beneficiary households as listed below,

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- 1. Location of programme beneficiary household within Ghana Greater Accra, Ashanti, Central & Eastern
- 2. Households and regions to be targeted must've have more than electricity access
- 3. Targeted regions with programme boundary All municipalities and districts in the four targeted regions
- 4. Baseline cooking technology only traditional / inefficient charcoal, firewood and LPG stoves as a primary source of cooking.
- 5. In order to promote the end users from moving to a better and cleaner source of cooking, UpEnergy will not distribute to households which already have access to electric cooking technology such as electric pressure cookers, induction stoves, electric rice cookers, etc.
- 6. During the distribution of the electric pressure cooker the potential end user will be asked if they're already part of any carbon programme, in case they're already beneficiary of any other carbon project, UpEnergy will not distribute to them.
- In addition to the above points UpEnergy will only distribute to the households with one of the following conditions

 Beneficiary household income Total household income should be less than the household income threshold
 (average household income of urban areas)
 Beneficiary comes under any of these demographic categories viz., Widowed, Single Mother, Family with working female member, any of the family members with difficulty in performing activities as specified in Volume 3E of Ghana 2021 Population

member, any of the family members with difficulty in performing activities as specified in Volume 3F of Ghana 2021 Population and Housing Census and Senior Citizens c. Beneficiary belongs to any of these community services related occupation such as Front-Line Health Worker, Sanitation

c. Beneficiary belongs to any of these community services related occupation such as Front-Line Health Worker, Sanitation Worker, School Teachers, Police, Fire and Forest Service, Agriculture, etc.

1.2.6 Selection criteria for participation in the Activity

The proposed programme BPTEC includes component project activities i.e., Project ECD within the programme. Hence each distributed ECD is considered as an individual project activity. The below table enumerates the inclusion criteria for the new project activity i.e., ECD under the programme BPTEC,

No.	Criterion to include new projects	How the new project activity to comply
1	Occur within one of the designated programme's geo- graphic regions boundaries as specified in the section 1.2.3 of MADD.	The new project ECD to be added to this programme shall be only within 4 of the programme boundaries in Ghana. Further the geographical coordinates of new project instances will be furnished in the project distribution database.
2.	Beneficiary household should be located in any of the mu- nicipalities and districts of the four targeted project boundary.	The new project ECD to be added to this programme shall be only located in municipalities and districts.
3.	Baseline cooking technology for the beneficiary house- hold	The new project ECD shall be distributed to the households with only traditional / inefficient charcoal, firewood or LPG stoves as a primary source of cooking in the baseline scenario. Beneficiary household having any kind of electric clean cooking technologies like electric pressure cookers, induction, rice cookers, etc. as a primary or secondary source of cooking are not eligible for the inclusion in the programme
4.	Be included in the project database with sufficient tech- nical, financial, geographic, and other relevant infor- mation to demonstrate conformance with the applicable set of eligibility criteria and enable evidence gathering by the validation/verification body.	The distribution database for this programme includes all rele- vant details of the new projects added i.e., new ECD added to this programme. This includes Name of ECD user, Address/Vil- lage/ Geographical coordinates of ECD household, Contact De- tails, Stove model Distributed, Date of distribution/installation, Unique ECD serial, house hold profile like family size, income levels, occupation, educational qualification etc. Further the monitoring report demonstrates conformance of the new pro- ject instances to the applicable set eligibility criteria such as ap- plied technology, geography of implementation and other in- clusion criteria etc. thus providing requisite evidences to VV

No.	Criterion to include new projects	How the new project activity to comply
5.	Have evidence of project ownership, in respect of each project held by the project proponent from the respective start date of each project ECD instance (i.e., the date upon which the project activity instance began reducing or re- moving GHG emissions).	The distribution receipts for the new project ECD will be made available for verification wherein the project ownership (car- bon waiver) and start date of crediting period (ECD distribution / installation date) are recorded
7.	Be eligible for crediting from the start date of the project activity instance through to the end of the project credit- ing period (only).	The crediting period for the new programme is expected to start on 01-02-2025 and end till 31-12-2030 i.e., end of NDC cycle.
8.	Only eligible for crediting from the start of the verification period in which they were added to the programme.	The ITMOs crediting for the added new projects will be only on or after the start date of verification period depending on the date of distribution.
9.	Not be or have been enrolled in another compliance or voluntary carbon programme.	The new projects added to this programme will have unique identification serial number and shall not be enrolled in any Compliance or other Voluntary Carbon Standards, thus avoid- ing double counting of credits generated. No double counting declaration has been duly provided by the activity proponent

1.2.7 Expected ITMO volume

Year	Expected ECD distribution	Expected ITMOs [tCO ₂ e]
2025 ¹²		
2026		
2027		
2028		
2029		
2030		
Total		

 $^{^{\}rm 12}$ Expected to be started from 01/02/2025 MADD Template V11

2 Methodological approach

2.1 Baseline for determination of mitigation outcomes:

2.1.1 Autonomous baseline ("business as usual")

In Ghana, 56.7% of the population resides in urban areas, while 43.3% resides in rural areas¹³. Specifically, households in northern Ghana predominantly use wood for cooking, whereas those in urban and coastal areas rely more on charcoal and LPG¹⁴. Wood and charcoal remain the predominant cooking fuels in Ghana, with 33.3% of households primarily using wood and nearly a third (34.1%) using charcoal. In rural Ghanaian households, wood constitutes 63% of the cooking fuel used¹⁵. LPG serves as the primary cooking fuel for 24.5% of households. According to the National Energy Statistics Report 2021¹⁶, wood fuel was extensively utilized for energy in Ghana in 2020, accounting for a consumption of 2977 ktoe (kilo tons of oil equivalent), equivalent to nearly 34% of the nation's total energy consumption.

In Ghana, air pollution ranks as the second leading cause of premature mortality¹⁷. Household air pollution (HAP) stemming from incomplete fuel combustion has been linked to adverse health effects, particularly impacting women's respiratory health. The utilization of hazardous fuels and cooking technologies in Ghana contributes to nearly 14,000 preventable deaths annually¹⁸.

The average household size in 2021 is 3.6, compared with 4.5 in 2010. The household size is somewhat larger in rural areas (mean size of 4.0 persons) when compared with urban areas (mean size of 3.3 persons)¹⁹.

The baseline determined for this mitigation activity is "in the absence of the project activity, the baseline scenario would be the continued use of traditional/intermediate charcoal & firewood, LPG stoves for meeting similar thermal energy needs as those provided by the project devices (EDC) in the MA project Boundary."

A baseline study to set the reference and business as usual scenario for the proposed mitigation activity has been conducted from December 2023 to January 2024 in the four administrative regions of Ghana namely Greater Accra, Eastern, Central and Ashanti that are targeted for this mitigation activity, to determine the proportion of population using various technologies for primary cooking. As per the baseline study conducted, charcoal being a predominant fuel (54.4%) in the project regions followed by LPG (30.6%) & firewood (15%) as shown in the figure below,

 $^{^{13}} https://census2021.statsghana.gov.gh/gssmain/fileUpload/reportthemelist/Volume\%203\%20Highlights.pdf (last accessed on 21/02/2024)$

¹⁴ www.jstor.org/stable/pdf/resrep33100.9.pdf (last accessed on 21/02/2024)

¹⁵ https://www.sciencedirect.com/science/article/abs/pii/S036054422201516X(last accessed on 21/02/2024)

¹⁶ https://energycom.gov.gh/files/National%20Energy%20Statistics%202021.pdf(last accessed on 21/02/2024)

¹⁷ https://www.improvedairfund.org/geography/ghana/#:~:text=Air%20pollution%20in%20Ghana,death%20and%20disability%2C%20after%20malnutrition (last accessed on 21/02/2024)

¹⁸ https://iris.who.int/bitstream/handle/10665/274281/9789241514026-eng.pdf?sequence=1 (last accessed on 21/02/2024)

¹⁹ https://census2021.statsghana.gov.gh/gssmain/fileUpload/reportthemelist/Volume%203%20Highlights.pdf (last accessed on 21/02/2024) MADD Template V11



Figure 3 – Primary Fuel Mix

The autonomous baseline or a "business as usual" scenario will be the continued use of non-renewable biomass fuel (charcoal) and / or LPG with the unimproved technology by the target population to meet the similar thermal energy needs as provided by the project cookstoves in the absence of this mitigation activity.

This baseline studies covers the following:

- Baseline survey End user specific information, stoves and fuel types in use, cooking pattern, seasonal variation in cooking and SDG contributions.
- Baseline KPT Quantification of baseline fuels.
- Baseline WBT- Quantification of energy efficiency of baseline devices.
- Baseline CCT- Quantification of specific energy consumption of baseline devices.

Baseline Survey and field tests

The baseline assessment establishes kitchen regime characteristics and the type of baseline technology being replaced by the MA stoves. The additional baseline survey & field tests (KPT (Kitchen Performance Test), WBT (Water Boiling Test), CCT (Controlled Cooking Test)) were performed for traditional firewood, intermediate charcoal/firewood, and LPG stoves in order to establish actual stove and fuel usage trends. The Kitchen Performance Test for traditional charcoal was carried out in December 2023 - January 2024, and for traditional firewood, LPG and intermediate charcoal it was carried out in April 2024 - May 2024.

Field questionnaires for both baseline survey and field test have been designed to capture accurate representation, understanding of the types of baseline technologies, etc. Furthermore, quality assurance measures like data collection through ODK/ONA, data analysis, data improving and verification have been incorporated to ensure data quality for each phase of survey.

The sample size considered was as follows:

As per GS Methodology for metered and measured energy cooking device v.1.2, the group size above 1000, minimum of 100 samples need to be carried out for baseline survey. Hence the number of samples surveyed is 180 (with 80% over-sampling), which has covered all four administrative regions of Ghana- Greater Accra, Eastern, Central and Ashanti.

The baseline survey was done by conducting in person interviews with a robust sample of end users. Following basic information has been gathered during the survey:

• Users follow up- Name, Address or location, contact details, geographical coordinates, etc

- End user characteristics no. of people served by baseline technology, typical usage pattern of the baseline technology (commercial, institutional, domestic, etc.)
- Fuel consumption pattern of the targeted area number of meals cooked in a day, Average cooking hours per day
- Available technology and fuel type used by the population for cooking
- Variations of usage in rainy or dry seasons
- Quantitative and qualitative assessment on the challenges faced with the existing baseline stoves.

Kitchen Performance Test (KPT)

The Kitchen Performance Test (KPT) serves as the primary field-based method to showcase the impact of stove interventions on household fuel usage. It aims to achieve two main objectives: firstly, to evaluate qualitative aspects of stove performance through household surveys, and secondly, to compare the effects of improved stove(s) on fuel consumption within real household kitchens. KPTs were conducted based on the guidelines of KPT protocol v.4²⁰, To accomplish these goals, the KPT involves quantitative assessments of fuel consumption and qualitative evaluations of stove performance and acceptability. Number of households monitored for KPTs:

SN	Fuel Type	Total Number of Samples ²¹
1	Traditional Charcoal	108
2	Traditional firewood	45
3	Intermediate Charcoal	50
4	LPG	50

Water Boiling Test (WBT)

The Water Boiling Test (WBT) were carried out according to the WBT protocol to ascertain the thermal efficiency of baseline stoves. The thermal efficiency of the stoves determined was based on Hot Start and Cold Start testing procedure as per the ISO Water Boling Test Protocol Version 4.2.3. The selection of samples was based on the different stoves types identified during the baseline assessment. Each stove type identified during the baseline assessment was procured from the market. Each stove underwent a total of 3 tests (including Hot start and Cold start) to establish the average efficiency. The questionnaire encompassed of details such as the time required to boil water, ambient temperature, size of vessel, etc.

Stove Type	Test Number	Cold Start Thermal Effi- ciency (%)	Hot Start Thermal Effi- ciency (%)	Thermal Effi- ciency – Avg. Of Cold & Hot Start (%)	Final Ther- mal Effi- ciency (%)
Square Type Coalp	ot Test 1				
Stove	Test 2				
	Test 3				
Square Type Coalg	ot Test 1				
Slove	Test 2				
	Test 3				
Round Type Coalp	ot Test 1				
Stove	Test 2				
	Test 3				
Intermediate Charco	al Test 1				
Slove	Test 2				

²⁰ https://cleancooking.org/binary-data/DOCUMENT/file/000/000/604-1.pdf (last accessed 19/11/2024)
 ²¹ Please see the shared baseline report and excel sheet for confidence/precision analysis
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	Test 3		
Intermediate Charcoal	Test 1		
Stove	Test 2		
	Test 3		
Three Stone Fire Stove	Test 1		
	Test 2		
	Test 3		
Fixed Mud Stove	Test 1		
	Test 2		
	Test 3		
Fixed Burner LPG Stove	Test 1		
	Test 2		
	Test 3		
Two Burner LPG Stove	Test 1		
	Test 2		
	Test 3		

Controlled Cooking Test (CCT)

The Controlled Cooking Test (CCT) conducted in the baseline scenario focused solely on cooking tasks that can be substituted by the project device such as the Electric Pressure Cooker, ensuring comparability with the CCT of the project device. The tests were conducted as per the Robert Bail's CCT protocol version 2.0 and Modern Energy Cooking Services (MECS) CCT protocol version 1.2. The tests were structured to capture a cooking pattern representative of a full year, utilizing a practical number of dishes anticipated to be commonly prepared using the project device, throughout the year. This entailed conducting multiple tests for various dishes or establishing a representative cooking pattern during a single test session. Sampling procedures adhered to Section 4.4 "General requirements for sampling" of the RECH (Reduced Emissions from Cooking and Heating) V4.0 methodology. The stoves determined from the baseline study were procured from the market to conduct the CCT test in order to get conservative results.

Type of Stove	Number of Stoves to be procured	Jollof Rice	Yam Porridge	Total number of cooking ²²
Round Type Coal pot Stove	5	3	3	30
Square Type Coal pot Stove	7	3	3	42
Intermediate Charcoal Stove	2	3	3	12
Three Stone Fire Stove	6	3	3	36
Fixed Mud Stove	4	3	3	24
Tyre Rim Stove	4	3	3	24
Fixed Burner LPG Stove	3	3	3	18
Two Burner LPG Stove	2	3	3	12
Oven Type Burner LPG Stove	2	3	3	12

 $^{^{\}rm 22}$ Please see the shared baseline report and excel sheet for confidence/precision analysis MADD Template V11

2.1.2 Impact of the most important existing and planned policies, laws, and measures for NDC implementation

Policy/ law/ measure No. 1	Nationally Determined Contribution (NDC) – 2021
Description	As per Updated NDC 2021 under the Paris Agreement (2020 - 2030), it aims to expand the adoption of market-based improved cooking solutions.
Туре	Mitigation Measure (Conditional)
Impact	By the implementation of this mitigation measure, it is expected to reduce green- house gas (GHG) emission reductions of about 4,214.2 kilo tonnes and avoid 2,617 tonnes of black carbon by 2030 ²³ . Also, this will create around 24,000 decent and green jobs.
Implementation plan/schedule	2021-2030
Assessment of impact on the proposed Activity	The proposed activity aims to distribute ECD units within a three-year time frame, creating approximately jobs (Direct & Indirect jobs), thereby contributing to the local economic development. Although the NDC of Ghana lists the adoption of improved cooking as a conditional mitigation measure, it depends on market-based mechanisms and international climate finance support to achieve its NDC goal. The NDC clearly mentions the activities can be adopted contingent to international finance, technology transfer and capacity building. There is no specific target related to the distribution/promotion of efficient cookstoves. Hence there is no Obligation to distribute such cookstoves and the proposed mitigation activity meant to be a regulatory surplus.

Policy/ law/ measure No. 2	National Energy Policy (NEP) 2021
Description	As per NEP 2021 released by the Ministry of Ghana, target is to distribute about 3
	million Improved Cookstoves by 2030.
	As per NEP 2021 released by the Ministry of Ghana, the Government has committed
	to provide LPG access for domestic, commercial and industrial usage, to 50% of the
	population, by the end of 2030.
Туре	Policy
Impact	Increased adoption of ECD by Ghanian households will lead to reduction in GHG
	emissions and reducing reliance on fuel wood and charcoal for cooking.
	The adoption of LPG as the preferred cooking fuel and the use of improved
	cookstoves would go a long way to reduce the negative impact on the environment,
	and health of women and children.
Implementation plan/schedule	2021-2030
Assessment of impact on the pro-	The proposed mitigation activity aims to distribute ECD ²⁴ units within three-
posed Activity	years timeframe, which is 6.6 % of the established goal of 3 million ECs by 2030.
	The NEP 2021 mentions an ambitious target to distribute about 3 million improved
	cookstoves by 2030, however this target is not enforced by any law so there is no

https://unfccc.int/sites/default/files/NDC/2022-06/Ghana%27s%20Updated%20Nationally%20Determined%20Contribution%20to%20the%20UNFCCC_2021.pdf (last accessed on 21/02/2024)
 ²⁴ ECD denotes either Electric Pressure Cooker or Electric Induction Stove
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obligation to distribute Improve cookstoves. Hence the proposed mitigation activity
is deemed to be regulatory surplus.
Government aims to continuously increase the penetration of LPG to 50% by 2030.

	T
Policy/ law/ measure No. 3	Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)
Description	This Act details the control, management, and disposal of hazardous waste, and electrical and electronic waste in Ghana. This Act requires importers and exporters of used or discarded electrical and electronic equipment (EEE) to register with the Ghana's Environmental Protection Agency (EPA), obtain a permit for importing or exporting EEE, and pay an advance eco levy on EEE manufactured or imported in Ghana. For the purpose of recycling, manufacturers, distributors, or wholesalers of EEE must take back used or discarded equipment they manufactured or sold for recycling pur- poses.
Туре	Act
Impact	This Act serves as the primary legislation for regulating the treatment of hazardous and e-waste, aiming to reduce the risk of harmful substances being released into the environment and posing a threat to both environmental and human health. With this Act, the disposal of EEE is conducted in an environmentally sound manner.
Implementation plan/schedule	August 2016 - present
Assessment of impact on the proposed Activity	UpEnergy is dedicated to promoting environmentally responsible practices through- out its improved cooking projects. UpEnergy strives to implement practices that en- sure waste from electrical and electronic equipment is disposed off responsibly and in an eco-friendly manner at the end of the product's life cycle in compliance with this Act. This is further detailed in section 2.5.3, vi.5 of this document. UpEnergy will run awareness campaigns and training sessions for project beneficiar- ies and community members to emphasize the importance of properly disposing of and recycling broken or defective electric cookstoves, encouraging responsible waste management.

Policy/ law/ measure No. 4	Hazardous and Electronic Waste Control and Management Regulations, 2016 (LI 2250)
Description	This Regulation, along with Act 917, provides comprehensive guidelines on waste classification, control, and management, establishes requirements for waste disposal, and outlines responsibilities for waste generators, transporters, and managers, among other related issues.
Туре	Regulation
Impact	This regulation alongside Act 917 is crucial for managing hazardous and electronic waste, as it helps prevent the release of harmful substances into the environment, thereby safeguarding both environmental and human health.
Implementation plan/schedule	August 2016 - present
Assessment of impact on the pro- posed Activity	UpEnergy aims to contribute to an improved environment, promote sustainability, and set an example of responsible waste management within our improved cooking projects. With respect to recycling, UpEnergy will work closely with local recycling

facilities to ensure that recycling processes are environmentally friendly and do not
harm the ecosystem. Hazardous materials, if any, will be handled and disposed of in
accordance with this regulation LI 2250 & Act 917.
UpEnergy will also conduct awareness campaigns and training sessions for project
beneficiaries and community members on the importance of proper disposal and
recycling practices for broken or defective electric cookstoves. This education will
help promote responsible waste management.
Detailed records will be maintained for each broken or defective electric cookstove,
including its condition, repair history, and recycling documentation. This documen-
tation will assist in tracking the environmental impact and cost savings associated
with our recycling efforts.

As per the "Operational Guideline for Article 6.2 cooperative approach in Ghana", Ghana has created a whitelist and has approved the mitigation activities²⁵ within the whitelist of the framework as "automatically additional" to Ghana's NDC baseline and does not need to demonstrate technical and financial additionality. Sustainable cooking which consists of efficient technologies such as Electric Cooking Device is listed in the first whitelist for 2022 to 2025. Hence, the proposed mitigation activity is additional to the NDC.

2.1.3 **Crediting baseline**

The crediting baseline for this mitigation activity will be continued use of non-renewable biomass-based charcoal, firewood, LPG burnt in with the traditional / inefficient/intermediate/LPG stoves in the project boundary; this will be the likely scenario without the proposed project activity and measures proposed by NDC and NEP of Ghana.

2.2 **Crediting period**

Expected start date of first crediting period: 01.02.2025 (expected date of first distribution under the programme)

End date of first crediting period: 31.12.2030

Total length of crediting period: 5 years, 11 months (technical life i.e., 5 years)

2.3 Avoiding double claiming

2.3.1 International and domestic public/private climate finance and other governmental support

The source of revenue for this mitigation activity is transfer of ITMOs to Foundation for Climate Protection and Carbon Offset (KliK Foundation), and additional revenue generated by distribution of electrical cooking devices under the project. UpEnergy duly declares that this mitigation activity is not part of any emissions trading program or any other mechanism that includes GHG allowance trading. The project has not sought or will receive any governmental support and any another form of GHG-related environmental credit.

2.3.2 **Carbon finance contributions**

The proposed mitigation activity has not been registered, nor is it seeking registration under any other GHG program to avail carbon benefits during the crediting period. A unique numbering or identification system for the Electrical Cooking Devices distributed/installed or distributed, is applied on the project devices. This shall ensure no double counting of stoves within the Project and ensure that stoves can be identified as belonging to this Project and not to a project managed by any other PP. Each Electrical Cooking Device distributed will have the UpEnergy logo or Brand name and unique serial number on the product. The unique serial number along with the customer details (name, address, etc) is also stored in the sales database assigned to each product. Hence the double accounting is prevented within the project activity and also from any voluntary or compliance carbon finance contributions.

²⁵ As per section 3.4.2.2 (c) Ghana framework on international carbon markets and non-market approaches: Sustainable cooking – The whitelist for efficient cooking includes introducing electric cooking to replace inefficient, traditional cooking stoves. (https://cmo.epa.gov.gh/wp-content/uploads/2022/12/Ghana-Carbon-Market-Framework-For-Public-Release_15122022.pdf(last accessed on 21/02/2024)) MADD Template V11

To prevent the double accounting of emission reductions by the key stakeholders involved in this grouped project viz., Electrical Cooking Devices manufacturer and end users, the carbon waiver agreements have been signed. This will prevent the other involved parties to claim the carbon credits generated by this project activity. The carbon waiver agreements will be shared with VV during validation & verification.

2.3.3 Attribution of mitigation outcomes

The resulted ITMOs solely belongs to UpEnergy Ghana 1, represented by UpEnergy Group PCC and will be sold to Switzerland through Klik Foundation or any other potential buyer in Switzerland, hence there will not be any attribution of the mitigation outcomes.

2.4 Promoting sustainable development and good governance

2.4.1 Country co-benefits

The contributions of proposed activity towards sustainable development are explained with indicators viz. social, economic, technological well-being and temporal as follows:

Social well-being: The activity will pave the way for development and increases the social status and living conditions and the prevailing living standard in the vicinity of the project activity and thus results in empowering the beneficiaries. Also, it will contribute to increase in the local employment by engaging workforce for operation and maintenance of the equipment.

The reduction in fuel needs will also lead to the programme beneficiaries saving time and money. This means that the users of electrical cooking devices will see a reduction in the fuel consumed and average cooking time, for the fact that these devices are highly efficient, leaving the users with extra time available for other productive activities in the project scenario.

Economic Growth: From an economic perspective, the programme will contribute to the scale-up of local businesses and organizations and will create a business opportunity during construction phase for local stakeholders such as suppliers, contractors etc. Further, the activity also influences creation of employment opportunities for local people, which would enhance their social status.

Good Health: The program will contribute to women's health by using improved cooking technologies. Sufficiently enhance indoor air quality thereby improving health of women and children and reducing incidences of smoke and fire related injuries and therefore result in saving of health-related expenses.

Affordable improved energy: The proposed project activity will promote Electrical Cooking Devices that result in reduced fuel consumption and emissions due to cooking.

2.4.2 SDG contributions of the Activity

SDG	Target	Relevance:	Indicator / MP Identifier	Monitoring parameter:	Ex-ante/ ex post Mesurément	Is this SDG a prior- ity in the transfer- ring country?
SDG 1: End poverty in all its forms everywhere	1.1 By 2030, eradicate ex- treme poverty for all people everywhere, currently meas- ured as people living on less than \$1.25 a day	The distribution of energy efficient stoves helps save ²⁶ per day per HH for the given project activity.	Average savings re- alized due to de- crease in expendi- ture on basic service such as cooking	Household fuel cost savings \$ / annum / HH	Fuel consumption in both ex-ante & ex-post scenario and cost of fuel in ex-post scenario	Yes
SDG 5: Achieve gender equality and empower all women and girls	5.1 End all forms of discrimi- nation against all women and girls everywhere	This project activity promotes employ- ment to women, thus helping to erad- icating gender-based discrimination and providing socio-economic parity	% of Female employ- ees	Proportion of female employ- ees %	No of Female Employees & Total Employees Strength in ex post scenario	Yes
	5.4 Recognize and value un- paid care and domestic work through the provision of pub- lic services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	By reducing cooking time, the pro- gram provides women in project households with more time to invest in other productive economic devel- opment activities	Average time saving associated with cooking time	Average cooking time saving by households in the project scenario hours / day / HH	Cooking time spent by HH in ex-ante / expost scenario	Yes
SDG 7: Ensure access to afforda- ble, reliable, sustainable and modern energy for all	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	The project aims to grant users access to affordable and improved cooking technology by distributing Electrical Cooking Devices	Number of house- holds having access to improved cooking technology due to project activity	Number of households with operational Electrical Cooking Devices No of HH	Number of Electrical Cooking Devices distri- bution & Usage ratein ex-post scenario	Yes

²⁶ An estimate & may change based on ex-post measurements MADD Template V11

SDG 8:	8.5 By 2030, achieve full and	The project activity generates employ-	Number of jobs cre-	Number of jobs created in	Total number of jobs created in ex-post sce-	Yes
Promote sustained, inclu-	productive employment and	ment for marketing / sales and distri-	ated	project scenario	nario due to the project activity	
sive and sustainable eco-	decent work for all women	bution / technical employees				
nomic growth, full and pro-	and men, including for young					
ductive employment and	people and persons with dis-					
decent work for all	abilities, and equal pay for					
	work of equal value.					
						ļ
SDG 15:	15.2 By 2020, promote the	The Project will reduce the demand	Amount of Non-re-		(i) Fuel consumption in both ex-ante & ex-	Yes
Protect, restore and pro-	implementation of sustaina-	for Non-renewable biomass over a 5-	newable biomass	tonnes /annum	post scenario	l
mote sustainable use of	ble management of all types	year period in participant nouseholds	saved	tornes y annum	(ii) Number of electric cooking device distri-	
terrestrial ecosystems, sus-	of forests, flatt deforestation,	deforestation			bution & usage rate in ex-post scenario	l
tainably manage forests,	substantially increase affor-	delorestation.				
and halt and reverse land	estation and reforestation					l
degradation and halt biodi-	globally					l
versity loss						
,						1

2.4.3 Compliance with environmental and social requirements

No negative environmental impacts have been identified from this mitigation activity, which is also confirmed through the blind assessment and stakeholder feedback forms collected during the Local Stakeholder Consultation (LSC). It is important to note that Ghana's framework on international carbon markets and non-market approaches has already whitelisted the high-efficiency electric cooking and deemed to auto additional and deemed to fulfil the environmental and other legal compliance by default²⁷.

2.4.4 Safeguarding of human rights

The project aims at distribution of Electrical Cooking Devices to targeted regions of Ghana, with the expected human right benefits like poverty alleviation, health & wellbeing, gender equality and economic prosperity by creation of jobs. Hence, with the envisaged benefits, the project activity incorporates a human rights-based approach. The Electrical Cooking Devices will be distributed to households using traditional cooking practises, intermediate charcoal/firewood cookstoves, LPG in the demarcated project boundary, without any discrimination based on gender, race, religion, etc.,

Further the project will have a positive impact on women considering that they will spend less time on cooking and for fuel purchase. Also, the mitigation activity is anticipated to create employment opportunities including women and men.

The project will be implemented in collaboration with local partners and UpEnergy will respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Right. The project will not discriminate with regards to participation and inclusion.

UpEnergy Feedback and Grievance Redress Procedure ensures that project-affected communities and individual grievances are properly prioritized and addressed. These measures are taken by UpEnergy to enhance accountability and transparency and to support the project initiatives that can help the communities to identify adverse effects to them, their communities, or their environment which had not previously been identified and mitigated by UpEnergy. The full grievance redress procedure is available upon request and detailed below:





The first step of a complaint is typically applied to the informal procedure, where the affected person discussed the identified issue or provides feedback with the Field Coordinator.

The Field Coordinator attempts to resolve the grievance immediately on an informal basis, The Field Coordinator and affected person work together as immediately as possible, to solve the identified issue.

The formal process requires the grievance to be filled in written form, in the grievance expression book available at the office of UpEnergy's local entity in Ghana. UpEnergy Ghana 1, represented by UpEnergy Group PCC will set up a dedicated toll-free customer care numbers that will be mentioned in the Electrical Cooking Devices distribution receipts and flyers,

²⁷ https://cmo.epa.gov.gh/wp-content/uploads/2022/12/Ghana-Carbon-Market-Framework-For-Public-Release_15122022.pdf (last accessed on 21/02/2024) MADD Template V11

which can be used for any complaints or maintenance if needed during the project activity and the same has been also explained to the stakeholders.

The address details of the UpEnergy's local entity in Ghana is as given below,

UpEnergy Ghana Limited	
Quartsons Building,	
Freetown Avenue,	
East Legon,	
Accra, Ghana	
Tel +233577553266	

In addition, the stakeholders shall also record their grievances to Compensation Office (CO)²⁸, FOEN & Ghana CMO as given / furnished below,

Department of the Environment,

Transport, Energy and Communications

Federal Office of the Environment FOEN

Climate Division

Worblentalstrasse 68, 3063 Ittigen, Postadresse 3003 Bern

Tel + 41 58 485 63 28

Ghana Carbon Market Office (CMO)

Environmental Protection Agency,

91 Starlet Street, Ministries,

Accra, Ghana

Tel +233(0) 50 130 1435 / +233(0) 50 130 1518

All grievances are to be assessed and an update is provided to the grievant.

2.4.5 Avoidance of corruption and bad governance

UpEnergy Ghana 1, represented by UpEnergy Group PCC always maintains highest standard of transparency and confirms that there is not any corruption involved in the project activity. We have robust and stringent internal policies that has laid provisions to prevent/identify any form of corruption, such as bribery, embezzlement, fraud, favouritism, cronyism, nepo-tism, extortion, and collusion.

UpEnergy Ghana 1, represented by UpEnergy Group PCC has a stringent group policy for preventing the discrimination in any form, since its group policy promotes equal opportunities for employment and advancement for employees regardless of age, gender, race, religion, colour, disability, national origin, or any other legally protected category and will not tolerate any form of unlawful discrimination. Also, the UPENERGY has Employee Disciplinary Code which insists a strong punishment up to criminal prosecution / termination of job for the bribery / forgery related offences.

 ²⁸ The grievance concerning the GHANA Carbon Market office (CMO) will be addressed and resolved within the office located in Ghana.
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2.4.6 Stakeholder/Beneficiary engagement

The stakeholder consultation process included invitation to wide range of invitees to include effective and equal participation of both men and women. Prior to the consultation, invitations were sent via email to stakeholders along with the following documents in the language that allows local stakeholders to understand and engage with the project:

- Non- Technical summary with relevant information about the project
- Summary of the economic, social and environmental impacts of the project
- Contact details/E-mail ID of the UpEnergy Ghana 1, represented by UpEnergy Group PCC

The consultation involved inviting comments/feedback from the following, category of stakeholders:

- Local people impacted by the project and official representatives
- Local policy makers and representatives of local authorities
- Local non-governmental organizations working on topics relevant to the activity
- Host country DNA
- Research organizations/institutes working on the technology involved in the activity
- Renewable energy/energy development nodal agencies
- Other relevant local NGOs of the host country

The Local Stakeholder Consultation (LSC) was held on 15th November 2023 with prior intimation to the targeted group. Invitations were sent to stakeholders along with feedback form and non-technical summary via email on 15th October 2023 and a reminder email was sent on 8th November 2023. Also, newspaper advertisement was published in the local newspaper on 7th November 2023. Apart from the e-mail and newspaper advertisement, stakeholders were invited via informal channels such as phone, WhatsApp. There were about 40 participants from various categories participated in the LSC meeting. The feedback forms were distributed during the physical meeting as well as via email. The Stakeholder Feedback Round (SFR) was formally initiated through email on the 20th of November 2023. Follow-up emails were also initiated to invite maximum feedback from the stakeholders.

Gender Sensitivity:

The Local Stakeholder Consultation (LSC) was carried out with a gender sensitive approach in mind. The activity also included compliance with the gender 'do no harm' safeguard, gender-gap analysis and gender sensitive stakeholder consultation. The activity reflected the key gender issues and requirements of gender sensitive design and implementation. The activity engages women in various activities of the value chain. Additionally, the project is aimed at reducing energy poverty which disproportionately affects women and young girls due to the roles that they play in most households (collecting of firewood and cooking over open fires and inefficient cookstoves in poorly ventilated kitchens). The primary beneficiaries of the project activity will be women and children since the project aims at reducing exposure of toxic gases caused by traditional cooking practises. The project also offers equal employment opportunities to women.

Human Rights:

The activity will be implemented in collaboration with local partners and UpEnergy will respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Right. The activity will not discriminate with regards to participation and inclusion.



2.4.7 Transformational change

The proposed activity contributes to an extent 10% of the targeted adoption of improved cooking technology by 2030 as proposed by NDC of Ghana. Further it significantly helps in dissemination of Electric Cooking Device technology throughout the project boundary. It is envisaged that the project beneficiary households will be encouraged to continue to use improved cookstoves even after the project crediting period, thereby accrue significant environmental as well as socio-economic benefits.

2.5 Determination, Monitoring and Reporting of Mitigation Outcomes

2.5.1 Quantification and determination of mitigation outcomes

The project adopts the emission reduction calculation from the GS "Methodology for metered & measured energy cooking devices" v1.2.

SDG 13: Climate Action: Induction Cookstoves

The Emission Reductions can be calculated using the following approach:

 $ER_y = BE_y - PE_y - LE_y$

Where:

ER_y Emission reductions in year y (tCO₂e/yr)

BE_y Baseline emissions in year y (tCO₂e/yr)

PE_y Project emissions in year y (tCO₂e/yr)

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LE<sub>y</sub> Leakage emissions in year y (tCO<sub>2</sub>e/yr)
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Baseline Emissions

The following approach has been adopted to calculate the baseline emissions from the referred methodology.

Case 1 (Electric Induction Stoves): It is possible to determine the thermal efficiency of the project device and to know the useful energy that is being replaced.

The baseline emissions shall be calculated from the total electric energy input used in the project scenario in year y, the energy ratio of the specific energy consumption of baseline device(s) and the project device, and the baseline emissions factor:

 $BE_y = EG_{p,useful,y} \times EF_{b,useful}$

Where:

BEy - Baseline emissions in the year y (tCO₂e)

EG_{p,useful,y} - The amount of useful energy applied in the project in year y (TJ)

EF_{b,useful} - Baseline emissions factor (tCO₂e per TJ pf energy input)

The baseline emission factor shall be determined applying the equation below:

$$\begin{split} EF_{b,useful} &= \sum_{k} \left(\sum_{i,j} P_{b,i,j} \times Percentage \ of \ fuel_{i} \times (EF_{b,i,CO2} \times fNRB_{i,y} \\ &+ EF_{b,i,non-CO2}) \times NCV_{b,i} \right)_{k} \\ & \div \sum_{k} \left(\sum_{i,j} P_{b,i,j} \times Percentage \ of \ fuel_{i} \times NCV_{b,i} \times \eta_{b,i,j} \right)_{k} \end{split}$$

Where:

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P_{b,i,j} - Amount of baseline fuel i used in device j in the baseline (tonnes)

 $EF_{b,i,CO2} - CO_2$ emission factor of the baseline fuel i (tCO₂e/TJ)

 $EF_{b,i,nonCO2}$ -Non-CO₂ emission factor of the baseline fuel i (tCO₂e/TJ)

fNRB_{i,y} - Non-renewability status of woody biomass fuel i during year y

NCV_{b,i} - The net calorific value of the baseline fuel type i (TJ/tonne)

 $\eta_{\text{b},\text{i},\text{j}}$ - Energy of baseline device j with fuel i (fraction)

K - Household k from the target population, where applicable

J - Baseline devices j I Baseline fuel i

The useful project energy in year y shall be calculated as follows:

 $\mathsf{EF}_{\mathsf{p},\mathsf{useful},\mathsf{y}} = \sum d \ \mathsf{EG}_{\mathsf{p},\mathsf{d},\mathsf{y}} \ x \ 0.0036 \ x \ \eta_{\mathsf{p},\mathsf{d},\mathsf{y}}$

Where:

EG _{p,d,y}	The amount of electricity used in the project scenario by device d in year y (MWh)
0.0036	Factor to convert MWh to TJ
$\eta_{p,d,y}$	Energy efficiency of the project device, d in year y (fraction)
D	Project device d

Case 2 (Electric Pressure Cooker): The baseline emissions shall be calculated from the total electric energy input used in the project scenario in year y, the energy ratio of the specific energy consumption of baseline device(s) and the project device, and the baseline emissions factor:

$$BE_y = \sum d EG_{p,d,y} \times SC_b/SC_p \times 0.0036 \times EF_{b,input}$$

Where:

 BE_y = Baseline emissions (tCO₂e) in the year y

 $EG_{p,d,y}$ = The amount of electricity used in the project scenario by device d in year y (MWh)

0.0036 = Factor to convert MWh to TJ

 $EF_{b,input}$ = Baseline emissions factor (tCO₂e per TJ of energy input)

SC_b = Specific energy consumption used in the baseline scenario (TJ/test per person)

 SC_p = Specific energy consumption used in the project scenario (TJ/test per person)

The specific energy consumption for baseline and project devices shall be determined through a mixed methods approach, combining a Controlled Cooking Test (CCT) with qualitative data of the dishes and cooking practices of the project region that can be prepared both by the baseline device and by the project device. This assumes that the project device such as EPC will replace one type of baseline cooking device. If the project device replaces more than one type of baseline cooking devices, then the *SC*_b shall be defined as the weighted average of the specific energy consumption of the replaced baseline cooking devices, weighted by the proportion of cooking by the baseline cooking device types in the target population and applying assumptions which lead to conservative estimations of specific energy consumption in the baseline.

$$SC_b = \sum u_j \times SC_{b,j}$$

 u_j = Proportion of cooking of baseline device j (Fraction)

 $SC_{b,j}$ = Specific energy consumption for device j used in the baseline scenario (TJ/test per person)

The baseline emission factor shall be determined applying the equation below. In this case, the amount of baseline fuel(s) $(P_{b,i,j})$ is sourced from the Controlled Cooking Test (CCT) described in paragraph 3.5.9 of applied methodology below:

$$EF_{b,input} = \sum_{k} \left(\sum_{i,j} P_{b,i,j} \times (EF_{b,i,CO2} \times fNRB_{i,y} + EF_{b,i,non-CO2}) \times NCV_{b,i} \right)_{k}$$
$$\div \sum_{k} \left(\sum_{i,j} P_{b,i,j} \times NCV_{b,i} \right)_{k}$$

Where:

 $EF_{b,input}$ = Baseline emissions factor (tCO₂e per TJ of energy input)

Project Emissions

The project emissions are calculated using the following equation (project electricity use):

 $PE_y = \sum d EG_{p,d,y} x$

Where:

PEy - Project emissions in year y (tCO₂)



2.5.2 Carbon leakage

The adopted methodology provides the following two options for calculating the leakage associated with the mitigation outcomes,

Option 1

Apply a default adjustment factor of 0.95 to the emission reductions to approximate leakage emissions. In this case, the term "- $\Sigma LE_{p,y}$ " in equations 1changes to "* 95%".

Option 2

Allows PD to do an assessment during the project monitoring to identify and quantify the potential sources of emission leakage. As per the applied methodology. Leakage emissions are accounted for the following sources:

#	Leakage Source	Assessment
1	The displaced baseline technologies are reused	No, there is very less chance for the displaced baseline technol-
	outside the project boundary in place of lower	ogies (traditional cookstoves) are reused outside the project
	emitting technology or with a higher intensity	boundary. It is highly unlikely that households outside the pro-
	than would have occurred in the absence of the	ject boundaries who may have obtained a more efficient stove
	project.	or other lower emitting technologies (like e.g. electric
		cookstoves) would go back to the use of baseline technology.
		Further households using ECD would still use the baseline tech-
		nology in secondary role during unexpected electricity failure.
		Thus, households would still need baseline stove in some cases.
		Hence this is a highly unlikely scenario for leakage.
2	Members of the population who do not partici-	No, as it is evident from the literature survey that the share of
	pate in the project, and previously used lower	household that use a lower emitting energy source like electric
	emitting energy sources, instead use the non-re-	is lesser when compared to traditional biomass cooking. These
	project activity	households that use a lower emitting energy source, such as
		electric cookers, induction, etc. are not likely to use non-renew-
		able biomass (NRB) saved under the project activity.
3	The project significantly reduces the NRB fraction	No, the project leads to reduction in charcoal usage which
	within an area where other GHG mitigation pro-	translated to reduction in firewood consumption thus ulti-
	haseline scenario	not expected that the NRB in other areas will be affected so
	baseline scenario.	quickly that it would impact other CDM/VER projects activities
		if any. Furthermore, fNRB update takes place in each renewal
		of Crediting period which automatically includes the studies
		evaluating the impact on FNRB.
4	The project population compensates for loss of	Not applicable, as the project population location is located
	the space heating effect of inefficient technology	mostly in southern part of Ghana, being a tropical African coun-
	by adopting some use of inefficient technology	where the climate is pleasantly warm with average tempera-
	by retaining some use of memorial technology.	tures ranging between 20 °C and 25 °C.
5	By virtue of promotion and marketing of a new	Not applicable, since the very design of the project is to distrib-
	technology with high efficiency, the project stim-	ute the Electrical Cooking Devices to households that are using
	ulates substitution with this technology by house-	traditional cooking practises. This will be ensured during the
	holds who commonly used a technology with rel-	time of distribution and their baseline technology and fuel type
	atively lower emissions.	will be recorded the project database. Hence it is highly unlikely
		commonly used a technology with relatively lower emissions
6	Overlap with REDD+ projects	Not applicable, since UpEnergy shall avoid the distribution of
		ECDs in vicinity of REDD+ projects at radius of at least 5 km to
		avoid any overlap. UpEnergy's operations team at Ghana will
		plan and communicate to distribution agents well in advance to
		exclude the areas of potential overlap with REDD+ projects.
		address and geo-coordinates will be gathered in the digital da-
		tabase, further during data QC process, this will be cross
		checked and distributions will be removed from the databased
1		if any project ECD lies within 5 km of radius of REDD+ project
1		boundary

The above assessment clearly demonstrates the possibilities of leakages from various potential sources are very unlikely in the project scenario.

Nevertheless, as a conservative approach, UpEnergy will apply an adjustment factor of 95% to the mitigation outcome to account for the leakage

2.5.3 Data acquisition: metering, data quality, aggregation, and reporting

Data and parameters not monitored/Fixed Ex Ante

Name	Description	Unit	Value	Source
NCV _{b,i}	The net calorific value of the baseline fuel type i (TJ/tonne)	TJ/ton		IPCC Default Value
EF _{b,i,co2}	CO ₂ Emission factor of the baseline fuel i (tCO ₂ e/tonne)	(tCO₂e/ tonne)		IPCC Default Value
EF _{b,i,non-co2}	Non-CO ₂ Emission factor of the base- line fuel i (tCO ₂ e/tonne)	(tCO₂e/ tonne)		IPCC Default Value
$\eta_{b,i,\mathrm{j}}$	Energy efficiency of baseline device j with fuel	fraction		Baseline Study (Water Boiling Tests)
Percentage of fuel_i	Percentage of fuel type i in the base- line situation	%		Baseline Assessment
SC _b	Specific energy consumption used in the baseline scenario	TJ/even t		Controlled Cooking Test
SCp	Specific energy consumption used in the project scenario	TJ/even t		Controlled Cooking Test
EF _{co2} , Char- coal production	CO ₂ emission factor for upstream emissions associated with char- coal production (traditional kiln)	tCO ₂ /TJ		
EF _{ch4, Charcoal} production	CH ₄ emission factor for upstream emissions associated with charcoal production (traditional kiln)	tCO ₂ /TJ		Scientific literature ²⁹
EF _{N2O} Char- coal production	N ₂ O emission factor for upstream emissions associated with charcoal production (traditional kiln)	tCO ₂ /TJ		
GWP _{CH4}	Global Warming Potential for CH ₄	tCO ₂ e		AR6 GWP

²⁹ 3Sources: Bertschi, Isaac T., Robert J. Yokelson, Darold E. Ward, Ted J. Christian, and Wei Min Hao. "Trace Gas Emissions from the Production and Use of Domestic Biofuels in Zambia Measured by Open-Path Fourier Transform Infrared Spectroscopy." Journal of Geophysical ResearchAtmosphere 108 (2003): 5–1, 5–13; Lacaux, J. P., J. M. Brustet, R. Delmas, J. C. Menaut, L. Abbadie, B. Bonsang, H. Cachier, J. Baudet, M. O. Andreae, and G. Helas. "Biomass Burning in the Tropical Savannas of Ivory Coast: An Overview of the Field Experiment Fire of Savannas (FOS/DECAFE 91)." Journal of Atmospheric Chemistry 22, no. 1-2 (October 1995): 195-216. https://doi.org/10.1007/BF00708189; Smith, K. R., D. P. Pennise, P. Khummongkol, V. Chaiwong, K. Ritgeen, J. Zhang, W. Panyathanya, R. A. Rasmussen, and M. A. K. Khalil. "Greenhouse Gases from Small-Scale Combustion in Developing Countries: Charcoal Making Kilns in Thailand." Research Triangle Park, NC: US EPA, 1999; Pennise, D., K. R. Smith, MADD Template V11 36/81
GWP _{N20}	Global Warming Potential for	tCO ₂ e	
	N ₂ O		

Data / Parameter 1:	NCV _{b,i}
Data unit:	TJ/tonne
Description:	The net calorific value of the baseline fuel type i
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	IPCC default data
QA/QC procedures	-
Any comment:	-

Data / Parameter 2:	EF _{b,i,CO2}
Data unit:	tCO2/TJ
Description:	CO2 emission factor arising from use of fuels in baseline scenario
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	IPCC default data
QA/QC procedures	-
Any comment:	-

Data / Parameter 3:	EF _{b,i,non-CO2}
Data unit:	tCO2/TJ
Description:	Non-CO2 emission factor arising from use of fuels in baseline scenario
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	IPCC default data
QA/QC procedures	-
Any comment:	-

Data / Parameter 4:	η _{b,i,j}
Data unit:	Fraction
Description:	Energy efficiency of baseline device j with fuel i
Measurement procedures (if any):	-

Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	
QA/QC procedures	-
Any comment:	-

Data / Parameter 5:	Percentage of fuel_i
Data unit:	%
Description:	Percentage of fuel type i in the baseline situation
Measurement procedures (if any):	The percentage of meals cooked on different type of stoves/fuel by households
	in project boundary will be estimate through a baseline assessment.
	Sample households were randomly picked from the targeted project regions
	according to their population weightage to ensure the samples are true repre-
	sentation of the targeted population.
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	Baseline Assessment
QA/QC procedures	-
Any comment:	-

Data / Parameter 6:	SCb
Data unit:	TJ/event
Description:	Specific energy consumption used in the baseline scenario
Measurement procedures (if any):	The CCT was performed in the baseline scenario considered only cooking task(s)
	that can be replaced by the project device (such as Electric Pressure Cooker), so
	that the results are comparable with the CCT of the project device.
	The test were designed so that it captures a cooking pattern representative of a whole year using a reasonable number of dishes expected to be most com- monly cooked in the project device (such as EPC) over the course of the year. This involved carrying out multiple tests for different dishes, or prescribing a representative cooking pattern during a single test.
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	CCT Test
QA/QC procedures	-
Any comment:	The parameter is used to determine the energy ratio when the project device is
	an EPC.

Data / Parameter 7:	<i>SC</i> _p
Data unit:	TJ/event
Description:	Specific energy consumption used in the project scenario

Measurement procedures (if any):	The CCT were performed in the baseline scenario considered only cooking
	task(s) that can be replaced by the project device (such as Electric Pressure
	Cooker), so that the results are comparable with the CCT of the project device.
	The test was designed so that it captures a cooking pattern representative of a whole year using a reasonable number of dishes expected to be most commonly cooked in the project device (such as EPC) over the course of the year. For example, this involved carrying out multiple tests for different dishes, or prescribing a representative cooking pattern during a single test.
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	CCT Test
QA/QC procedures	-
Any comment:	The parameter is used to determine the energy ratio when the project device
	corresponds to Case 2.

Data / Parameter 8:	$TDL_{j,y}$
Data unit:	Fraction
Description:	Average technical transmission and distribution losses for providing electricity
	to source j in year y.
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	Determined as per the CDM tool TOOL05, paragraph 7.2 (Data/parameters
	monitored, table 3)
QA/QC procedures	-
Any comment:	This parameter is monitored where the energy consumed by the project devices
	is electrical and is directly measured during project implementation.

Data / Parameter 6:	EFco2, Charcoal production
Data unit:	tCO ₂ /TJ
Description:	CO_2 emission factor for upstream emissions associated with charcoal production (traditional kiln)
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	
QA/QC procedures	-
Any comment:	-

Data / Parameter 7:	EF _{ch4} , Charcoal production
Data unit:	tCO ₂ /TJ
Description:	CH ₄ emission factor for upstream emissions associated with charcoal produc- tion (traditional kiln)
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	Scientific Literatures – Refer footnote 31
QA/QC procedures	-
Any comment:	-

Data / Parameter 8:	EF _{N20} Charcoal production
Data unit:	tCO ₂ /TJ
Description:	N_2O emission factor for upstream emissions associated with charcoal production (traditional kiln)
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	Scientific Literatures – Refer footnote 31
QA/QC procedures	-
Any comment:	-

Data / Parameter 9:	GWP _{CH4}
Data unit:	tCO ₂ e
Description:	Global Warming Potential for CH ₄
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	AR6 GWP
QA/QC procedures	-
Any comment:	-

Data / Parameter 10:	GWP _{N2O}
Data unit:	tCO ₂ e
Description:	Global Warming Potential for N ₂ O
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	AR6 GWP
QA/QC procedures	-
Any comment:	-

Data / Parameter 11:	End _{life}
Data unit:	tCO ₂ e/ECD
Description:	Life cycle emission factor for ECD
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	Fixed as ex-ante throughout the crediting period
Source of data:	Life Cycle Emissions calculated in accordance to "Product Life Cycle Accounting
	and Reporting Standard" by GHG Protocol
QA/QC procedures	-
Any comment:	-

Data / Parameter 12:	
Data unit:	
Description:	
Measurement procedures (if any):	
Value Applied	

Monitoring frequency:	Fixed as ex-ante
Source of data:	Determined as per the values from scientific literature
QA/QC procedures	-
Any comment:	-

Data / Parameter 12:	
Data unit:	
Description:	
Measurement procedures (if any):	
Value Applied	
Monitoring frequency:	
Source of data:	
QA/QC procedures	-
Any comment:	-

Data / Parameter 3:	LE _v
Data unit:	tCO2e per year
Description:	Leakage in project scenario in year y
Measurement procedures (if any):	Calculated using formula as per MECD Tool Version 1.2 LE _y = BE*(1-Leakage emission factor)
Monitoring frequency:	Calculated annually
Source of data:	Apply a discount value of 0.95 to the emission reductions to approximate
	leakage emissions, or
QA/QC procedures	Transparent data analysis and reporting
Any comment:	As highlighted in section 2.5.2, the possibilities for emission reduction leakage
	are almost nil for the proposed mitigation activity, however UPENERGY would
	like to apply a methodology default adjustment factor of 0.95 in the emission
	reduction calculation for conservative estimation of ITMOs. Also, UpEnergy
	shall ensure during the time of EC distribution that there is no REDD+ project in
	the distribution area at radius of at least 5 km to avoid any overlap.

Parameters monitored and determined ex-post:

Data / Parameter 1:	Pb,ij
Data unit:	tonnes/year/HH
Description:	Amount of baseline fuel i used in device j in the baseline
Measurement procedures (if any):	The value will be determine based on the Kitchen Performance Test carried out
	by UpEnergy by adopting the following,
	1. The sample size for KPT were determine based on the CDM -EB67-
	A06-GUID Guideline Sampling and surveys for CDM project activities
	and programmes of activities (Version 4.0.) by applying 90%/10% con-
	fidence/precision level.
	2. Sample households were randomly pick from the targeted project re-
	gions according to their population weightage.
	3. The KPTs were conducted in accordance to KPT protocol.
Value Applied	
Monitoring frequency:	Once in every 2 years
Source of data:	Baseline Kitchen Performance Test (BKPT)

QA/QC procedures	Compliance with the general requirements for KPT protocol. Additionally thor- ough assessment on the obtained results which includes outlier analysis.
Any comment:	 UpEnergy will/has adopted the following measures to ensure the accuracy and conservativeness to determine the baseline fuel consumption: The baseline KPT study will/has been conducted during the dry season in Ghana, wherein the baseline fuel use is expected to be lowest in the year due to lower moisture content in the fuel. Although baseline KPT study measured consumption of both the primary fuel and other supplementary fuels, UpEnergy will/has only accounted the consumption for primary fuel for the calculation of P_{b,l,j}. UpEnergy will/has conducted sampling through the sample size requirement by considering over sample to ensure the better accuracy.

Data / Parameter 8:	fNRB _{i,y} ³⁰
Data unit:	Fraction
Description:	Fraction of biomass that is considered non-renewable.
Measurement procedures (if any):	As determined by Ghana & Switzerland.
Value Applied	0.30
Monitoring frequency:	Fixed as ex-ante throughout the crediting period, however fNRB value is dy- namic and updated every time whenever a new value is set by Ghana & Swit- zerland
Source of data:	To be updated regularly based on value(s) to be set by Ghana and Switzerland. Until then fNRB value of 0.30 shall apply.
QA/QC procedures	-
Any comment:	fNRB value will be updated as on when there is latest value set by Ghana & Switzerland is available.

Data / Parameter 1:	$\eta_{p,d,y}$
Data unit:	Fraction
Description:	Thermal efficiency of the project device
Measurement procedures (if any):	
Values Applied	
Monitoring frequency:	Calculated annually
Source of data:	Manufacturer's specifications or Third-party certification
QA/QC procedures	For modern electric cooking devices, thermal efficiency is expected to be con-
	sistent over the technical life span of the product.
Any comment:	This parameter is used in the determination of useful energy.

Data / Parameter 11:	$EF_{el,y}$
Data unit:	tCO2e/MWh
Description:	The emissions factor of the project electricity system in year y

³⁰ fNRB value will be replaced in future based on the national study to be conducted by Ministry of Energy, Ghana. MADD Template V11

Measurement procedures (if any):	
Values Applied	
Monitoring frequency:	Fixed as ex-ante
Source of data:	Ghana's Latest harmonised grid emission factor dataset provided by UNFCCC to
	be applied
QA/QC procedures	-
Any comment:	This parameter is used in the determination of project emission

Data / Parameter 2:	$EG_{p,d,y}$	
Data unit:	MWh	
Description:	The amount of energy used in the project scenario by device d in year y (MWh)	
Measurement procedures (if any):	Direct, continuous measurement through system integrated data loggers	
Monitoring frequency:	Continuous – Annual Aggregation	
Source of data:	Direct, continuous measurement	
	Ex-post monitoring survey shall be conducted to statistically determine the valid proportion of households actively using the project technology for each project vintage.	
	The total sample size determined by stratifications based on technology age, stove model, region & urban/rural spilt to ensure the accurate representations of project households	
QA/QC procedures	Thorough assessment on the obtained results which includes outlier analysis	
Any comment:	The accuracy and conservativeness of Electric cooking device consumption monitoring is ensured by adopting the following,	
	UpEnergy intended to do the monitoring survey on twice a year during the wet season & dry season to capture the variations in the consumption due to seasonality changes if any.	
	UpEnergy intends to use the conservative bound value (lower / upper) of pro- ject electricity consumption results for calculation of BE and PE, even if project electricity consumption results meet the 90%/10% reliability criteria. Further a conservative weighted average of the energy consumption obtained through monitoring shall be applied in the ITMO calculation to evade over crediting.	

Sampling Plan for Project Monitoring

The sampling plan given below defines the approach for determining relevant monitoring parameters via ex-post sampling. All required monitoring and documentation will be implemented, reported, consolidated and managed by the UPENERGY or a qualified expert partner to meet verification requirements.

i. Target population

The target population is the total population of household using the project Electrical Cooking Devices within the existing project boundary.

ii. Parameters of Interest

The objective of the sampling plan for this project activity is to determine the following parameters of interest:

 EG_{p,d,y}: Project fuel consumption for an individual technology in project scenario. The actual value will be determined based on the aggregate of the energy consumption compiled from the determined sample required during the project monitoring.

iii. Sampling Plan

Stratified random sampling shall be applied for determining the project fuel consumption for each project scenario separately. The sample size determined shall be distributed within each age category based on percentage of electric cooking device in corresponding age category. Further the samples will be stratified based on region, stove model, urban / rural category. For example, if only Electric Cooking Device in the first year of use (age 0-1) are being credited, a usage parameter must be established through a usage survey for Electric Cooking Device age 0-1. If Electric Cooking Device in the first year of use (age 0-1) and second year of use (age 1-2) are credited, a usage parameter is required that is weighted to be representative of drop off rates for Electric Cooking Device age 0-1 and age 1-2. The minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited.

For determining the Energy consumption (EG_{p,d,y}) in the project scenario, direct, continuous measurement (aggregated annually) will be applied . Sampling approach is applied in line with Guideline: Sampling and Surveys for CDM project activities with confidence/precision level. Higher than minimum required sample size should be considered to accommodate potential device failure, measurement gaps from individual measurement devices. The mean value and standard deviation of energy consumption for sample size calculation for the first verification will be determined based on pilot surveys (10 Households). For subsequent monitoring the mean value and standard deviation of project fuel consumption obtained from the previous MP shall be used. The determined sample shall be distributed within each age, region, model & urban/rural category based on percentage of stoves in corresponding age category for ensure the accurate representation of samples. The calculated annual sample size will be multiplied with

iv. Monitoring Methodology for Energy Consumption (EG_{p,d,y})

a) Energy consumption Monitoring Surveys

UpEnergy would like also do a physical survey which investigates changes over time in a project scenario by surveying end users with project technologies on a bi-annual basis.

The majority of interviews in a monitoring and usage survey will be conducted by UpEnergy staff or by hired experts who would be trained before and include expert observation by the interviewer within the kitchen in question, while the remainder may be conducted via telephone by the same interviewers on condition that in-kitchen observational interviews are first concluded and analysed such that typical circumstances are well understood by the telephone interviewers.

Along with the ex-post usage/energy consumption survey, a monitoring survey will be carried out to assess end-user cooking characteristics such as technology use, energy consumption, seasonal variation, SDG related assessment & costing savings, cooking time reduction etc.

Monitoring Frequency – Bi-annual basis

a) Digital MRV (dMRV)

The Electric Cooking Device (ECD) is a 100% metered cooking device that records the amount of energy or fuel used for cooking over a period of time. A subset of Electric Cooking Devices (ECDs) will be equipped with

for usage rates, energy Consumption of the selected representative sample of households by deploying temperature, Consumption (kWh)/time sensing data loggers, inbuilt in the Electric Cooking Device, which measures and logs temperature/pressure/Consumption (kWh)/Time (Min) of the Electrical Cooking Devices with a time stamp. The key differentiator of this digital monitoring system with respect to the conventional method is a significant improvement in measurement accuracy. The key parameters monitored with data loggers: -

S. No	Description	Datapoint	
1.	Parameters to be monitored	Temperature, Time & Consumption/ Date	
2.	Frequency of measurement	Six times per day	
3.	Time in Min	Direct Measured	
4.	Pre-Heat Energy & Time	Direct Measured	
5.	Keep Pressure/Warm Energy & Time	Direct Measured	
6.	Pressed Plus & Minus during Cooking	Direct Measured	
7.	Maximum Temperature	Direct Measured	
8.	Usage Rate (U _{py})	From Cooking hours/day	

Parameters	Description	
Pre-Heat Time	The amount of time in minutes the EPC was in Pre-Heat phase	
Pre-Heat Energy kWh	The amount of energy consumed in kWh during the Pre-Heat phase	
Keep Pressure Time Min	The amount of time in minutes the EPC was in Keep Pressure phase	
Keep Pressure kWh	The amount of energy consumed in kWh during the Keep Pressure phase	
Keep Warm Time Min	The amount of time in minutes the EPC was in Keep Warm phase	
Keep Warm kWh	The amount of energy consumed in kWh during the Keep Warm phase	
Number of Heating Cy- cles	Number of times the Heating element was powered during Keep Pressure phase	
Max Temp	Maximum Temperature measured on NTC during this Cooking Session	

The samples for both ex-post usage surveys and digital monitoring surveys will be the same and the sample size will be determined based on CDM sampling guideline CDM-EB67-A06-GUID Guideline Sampling and surveys for CDM project activities and programmes of activities (Version 4.0.) and Sampling and surveys for CDM project activities and programmes of activities Version 9.0 with the confidence/precision level. The calculated annual sample size will be multiplied

In addition to the digital monitoring, PP would like also do a physical usage survey/energy consumption monitor which investigates changes over time in a project scenario by surveying the end users on an annual basis. This is to substantiate results obtained from the dMRV.

v. Other elements of monitoring plan

1. Total Distribution Record:

The total distribution record documents the information as listed below for the total distributions. A carbon waiver including a warranty card will be distributed with each electric cooking device distributed. UpEnergy shall be having two copies of the warranty card cum carbon waiver receipt, while one of the copies shall be handed over to the End User and the other copy is kept in the records of UPENERGY either in physical and electronic format. Further the distribution process will be completely digital and the carbon waiver and warranty shall also be recorded digitally in addition to physical format. The total distribution record will be kept electronically and with supporting evidence from paper records and/or electronic records and will be provided to the VV at verification.

The Total Distribution Record contains:

- a) Project-ID
- b) Unique identification of device/ serial number
- c) Model type
- d) End user specific information
- e) Date of distribution
- f) Fuel and cooking technology used in the baseline scenario
- g) Total distributions

Frequency: Ongoing

2. Project Database:

The project database considering the total distributions along with the date of installation. Every Electrical Cooking Devices listed in the total distribution records will be transferred into the project Database with the following information captured digitally:

- a) Name, address, GPS coordinates and telephone number of end users
- b) Electric Cooking Device models and fuel sources replaced by the Electrical Cooking Device.
- c) Unique identification of device/ serial number
- d) Model type
- e) Date of distribution

Frequency: Ongoing

3. Disposal Policy for baseline stoves

The Mitigation Activity encourages full adoption of project stove distributed. To incentivize full adoption, the activity proponents extend a full-year warranty in exchange for the disposal of a household's traditional stove. The used baseline stoves that are retrieved from households are sustainably recycled / disposed off in accordance to the recycling and disposal policy for charcoal stoves developed and adhered by UpEnergy Ghana 1, represented by UpEnergy Group PCC. UpEnergy disposal policy endeavours to adopt practices that ensure that used charcoal stoves are disposed of and recycled in an environmentally friendly and responsible manner, reducing waste and promoting sustainability in our clean cooking projects. Our disposal policy provides guidelines and procedures for the proper disposal and recycling of used charcoal stoves to minimize their environ-mental impact. Members of supply chain and distribution teams are expected to integrate these best practices in their operations.

4. Disposal & Recycling for project device:

UpEnergy is committed to promoting environmentally responsible practices in all aspects of operations in our improved cooking projects. UpEnergy will dispose the e-waste brought by the end-users at the end-of-life cycle of the product. The diagram below outlines the process of electric cooking equipment returned by end users due to being broken or defective.



UpEnergy's recommended practice for managing electric waste.

Compo-	Description	Material	Reclamation	Special-
nent/Grouping		Grouping	Application	ized
				Recycling
				And
				Disposal
				Method

Structural Compo- nents Non-Pressure Re- taining or Non-High Temper- ature Adjacent (Can be detached and reattached with- out damage)	 Solid parts, either standalone or part of a mechanical sub-assembly. Subject to OEM (original equip- ment manufacturer) approved inspection using non- invasive methods like visual examination for wear, scratches, breakage, or cracks. Salvageable parts undergo sanitization and cataloguing. Resource recovery must be approved by the OEM and not infringe on patents. 	Plastics, Metal	Test and validate for resource recovery using OEM approved meth- ods & tooling.	Assign to certified recycling and disposal facilities.
Seals/Gaskets/O-	Sealing elements for leak	Rubber, Plas-	N/A - Components	
Rings	prevention.	tics, Metal	prone to wear.	
Springs & Actuat-	Mechanical parts for	Plastics,	resource recovery	
ing Parts	movement and tension.	Metal	unless approved by	
Heating Elements	Heat generating platform (EC)	Metal	Manufacturer (OEM).	
Control Interfaces	User-operated panels and buttons for device management.	Plastics, Glass		
Sensors	Temperature and pressure monitoring devices.	Electri- cal/Electronic		
Induction Coils	Field generating element in induction cooker.	Electri- cal/Electronic	Test and validate on the condition that specialized tooling and methods approved by the OEM are utilized, to ensure safe resource recovery where applicable	
Printed Circuit Boards (PCBAs)	Constitute circuitry for appliance control and power distribution.	Electri- cal/Electronic		
Internal Wiring & Electrical Connectors	Conductive elements for power and signal transmission	Electri- cal/Electronic		
Inner pot	Food-item container (EPC)	Metal with non-stick coatings	Reuse at the user's home as cookware or storage ware.	
Power Cable		Electri- cal/Electronic	Store and Reuse in the user's home with compatible appliances as per the technical team's recommendation.	

5. Operation & Maintenance:

UpEnergy Ghana 1, represented by UpEnergy Group PCC ensures that each product distributed includes the Product OEM EC Customer User guide. This comprehensive guide contains essential maintenance procedures for improving the electric

cooking device, along with solutions for common issues that may arise during its usage. Additionally, we offer a customer service number to provide additional support to end users in case they encounter any difficulties.

UpEnergy offers a limited manufacturer's warranty of from the date of purchase for the device, which includes:

- 1. The Electric Cooking Device (ECD) unit
- 2. The included Power Cable

The above warranty is applicable when the device is used according to the guidelines stated in user guide/ manual. Failure to take care of your EPC or accessories could result in poor performance and may not be covered under warranty.

Further, UpEnergy will undertake the following risk management procedures to tackle of defective products specially in three areas of focus:

- Supply chain QA/QC: every device will be tested in production and then checked again during pre-shipment inspection. Each device will then be checked a third time prior to distribution. If any defect is identified, the device will be guarantined for rework, and then retested before it can be distributed.
- Defect collection: any device identified as defective during the warranty period will be collected from the customer and quarantined for testing and repair. If possible, it will then be redistributed, or otherwise it will be disposed of.
- Disposal of defective and irreparable devices will be carried out in compliance with the Hazardous and Electronic Waste Control and Management Act (2016)

2.5.4 **Reporting of mitigation outcomes**



ITMO Mitigation Reporting Process

1. Organizational structure of monitoring and inclusions:

Person	Role
UpEnergy database administrator	The database administrator is responsible for updating and main-
	taining all electronic databases. Required competencies include ex-
	perience with data management systems (eg. Excel, STATA, or SPSS),
	minimum 2 years working experience in a similar field, and at mini-
	mum a Bachelor's degree from an institution of higher education.

Monitoring team	The monitoring team will be assigned by the UpEnergy to conduct		
	the user interviews and appliance tests during the periodic sampling		
	and reports the results to the database administrator. Proper train-		
	ing will be provided to all enumerators/monitoring team before		
	every survey exercise. The skills and experience required for the data		
	collection activities include:		
	 Experience conducting surveys/tests 		
	• Experience conducting door-to-door surveys of biomass consump-		
	tion.		
	• Local language skills (especially important for input to question-		
	naire design and interviewing of end users)		
	• English language skills		
	Cultural awareness		
	Numerical proficiency		
	Data entry skills		
Carbon Technical Team	UpEnergy has a pool of carbon and energy experts, who are involved		
	in technical and statistical analysis, ITMOs calculations and reporting		
	of MO. The carbon technical team has a vast knowledge and experi-		
	ence in both voluntary and compliance carbon projects.		

2. Quality Assurance/Quality control

As the Mitigation Activity intended to include 4 multiple regions within a country with a high level of cultural diversity as well as different end user groups, there is no "one size fits all" approach for dealing with these issues. However, in order to avoid many of these problems the UpEnergy will undertake the following strategies, tailoring the specific approach to the local circumstances:

a) Ensuring end user awareness

At the time of distribution, the ECD customer is made aware that they are required to participate in monitoring activities. This will be via a written statement (in English and local language where appropriate) on the carbon waiver form, or via alternative means such as training, distribution personnel to explain the importance of monitoring to each customer.

b) Questionnaire design

The design of the questionnaire will ensure that the questions are non-intrusive and easy to understand for both the interviewee and interviewer. To avoid contradictions in the responses from the end users, UpEnergy shall include to constraints in the digital questionnaires.

c) Drawing on local knowledge

The local contractors to be hired by the UpEnergy in the country will play an important role in tailoring the approach to suit local circumstances. For example, in some instances, it may be essential for a local person to conduct the interview in order to obtain accurate results, e.g. to explain to the end user that their old stove will not be removed if they admit to its continued use.

d) Quality of contractors.

Any third party hired by the UpEnergy to carry out sampling surveys will be required to demonstrate a high level of cultural awareness, local language skills and appropriate experience with data entry and data management. The UpEnergy will ensure that contractors are adequately trained for the tasks they are contracted for (e.g. Carrying out of KPTs/CCTs in line with a methodology supported by an appropriate international body/standards). Training will also be provided on how to deal with non-responses, refusals and other problems should these occur.

2.6 Additionality of Activity

UpEnergy intends on distributing the Electrical Cooking Device at highly subsided price to the target population and this will certainly cause a financial barrier, hence the monetization of the mitigation outcomes ("carbon revenues") generated by the activity is needed for successful implementation and sustained operation, the scale of the project's ambition cannot be achieved without access to carbon finance (or other results-based financing facilities).

The following key barriers are identified which are the potential challenges on implementation mitigation activity and realization of mitigation outcomes,

S.No	Key Barriers for Adoption Electrical	Counter measures to be by UpEnergy taken with support of Carbon Revenue
	Cooking Devices	
1	Lack of affordability	Distribution of Electrical Cooking Devices will be at a subsidized cost
2	Lack of awareness	Sensitization of target population through awareness campaigns & promotional events
3	Lack of wide accessibility	Ensuring distribution of Electrical Cooking Devices to the last mile of the project boundary
4	Lack of EPC/IS Quality	Manufacturing & Distribution of state-of-the-art Electrical Cooking Devices with
		5 years of warranty assurance
5	Integrity	Use of digital monitoring for accurate reporting of mitigation outcomes

As can been inferred from the above table without carbon revenues, affordability issues will continue to persist as the key barrier to increased adoption rates of Electrical Cooking Devices. As such, the revenues from the sale of Mitigation Outcomes are critical to help unlock access and drive mass-scale adoption of improved cooking technologies.

Reference Scenario:

The section 2.1.1 discussed in depth on the autonomous baseline reference and in the absence of the Mitigation Activity, the expected reference development would be continued use of traditional cooking technologies with use of non-renewable biomass and fossil-based charcoal, firewood and LPG for meeting similar thermal energy needs. This reference scenario is also the most economically attractive alternative (in terms of capital investment) corresponding at least to the state of the art in terms of technology. Although the NDC of Ghana lists the adoption of clean cooking as a conditional mitigation measure and also NEP 2021 of Ghana mentions a target of 3 million clean cooking products by end of NDC cycle, however it depends on market-based mechanisms and international climate finance support to achieve its NDC goal. The NDC clearly mentions the activities can be adopted contingent to international finance, technology transfer and capacity building. There is no specific target related to the distribution/promotion of efficient cookstoves in the NDC. There is no obligation to distribute such cookstoves, hence the proposed mitigation activity meant to be a regulatory surplus and emission re-duction achieved will be additional to the reference development.

It is important to note that Ghana's frame work on international carbon markets and non-market approaches has whitelisted the high-efficiency improved biomass cookstove projects and deemed to auto additional, hence this Mitigation Activity need not to demonstrate technical and financial additionality. However, the financial additionality of the pro-gramme has been demonstrated hereunder as per the step wise guidelines provided by "Offsetting CO2 emissions: Pro-jects and Programmes - A communication of the FOEN in its capacity as enforcement authority of the CO2 Ordinance. Status as of 2024". As per the "Ghana carbon market framework", "The whitelist for efficient cooking includes introducing high efficiency electric cooking to replace inefficient traditional/intermediate cooking stoves. "Furthermore, according to the framework "Ghana considers any mitigation activity or technology in the whitelist as automatically additional (not required to demonstrate technical and financial additionality"³¹

However, the financial additionality of the project has been demonstrated here as per the step wise guidelines provided by official Communication document of FOEN.

Step 1: Economic feasibility analysis (financial additionality)³²

UpEnergy has adopted the option of investment comparison analysis to demonstrate the financial additionality in accordance to the "Emission Reduction and Carbon Storage Projects and Programmes - A communication of the FOEN in its capacity as enforcement authority of the CO₂ Ordinance. Status as of 2024".

The below table demonstrates the proposed mitigation activity, NPV method calculated over 7 years has been used to demonstrate additionality:

S No	Cost Component	Excl. ITMOs Revenue	Incl. ITMOs Revenue
1	EC sales revenues		
2	Programme costs		
3	Net revenue		
4	IRR	N/A (-ve)	

The investment comparisons analysis reveals the NPV is negative when there is no revenue inflow from ITMOs and on the other hand with the aid of carbon revenue the NPV works out to be positive. As evidenced through the NPV analysis the project activity is financially unviable without monetisation of the mitigation outcomes, thus the project is proven to be additional.

Further the following table shows the comparison between key financial parameters for an unsubsidized and a subsidized electric cooking device,

#	Description	Unsubsi- dized	Subsidized	Unit	Source
				\$ / day / HH	Ghana EC 5047 – Ex Ante ITMO v2
1	Average savings realized with project			\$ / annum /	
				HH	Calculated
2	Cost of Project			\$ / EC	Investment Comparison Analysis
4	Simple Payback Period for Project			months	Calculated
ц				\$ / HH / 7	
D	Project Life Cycle savings			Years	Calculated
6	Investment Cost as % of Project Life Cycle			0/	
0	savings			/0	Calculated
7	% of Costs covered by carbon revenues			%	Calculated

Step 2: Sensitivity Analysis

A sensitivity analysis has also been carried out to understand and analyse the variations in the NPV with respect to the select key financial parameters viz., Cost of Manufacturing, Cost of Sale, End User Distribution Cost and ITMO Sale Price. These key financial parameters are selected for the sensitivity analysis considering their impact on the financial analysis and

³¹ https://cmo.epa.gov.gh/wp-content/uploads/2022/12/Ghana-Carbon-Market-Framework-For-Public-Release_15122022.pdf (last accessed on 21/02/2024)

³² The distribution number in the financial model encompasses both Electric Pressure Cookers (EPC) and Electric Induction Stoves (EIS). MADD Template V11 51/81

Ľ	the sensitivity analysis is tabulated below,			
lter- a- tion	Parameter / Variation	IRR excluding ITMOs revenue	IRR including ITMOs revenue	
1	Manufacturing cost / -10%	N/A (-ve)		
2	EC sale price / +10%	N/A (-ve)		
3	Overall Cost / -10%	N/A (-ve)		
4	Iteration 1,2 & 3 combined	N/A (-ve)		

uncertainties & dynamics involved in market situation and economic conditions at the project location. The key outcome of the sensitivity analysis is tabulated below,

As can been seen in the above table, the Project NPV is found to be negative (N/A) in all iterations with respect to +/- 10% variations in the key financial parameters. This proves the project is additional in all scenarios and strongly indicates that the carbon revenue is vital for sustenance of the project.

Step 3: Common Practice Analysis

UpEnergy has carried out a common practice analysis to identify list of electrical cooking projects that are implemented without any carbon finance mechanism in the project boundary. There is no other project activity with the similar intervention being implemented in the proposed programme's boundary³³.

Thus, it is evident from the common practise analysis that no similar project is being carried out in the project boundary without carbon finance, hence additionality in relation to current practice is considered to be demonstrated.

3 Business model and role of carbon

The proposed structure is that financial support will flow from the investor into an SPV. The carbon revenues from the sale of ITMOs to the KliK Foundation will flow into the SPV, from where funds will go towards repayment of investors and coverage of ongoing project operation and maintenance costs. In summary the entities involved along the value chain are the KliK Foundation, UpEnergy Ghana 1, represented by UpEnergy Group PCC, UpEnergy (Ghana) Limited and a third-party investor. Funds flow summarized in the diagram below.



In summary, the carbon revenue will be used for:

- 1) Local technical capacity building, focused on high-quality manufacturing of EC;
- 2) The build-out of a large-scale, last-mile distribution network, including CRM tool build-out and training of distribution agents; and
- 3) Set-up of live data monitoring platform to enable digital MRV of EC usage, experiment design, and intervention planning.

³³ As verified from various carbon programme registries like Gold Standard, VERRA, etc, as of 23 Dec 2024. MADD Template V11

Annexure 1: Survey Questionaries

Baseline Survey Questionnaire

Please read aloud the prompt asking household for consent to be interviewed:

Hello, my name is (your name). I am doing a survey on household cooking practices and fuel usage. If you agree to participate in this survey, it will take about 30 minutes. Your responses will be used to inform us about general cooking practices and fuel use in this area. All the information I collect will be kept private. Your name will not appear anywhere in the final report, and no information that may identify you will be contained in the final report without your permission. Participation is voluntary.

Household member consent and initial qualifying questions:		
Are you willing to participate in this survey?	□ Yes	□ No
If answer above is "No", say thanks to HHs, stop the interview	and select another l	household.
Are you the primary cook for your household?	🗆 Yes	□ No
(Primary cook is the family member who does most of the cook- ing, including cooking food, making tea/coffee and boiling drink- ing water)		
If answer above is "No", say thanks to HHs, stop the interview and select another household.		

1.	General Information	
1.1	Date of Survey	
1.2	Name of Surveyor	
1.3	Name of the respondent (primary cook)	
1.4(a)	Address	
1.4(b)	Region	
1.4(c)	District	
1.4(d)	County	
1.4(e)	Sub-county	
1.4(f)	City/Village	
1.4(g)	Urban/Rural	
1.5	GPS co-ordinates	
1.6	Contact Number of the respondent	
1.7	How do you identify your gender?	
1.8	Respondent's age group	□ 13-18 years
		□ 18-25 years
		□ 26-35 years
		□ 36-45 years
		□ 46-55 years

		□ Above 55 years	
		□ Refused to answer	
1.9	What is the highest level of education obtained by a member of this household?		
1.10	How many family members in each age group do you usually cook for?	Gender/Age group	Count
		Children 0-14 years	
(Permanent members in the family)	Female 15 and above		
		Men between 15 -59 years	
		Men above 59 years	
1.11	What is the main source of income for your house- hold?		

	Stove Technology and Fuel Use		
2.1	What type of cooking (e.g., Household, commercial)	Residential	
	do you use your stove for?	Commercial	
		□ Both	
2.2	How many stoves are being used for cooking in this household?		
2.3	What type of stoves do you use for majority of cook- ing? (Select all that apply)	Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	
		Others (specify)	
		(Mention stove type and fuel type)	
If the abo	ove response has "Intermediate stove" and/or "Electr	ic stoves", move to 2.3.1, otherwise jump to	o 2.4
2.3.1	Is the stove part of any carbon program?	□ Yes □ No	
2.4	How many meals you cook in a day on each of the stove types being used?	Stove	No. o Meals/day
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	

		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	
		Others (specify)	
		(Mention stove type and fuel type)	
2.5	How many days in a week do you cook on each of the stove types being used?	Stove	No. of days/ week
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	
		Others (specify)	
		(Mention stove type and fuel type)	
2.6	How many hours do you spend on cooking a meal in a day?	hours/meal	
2.7	Is there any seasonal variation in stove usage and fue usage with respect to dry and wet season?	□ Yes □ No	
	If "Yes" move to 2.7.1 otherwise jump to 2.8		
2.7.1	How many meals you cook in a day in dry season on each of the stove types being used?	Stove	No. of Meals/day
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	

		Others (specify)	
		(Mention stove type and fuel type)	
2.7.1.1	How many days in a week do you cook in dry season on each of the stove types being used?	Stove	No. of days week
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	
		Others (specify)	
		(Mention stove type and fuel type)	
2.7.2	How many meals you cook in a day in wet season on each of the stove types being used?	Stove	No. Meals/day
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	
		Electric Stove	
		Solar Cooker	
		Biogas Stove	
		Others (specify)	
		(Mention stove type and fuel type)	
2.7.2.1	How many days in a week do you cook in wet season on each of the stove types being used?	Stove	No. of days week
		Three-Stone Fire/Open -Fire Stove	
		Permanent Firewood Stove with Chimney	
		Traditional Charcoal Stove	
		Intermediate Firewood Stove	
		Intermediate Charcoal Stove	
		Kerosene	
		LPG Stove	

		Electric Stove		
		Solar Cooker		
		Biogas Stove		
		Others (specify)		
		(Mention stove type and fuel t	type)	
2.8	Where do you normally cook in dry and wet season?	Dry Season	Wet Seasor	1
	If answer to 2.8 is "Indoor" go to 2.8.1 otherwise ju	mp to 2.9		
2.8.1	Is your kitchen properly ventilated, has chimney/ex- haust fan to remove smoke?			
2.9	Does your household have a practice of space heat- ing?			
	If "No" jump to 3.1 otherwise continue.			
2.9.1	Do you use the cookstove for space heating purposes?			
	If "No" move to 2.9.3 otherwise continue.			
2.9.2	Which stove type do you use for space heating? (Only	Stove Type		
	when HH contains multiple stoves)	Three-Stone Fire/Open -Fire S	tove	
		Traditional Charcoal stove		
		Other Intermediate Stove grate, chimney, or isolation)	(which has	
		Kerosene		
		LPG Stove		
		Electric Stove		
		Solar Cooker		
		Biogas Stove		
		Others		
		(Mention stove type and fuel t	type)	
2.9.3	What heating facility are you using for space heating?			

	Access to Fuel and General Household Conditions	
3.1	Method to acquire wood fuel?	
		Purchasing
		Both
	Move to 3.2 & 3.3 if option "Collect" selected in 3.1 in 3.1, otherwise continue.	then jump to 3.5. Jump to 3.4 if option "Purchasing" selected
3.2	If you collect fuel, who normally gathers wood fuel in your household?	

3.3	How many hours do you spend on wood fuel collec- tion?	hrs/week
3.4	If you buy wood fuel, how much do you spend per week on it?	/week
	(Mention in local currency)	
3.5	What is the average cost of charcoal per kilogram?	
	(Mention in local currency)	
3.6	What is the average cost of wood per kilogram?	
	(Mention in local currency)	
3.7	If you have LPG stove in your household, what is the	
	"LPG Stove" selected in 2.3)	
3.7.1	What is average cost of LPG refill per month?	
	(Mention amount in local currency) (This question appears only if "LPG Stove" selected in 2.3)	
3.8	Are you able to buy or collect enough fuel to meet your household cooking needs?	
	If "No" continue to 3.8.1 otherwise jump to 3.9	
3.8.1	What is the reason for not being able to buy or collect	□ It takes too long to collect fuel
	enough wood ruer?	\Box It is hard to find fuel
		It is too expensive/cannot afford
		Others
3.9	Do you have electricity connection in your house- hold?	
3.9.1	How many hours in a day you get electricity?	
3.9.2	What is the average cost of electricity? (For a kWh unit)	
	(Mention amount in local currency)	

	Sustainable Development and Household Background	
4.1	Do you think your present stove emit more smoke in- side the kitchen?	□ Yes □ No
4.2	Are there children below 5 years present in the HH?	□ Yes □ No
4.3	While using your stove, which of these health issues	□ Sore eyes
tered?	tered?	
		Headache
		□ Asthma or respiratory issues
		□ heart disease
		Others

4.4	Do you think your stove consumes more fuelwood and/or charcoal for cooking?	□ Yes	□ No
4.4.1	Do you think your stove consumes more LPG for cooking?		
4.4.2	How satisfied are you with your current cooking de- vices?		
4.5	Have you heard of Electric cooking devices like Elec- tric Pressure Cooker?	□ Yes	□No
4.6	Given a chance would you be interested in buying an EPC?	□ Yes	□ No
4.7	Have you heard about Improved Charcoal Stoves?	□ Yes	□ No
4.8	Given a chance would you be interested in buying an Improved Charcoal Stove?	□ Yes	□ No

Kitchen Performance Test

Please read aloud the prompt asking household for consent to carry out study:

My name is (your name). I am doing a study on household cooking practices and fuel usage. If you agree to take part in the study, the study team will visit you 15-30 minutes before you plan to begin cooking to measure the fuel use. We will measure all fuels used to complete a cooking event (each day) by weighing your fuel inventory before and after you cook. We may also ask you a few questions about your cooking practices and take some photographs of your fuels, cookstove, and kitchen area. Your responses will be used to inform us about general cooking practices and fuel use in this area. All the information I collect will be kept private. Your name will not appear anywhere in the final report, and no information that may identify you will be contained in the final report without your permission. Participation is voluntary.

Household member consent and initial qualifying questions:			
Are you willing to participate in this Kitchen Perfor- mance Test?	□ Yes	□ No	
If answer above is "No", say thanks to HHs, stop the interview and select another household.			

	Kitchen Performance Test				
5.1	Visit 1				
5.1.1	Start of fuel measurement (day 1)	Date		Time	
5.1.2	Fuel measurement	Fuel Type	Initial stock –	Day1	Additions - Day 1
	(Day 1)	Wood			
		Charcoal			
		Kerosene			
		LPG			

		Electricity		
		Others		
5.1.3	Moisture Content	Wood		
	(% dry basis)	Charcoal		

5.2	Visit 2				
5.2.1	Start of fuel measurement (day 2)	Date		Time	
5.2.2	Fuel measurement	Fuel Type	Remaining Sto	ock – Day 2	Additions - Day 2
	(Day 2)	Wood			
		Charcoal			
		Kerosene			
		LPG			
		Electricity			
		Others			
5.2.3	Moisture Content	Wood			
	(% dry basis)	Charcoal			

5.3	Visit 3				
5.3.1	Start of fuel measurement (day 3)	Date		Time	
5.3.2	Fuel measurement	Fuel Type	Remaining Sto	ck – Day3	Additions – Day 3
	(Day 3)	Wood			
		Charcoal			
		Kerosene			
		LPG			
		Electricity			
		Others			
5.3.3	Moisture Content	Wood	·		
	(% dry basis)	Charcoal			

5.4	Visit 4			
5.4.1	Start of fuel measurement (day 4)	Date	Time	

5.4.2	Fuel measurement	Fuel Type	Remaining Stock – Day 4
	(Day 4)	Wood	
		Charcoal	
		Kerosene	
		LPG	
		Electricity	
		Others	

End of KPT

Controlled Cooking Test

1	Environmental Variables		
1.1	Wind Conditions		
1.2	Air temperature	• °C	
1.3	Date	DD/MM/YYYY	

2	Physical Test Parameters	
2.1	Average dimensions of wood	cm
2.2	Wood moisture content (wet basis)	%
2.3	Dry weight of Pot # 1	Grams
2.4	Dry weight of Pot # 2	Grams
2.5	Dry weight of Pot # 3	Grams
2.6	Dry weight of Pot # 4	Grams
2.7	Weight of container for char	Grams
2.8	Local boiling point of water	°C

3	Measurement	
3.1	Initial weight of fuelwood (wet basis)	Grams
3.2	Final weight of fuelwood (wet basis)	Grams
3.3	Weight of charcoal with container	Grams
3.4	Start time of cooking	minutes
3.5	End time of cooking	minutes
3.6	Cooking Duration	minutes
3.7	Weight of Pot#1 with cooked food	Grams

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3.8	Weight of Pot#2 with cooked food	Grams
3.9	Weight of Pot#3 with cooked food	Grams
3.10	Weight of Pot#4 with cooked food	Grams
End of CCT		

Post Distribution Survey Form – Project ECD

1	General Information	
1.1	Date of Purchase	
1.2	Receipt Number	
1.3	EPC Serial Number	
1.4	Distribution Agent Name	
1.5	Name of End-User	
1.6	Address	
1.7	Town/City/District	
1.8	Phone Number	
1.9	General Information	

2	Performance & Adoption	
2.1	How frequently do you use the Electric Pres- sure Cook Stove?	/Day
2.2	How satisfied are you with the overall perfor- mance of the Improved Cook Stove?	Very satisfied
		Satisfied
		Neutral 🗆
		Unsatisfied
		Very unsatisfied
2.3	Have you noticed any improvement in indoor air quality or health since using the Electric Cook Stove	Yes, significant improvement
		Yes, slight improvement
		No change
		No, it's worse
		Not sure

3	Durability & Quality		
3.1	How would you rate the overall build quality of the stove?	Excellent	
	mplate V/11		62/91

		Good 🗆
		Average
		Below average
3.2	Have you experienced any issues with the	□No
	stove?	□Yes, Please Specify
3.3	Has the stove required any repairs or mainte-	□No
	nance since you started using it?	□Yes, Please Specify

4	Customer Service & Support		
4.1	How would you rate your experience with the purchase process?	Very satisfactory	
		Satisfactory 🗆	
		Neutral 🗆	
		Unsatisfactory	
4.2	Did you receive adequate instructions on how to use and maintain the stove?	Yes, very clear	
		Yes, somewhat clear 🛛	
		No, not clear 🛛	
		No instructions provided \Box	
4.3	Have you contacted customer support for any assistance?	□ Yes	
		□ No	
4.4	Grievance Register Number		
4.5	If yes, how would you rate the customer support experience?	Very satisfactory	
		Satisfactory 🗆	
		Neutral 🗆	
		Unsatisfactory	

5	Additional Feedback	
5.1	What features of the Electric Pressure Cook Stove do you like the most?	· ······
5.2	What improvements would you suggest for the stove?	
5.3	Any additional comments or suggestions?	

End of Survey

Project Survey Questionnaire (including data extraction Consent to Participate)

Introduction to the survey respondent

NOTE: You (surveyor) should not suggest answers and not induce any bias. Always listen closely to the respondent and fill the answer correctly into the collection data form.

Hello, my name is (your name). I am doing a survey on household cooking practices and fuel usage. If you agree to participate in this survey, it will take about 30 minutes. Your responses will be used to inform us about general cooking practices and fuel use in this area. All the information I collect will be kept private. Your name will not appear anywhere in the final report, and no information that may identify you will be contained in the final report without your permission. Participation is voluntary.

Household member consent and initial qualifying questions:			
Are you willing to participate in this survey?	□ Yes	□ No	
If answer above is "No", say thanks to HHs, stop the interview a	nd select anot	her household.	
Are you the primary cook for your household?	□ Yes	□ No	
(Primary cook is the family member who does most of the cooking, including cooking food, making tea/coffee and boiling drinking water)			
If answer above is "No", say thanks to HHs, stop the interview and select another household.			
Do you have any other improved cookstove that are part of any other carbon program?	□ Yes	□ No	
If answer above is "Yes", say thanks to HHs, stop the interview and select another household.			

2	Pre- Qualification Assessment				
A	Is project location within the Programme Boundary?	□Yes □No			
	If 'Yes' Proceed to B 'else' terminate the survey.				
В	Baseline Cooking Technology	Inefficient Charcoal			
	(Please tick one or more fields as applicable)	Traditional Wood (Three stone)			
		Intermediate Charcoal Stove			
		Intermediate Wood stove \Box			
		Inefficient LPG			
		Others			
	Note: Households which already have access to electric cooking technology such as electric pressure cookers, in duction stoves, electric rice cookers, etc are not eligible to be distributed.				
	Baseline Fuel Type	Wood 🗆			
	(Please tick one or more fields as applicable)	Charcoal 🗆			
		LPG 🗆			
		Others			
С	Do you have electricity connection in your household?	□ Yes □ No			

	How many hours in a day you get electricity?	hours
D	Applicable to the households with one of the following condi- tions:	
D.1	Is your family's income entirely dependent on you?	□ Yes □ No
	Beneficiary household income during the year of Electric Cooking Device purchase	
D.2	Beneficiary comes under any of these demographic catego- ries	Widowed Image: Description Single Mother Image: Description
		Family with working female member \Box
		Difficulty in performing activity
	<i>Note: Difficulty in performing activity include:</i> Difficulty Walking or Climbing Stairs/ Difficulty in Remembering or Con in Communicating. A per Ghana 2021 Population & Housing	in Seeing/ Difficulty in Hearing/ Difficulty in centrating/ Difficulty with Self-care/ Difficulty Vol 3F
D.3	Beneficiary belongs to any of these community services re-	Front-Line Health Worker
		Sanitation Worker □
		School Teachers D
		Police
		Fire and Forest Service □
		Agriculture
E	How many family members in each age group do you usually cook for?	Gender/Age Count
	(Permanent members in the family)	Children 0-14 years
		Female 15 and above
		Men between 15 -59 years
		Ivien above 59 years

1	Database Information (this section must be filled before the survey, using information from master database)		
1.1	Name of End User in the database		
1.2	Address of the End User in the database		
1.3	Region		
1.4	District		
1.5	Division/County		

1.6	Parish/Sub-County	
1.7	Village /Zone	
1.8	Contact Details (if Available)	
1.9	EPC Model in database	
1.10	EPC serial number in database	
1.11	Date of distribution/Installation	

3	General Information (to be filled at the time of survey)			
3.1	Date of Survey	DD	MM	YYYY
3.2	Name of Surveyor			
3.3.1	Respondent's First Name (Primary user)			
3.3.2	Respondent's Last Name			
3.4	How do you identify your gender?	□ Male		
		□ Female		
		□ Prefer n	ot to disclose	
		□ Other…		
3.5	Occupation of the Respondent			
3.6	Respondent's Phone Number			
3.6.1	Income range for your household per month?			
37	Is the User / Respondent same as the End User men-			
5.7	tioned in the master database			
	It it is "No" move to 3.7.1, otherwise jump to 3.8			
3.7.1	Record the Respondent's relationship with the end	□ Spouse		
	user mentioned in database	□ Sibling		
		□ Close R	elative (Aunt,	Uncle, Cousin, etc)
		□ Parent/0	Grand Parents	s/In-Laws
		□ Adult Ch	nild	
3.8	Is the User / respondent's address same as that men-	□ Yes	C] No
	If it is "Yes" move to 3.8.1, otherwise jump to 3.8.2			

3.8.1	GPS co-ordinates		
	Jump to 3.9 from here	I	
3.8.2	Region		
3.8.3	District		
3.8.4	Division/County		
3.8.5	Parish/Sub-County		
3.8.6	Village /Zone		
3.8.7	GPS co-ordinates		
3.9	Does EPC model match with database?	□ Yes □ N	0
	If it is "No" move to 3.9.1, otherwise jump to 3.10		
3.9.1	Record the EPC model	EPC Model	
3.10	Does EPC serial number match with database?	□ Yes □ N	0
	If it is "No" move to 3.10.1, otherwise jump to 3.11	I	
3.10.1	Record the EPC serial number.	EPC Serial Number	
3.10.2	Have you replaced your EPC as part of the warranty?	🗆 Yes 🗆 N	0
3.11	Is the project EPC (Electric Pressure Cooker or tech- nology) currently being used in your home?	🗆 Yes 🗆 N	0
	If it is "Yes" move to 3.11.1, otherwise move to 3.11.2		
3.11.1	Since when did the end user start using the project	□ Immediate usage	
		□ Using from the next day	
		□ Started using within a we	ek
		□ Other	
3.11.2	What is the reason for not using the EPC?	□ Broken/Damaged	
		□ Gifted to others	
		□ No time for cooking	
		□ Taste of food not good	
		□ Other	
	If the answer is "Broken/Damaged" for 3.11.2, move to 3.11.2.1, otherwise jump to 3.11.3		
3.11.2.1	Have you contacted to register a service request?	🗆 Yes 🗆 N	0
3.11.3	Since how many weeks the EPC is not in use?		
	Say thanks to the HH and stop the interview.		
3.13	How many family members in each age group do you	Gender/Age	Count
	usually cook for? (Permanent members in the family)	Children 0-14 years	
		Female 15 and above	

	Men between 15 -59 years	
	Men above 59 years	

4.	Stove Technology					
4.1	How many stoves are being used for cooking in this house- hold?					
4.2	Stoves	Model/Type	Fuel type		Place of	cooking
		(E.g. Three stone fire, tradi- tional charcoal, Improved Charcoal stove, LPG, Electric, Biogas, etc.,)	(E.g. Charcoal LPG, Kerosen tricity, etc.,)	, Wood, e, Elec-	(In-door, Open)	Semi-open,
4.2.1	Stove 1 (Project Stove)	EPC	Electricity			
4.2.2	Stove 2					
4.2.3	Stove 3					
4.2.4	Stove 4					
4.2.5	Stove 5					
	Continue to 4.3 if fuel typ	pe is "wood" or "Charcoal" in 4	2.2 to 4.2.5, oth	herwise ji	ump to 5.1	•
4.3	Method to acquire cooking	j fuel	□ Collecting			
			Purchasing			
			□ Both			
4.4	Frequency of acquiring co	oking fuel		Daily	Weekly	Monthly
			Secondary Stove			
			Stove 3			
			Stove 4			
			Stove 5			

5	Stove Usage		
5.1	Is the project stove (EPC) in good condition?	□ Yes	□ No
	Physically check for damages, wear and tear, inside coo	ker, lid and display p	anel. Also, take pho-
	tographs of the project stove, cooking area, other stoves	present.	
5.2	Is the EPC power on and display control panel working	□ Yes	□ No
	propeny?	Notes	
5.3	Are you using the EPC daily?	□ Yes	□ No

5.4	Is there power out regularly?	□ Yes □ No
	If it is "Yes" move to 5.4.1, otherwise jump to 5.5	
5.4.1	How many hours (during cooking or heating event) per day is the power outage?	
5.4.2	How do you cook during power outage?	□ Baseline Stove
		Improved Cookstove
		□ Any other (specify)
5.5	How many meals you cook in a day on your project stove (EPC)?	
	(Consider only full cooking event (like breakfast, lunch, din- ner, etc.). Do not count boiling liquid (boiling water, milk, tea, etc.), making light snacks or reheating cooked food.)	
5.6	How many days in a week do you cook on your project stove?	
5.7	How many hours you spend on cooking a meal on your pro- ject stove?	
5.8	Is the baseline stove still present?	□ Yes □ No
	If it is "Yes" move to 4.8.1, otherwise jump to 4.8.4	
5.8.1	Are you still using the baseline stove?	□ Yes □ No
	If it is "Yes" move to 4.8.2, otherwise jump to 4.8.4	
5.8.2	How many meals you cook in a day on your baseline stove?	
	(Consider only full cooking event (like breakfast, lunch, din- ner, etc.). Do not count boiling liquid (boiling water, milk, tea, etc.), making light snacks or reheating cooked food.)	
5.8.3	How many days in a week do you cook on your baseline stove?	
	Jump to 5.9 from here	
5.8.4	If it is "No", what is the status of that stove?	Dismantled/broken
		□ Given to UpEnergy for extended warranty
		□ Gave to others
		□ Kept at home, not in use
		□ Other (Specify)
5.9	Is there any difference in cooking in dry and wet season?	□ Yes □ No
	If it is "Yes", move to 5.9.1, Otherwise jump to 5.10	
5.9.1	If yes, specify number of meals prepared in wet and dry sea-	Dry season
	Son in a day?	Wet season
5.10	Do/Did you have/had any other clean energy products (like Cookstove, Water purifier, etc.,) distributed by UpE other	□ Yes □ No

	than EPC?		
	If the answer is "Yes" then move to 5.10.1, otherwise jur	np to 5.11	
5.10.1	What is the serial number of the product?		
5.11	Have you received any training or training materials (e.g., leaflets) on how to use your project stove (EPC) properly? (Consider training on how to use the stove, precautions to be taken while using the stove, etc.)	□ Yes	□ No
5.12	Is there a warranty supplied with your project stove (EPC)?	□ Yes	□ No
5.13	Were you using the baseline stove for space heating?	□ Yes	□ No
	If it is "Yes", move to 5.13.1, Otherwise jump to 6.1		
5.13.1	What heating facility are you using now?	□ None	
		□ Baseline stove	
		□ ICS stove	
		□ Other	

6	SDG Contributions and Impact		
6.1	Do you see reduction in fuel consumed after purchasing EPC?	□ Yes	□ No
6.2	Do you save money using project stove compared to the base- line usage?	□ Yes	□ No
	If the answer is "Yes" move to 6.2.1, otherwise jump to 6.3		
6.2.1	How much is the money saving per month on fuel purchase?	Amount	
6.3	What is the average cost of electricity per kWh?	(Amount in local currency)	
6.4	Are there children below 5 years in the HH?	□ Yes	□ No
6.5	Have you encountered any respiratory or other illnesses asso- ciated with smoke while using a traditional stove?	□ Yes	□ No
6.6	Do you feel there is a reduction in smoke when using EPC compared to that traditional stove?	□ Yes	□ No
6.7	Do you see a reduction in time taken for cooking when com-		
		□ Yes	□ No
	If the answer is "Yes" move to 6.8, otherwise jump to 7.1		
6.8	How much time on an average do you save on cooking a meal in EPC as compared to that of traditional stove?	hrs	s/meal

7	KPT selection and CCT Testing		
7.1	Has the household selected for Kitchen performance test?	□ Yes	□ No
	If it is "Yes" then jump to Section 6.3, otherwise move to 6.2		
7.2	Has the stove selected for CCT Testing	□ Yes	□ No
7.2.1		Model	

	If "yes" record the model and serial number of replacement Serial Number stove (EPC) provided to user		
7.3	Note: Please capture photographs of:		
	EPC with serial number visible		
	CCT replacement stove with serial number visible (if applicable)		
	Cooking area/Kitchen		
	Baseline stove and Other Stoves (if any)		
	Fuel storage area (Charcoal or wood) (if applicable)		
	Photograph of Receipts		
	Photograph of Surveyor with End User		

End of Survey

Thank you very much for your time today. We might need to contact you again in the future to confirm your answers or find out some more details. Would it be ok if we contact you by phone?

□ No

Please note down a second phone number if available

Annexure 2: Mitigation Activity Summary (MAS)

template version 1.2

1. Overview

	Reference to MADD (chapter, page, paragraph)	Comments from the compensation office.	
1.1. Country of Activity	Section 1.1	Ghana	
1.2. Title of Activity	Section 1.1	Building Pathways to Electric Cooking (BPTEC) in Ghana	
1.3. Version and date of this Miti- gation Activity Summary (MAS)	MAS_ECD_Ghana_5047_Up- Energy_ v1.0	06.01.2025	
1.4. Version and date of the cor- responding MADD	MADD_ECD_Ghana_UpEn- ergy_v2.1 _clean	06.01.2025	
1.5. Version and date of the vali- dation report		V3 09.01.2025	
1.6. Project Number as stated in Swiss Feedback on MAIN or Swiss Letter of Intent (if avail- able)		5047	
1.7. Project Type		The proposed mitigation is a programme and not a project	
1.8. Eligibility criteria for projects in the program	Section 1.2.6	The eligibility criteria for component project activities i.e., individual Project ECD within the programme is specified in section 1.2.6 of MADD.	
1.9. Summary		The proposed mitigation activity over its lifetime aims to build transition pathways to Electrical Cooking De- vices (Electric Pressure Cooker (EPC) and Induction Stoves (EIS), collectively represented as ECD) in Ghana.	
		The activity is a large-scale Mitigation Activity (MA). It will be developed and operated by UpEnergy Ghana 1, represented by UpEnergy Group PCC through its local subsidiary in Ghana (UpEnergy Ghana Limited).	
		Under the MA, UpEnergy plans to distribute XXX,XXX Electric cooking de-vices units over 3 years (2024- 2026). The Electric Cooking Device will be distributed at a heavily subsidized rate, alleviating the financial burden for households.	
		The goal of this program in coal & LPG fuel consump tributing and using the end nology i.e., Electric Press Electric Induction Stoves contributes to reducing gu provides a healthy environ sustainable development stove usage pattern accu use additional digital moni tric cooking devices. The p ute high-quality Electric of ians.	is to reduce firewood, char- bition of households by dis- ergy- efficient cooking tech- ssure Cookers (EPC) and (EIS), thus the programme reenhouse gas (GHG) and ment and contributes to the of Ghana. To capture the urately, UpEnergy plans to toring in a share of the elec- bro-gramme aims to distrib- cooking devices to Ghana-
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		The planned mitigation ac under CDM/or any volunta designed based on the G "Methodology for metere cooking device v.1.2", wi pling/Procedures.	tivity is new (not registered ory standards) and has been old Standard methodology ad and measured energy th relevant rules for Sam-
		Currently, the programme The relevant documents in Validation Report is share to Compensation Office, Market Office, EPA, Ghan	is under Validation Stage. Including the MADD and the ed along with the MAS form FOEN, Swiss and Carbon a.
1.10. Expected emission reduc-		The MADD should contain the	following information:
tions (ER) per year and over project duration (in t		Year	Expected ER (t CO ₂ eq)
CO ₂ eq)		2025	XX,XXX
		2026	XXX,XXX
		2027	XXX,XXX
		2028	<i>XXX,XXX</i>
		2029	XXX,XXX
		2030	XXX,XXX
		Total (until 2030)	<i>x,xxx,xxx</i>
		Total (entire project duration)	<i>X,XXX,XXX</i>
1.11. Applicant		UpEnergy Ghana 1, repre	sented by UpEnergy
		Group PCC	
		ANANTHA KARTHIK RAJ	IAGOPALAN
		c/o ChiLin Global Fiducia NeXTeracom Tower III, Ebene, Mauritius	ary Services Ltd, Level 8, Rue Du Savoir, Cybercity,
		Email: anantha@UpEnerg	gynergygroup.com
		Mobile: +91 9884273950	(India)
1.12. Contact person (if applica- ble)		NA	
1.13.Start date of implementation	Section 2.2	01.02.2025	

1.14.Duration of 1st crediting pe- riod	Section 2.2	01.02.2025 – 31.12.2030
1.15. Duration of activity (years)	Section 2.2	5 years 11 months

2. Aims of the project/program

This section presents the most important information required to place the planned activity in a broader context and the existing (inter)national frameworks.

	Reference to MADD	Comments from the compensation office.
2.1 Current state		The activity has completed validation and documents for bilateral au- thorization viz., Validated MADD and Validation Report are being sub- mitted to Compensation Office, FOEN, Swiss and Carbon Market Of- fice, EPA, Ghana.
2.2 Aims	Section 1.2.1	The goal of this program is to reduce firewood, charcoal & LPG fuel consumption of households by distributing and using the energy- efficient cooking technology i.e., Electric Pressure Cookers (EPC) and Electric Induction Stoves (EIS), thus the programme contributes to reducing greenhouse gas (GHG) and provides a healthy environment and contributes to the sustainable development of Ghana.
		Around XXX,XXX operational Electric Pressure Cookers (EPC) and Electric Induction Stoves (EIS) ³⁴ will be provided and installed in Ghanaian households through this initiative. The programme will source high quality Powerup Electrical cooking devices to the local community. Up- Energy Ghana Limited will oversee local engagement efforts, including various on-site activities such as capacity building, distribution, and post-purchase service.
		Through the implementation of the mitigation activity, it is expected that significant reduction in greenhouse gas (GHG) emissions will be enabled. Residential users with improved cooking technologies will reap the benefits of using electric cooking devices by the implementation of this mitigation activity. This will not only stop Ghana's rapidly increasing deforestation (the country lost 118 kha of natural forest in 2022, which is equal to 78.0 Mt of CO ₂ e emissions ³⁵) but it will also lessen the risk of indoor smoke pollution to human health, free up more time for women and children to spend cooking and buying fuel. The end users will be made aware in advance that using electrical cooking appliances produces carbon financing, which is then utilized to recover programme implementation expenses and subsidize the price
		The distribution of ECD in this mitigation activity will significantly reduce fuel consumption, resulting in an improved living environment for recip- ients, and reduced pressure on local forests. By reducing fuel con- sumption, CO_2 emissions from combustion of non-renewable biomass will be correspondingly reduced. The MA will yield a wide range of sus- tainability benefits that will provide beneficiaries with economic, social and environmental improvements.

³⁴ UpEnergy intends to distribute one project stove (either EPC or EIS) per family based on the current Ghanian family size and requirement

³⁵ https://www.globalforestwatch.org/dashboards/country/GHA/?category=undefined (last accessed on 21/02/2023) MADD Template V11

2.3 Reference scenario / baseline	Section 2.1 & Section 2.6	The target population for this activity are the Ghanaian households that use traditional / inefficient stoves (woodfuel, charcol and LPG) across the pre-defined programme regions. Therefore, it is assumed that in the absence of the Mitigation Activity, the baseline scenario would be the traditional cooking technologies with use of biomass-based char- coal for meeting similar thermal energy needs. The alternative refer- ence scenario for the MA would be implementation of the programme without support of carbon revenue. However, the investment compari- sons analysis has proved that the programme is economically not fea- sible without support of carbon finance as demonstrated in section 2.6 of MADD. Hence the expected reference development would be con- tinued use of traditional cooking technologies with use of non-renewa- ble biomass-based charcoal, woodfuel and LPG for meeting similar thermal energy needs. This reference scenario is also the most eco- nomically attractive alternative (in terms of capital investment) corre- sponding at least to the state of the art on the technology front.
2.4 I echnology, state-of-the-art and common practice	Section 1.2.1 & Section 2.6	The project will implement PowerUp's EPC which revolutionizes the cooking experience, blending efficiency with sophisticated technology. This electric pressure cooker is fitted with a 6.0-liter capacity aluminium non-stick pot which accommodates meals for families up to five family members (approximately 2 kgs) with ease. The cooker is built to last, with a robust stainless-steel enclosure and a lifespan of 5-7 years.
		The cooker also features a built-in energy meter and usage-data stor- age accessible via USB A, along with being PAYGO-ready for ease of payment. The user interface is intuitively designed, displaying kWh us- age on a custom LCD screen and offering multiple cooking presets (Beans, Rice, Potatoes, Meat) alongside versatile functions like frying, slow cooking, boiling water, and a delayed-start for up to 24 hours. The product may also set to become IOT enabled in future iterations, allow- ing for live remote monitoring. Safety is prioritized in the EPC's design, incorporating features like the button-triggered pressure release, lid de- tection function, an insulated body, locking pin, and advanced safety components like the thermal fuse and pressure sensor which ensure a safe cooking environment.
		The Electric cooking device ³⁶ features a greater thermal performance, more fuel savings, a longer lifespan, a higher safety rating, an aspira- tional design, and a lighter structure.
		Further, the project will also include the implementation of UpEnergy Induction Cooktop is a portable single burner system designed to fit pot diameters of up to 26cm, it will feature a minimum efficiency of $xx\%$, and a lifespan of $x - x$ years.
		The unit offers adjustable cooking power and temperature levels, al- lowing for versatile culinary applications. It incorporates essential safety features, including a child lock, auto shut-off, and overheating protection, alongside cool to touch surfaces to mitigate the risk of burns, making it a safe choice for households.
		Functionalities for convenience, such as a manual timer, keep warm function, and delayed start. It also includes pre-set cooking modes for simplified meal preparation (yam porridge, jollof rice, chapati, etc.), pan detection, and backlit controls for easy operation. An expanded cook- ing guide detailing advisable settings for common meals aids adoption.
		Constructed with a plastic shell and a hardened glass burner surface, the cooktop is designed for both durability and ease of cooking.

³⁶ UpEnergynergy shall introduce few other electric cooking device models with the similar performance / efficiency level during the course of project implementation. MADD Template V11

	Enhancing its functionality, the cooktop will feature built-in usage data storage, accessible via USB A, enabling users to monitor and manage their cooking habits effectively. Furthermore, it is set to incorporate IoT capabilities, allowing for live remote monitoring.
 2.5 Analysis of potential social and environmental impacts (<i>Art.</i> 5.1.b.5, CO₂-O; <i>Art.</i> 6.2, PA) 	No negative environmental impacts have been identified from this Mit- igation Activity, which is also confirmed through the blind assessment and stakeholder feedback forms collected during the Local Stakeholder Consultation (LSC). The programme has a positive environmental and social impact by its contribution towards SDG 1,5,7,8, 13 & 15 as tab- ulated in section 2.4.2 of MADD.
	Additionally, the programme aims to benefit the socio economically un- der privileged section of Ghanaian population such as low-income households, widowed, single mother, family with working female mem- ber or members with Difficulty in Performing Activities, Senior Citizens, also beneficiary belonging to any of the community services related occupation such as Front-Line Health Worker, Sanitation Worker, School Teachers, Police, Fire and Forest Service, Agriculture, etc.

3. Quantification of emission reductions and carbon storage

This section contains the monitoring concept (ex-post calculation). It has to fully explain which methodology is utilized to calculate emission reductions or carbon storage and what monitoring concepts are envisioned to ensure accurate and precise determination of emission reduction and carbon storage during the activity duration. Errors in the calculation may result in overestimation of emission reductions and carbon storage, rendering the activity potentially incompatible for compensation projects. Generally, conservativeness and accuracy of available measurements should be discussed thoroughly. The more precise measurement methods are available and implementable, the less conservative the assumptions need to be, and vice versa: in case accurate and precise measurements are not fully implementable conservative adjustment factors should be included.

		Reference to MADD	Comments from the compensation office.
3.1 <i>Ex-post</i> calcula- tion of emission reductions	3.2 Mandatory spread sheet attached to the MADD	Ghana 5047 BPTEC_Ex- ante ITMOs v.2	Ex-ante ER calculation sheet is attached along with the MADD.
	3.3 Improvements of known methodolo- gies	Section 2.5.1	The programme refers the emission reduction calcula- tion from the Gold Standard methodology "Methodology for metered and measured energy cooking device v.1.2", with relevant rules for Sampling/Procedures, Method 1 under section 3.10.1 for the calculation of the Internationally Transferred Mitigation Outcomes (ITMOs).
			In accordance with the Ghana CMO's finding (FAR 12), UpEnergy (UpEnergy) has considered the ITMOs calcu- lation from a xxxxx x xxxx xxxx and fuel per- spective. With the xxxx xxxx approach, UpEnergy xxxxxxxxxxxxxxxxxx (to the disposal hub and emission from the xxxxx (though the ECD will be subjected to recycling) and xxxxx xxxx x x x x saved by the MA, into the revised ITMO calculation. Up- Energy has considered this approach since including xxxxx emissions provides a more accurate picture of the total environmental impact of cookstove projects.

	3 1 Leakage	0 11	
	3.4 Leanaye	Section 2.5.2	The adopted methodology provides the following two options for calculating the leakage associated with the mitigation outcomes:
			Option 1: Apply a default adjustment factor of 0.95 to the emission reductions to approximate leakage emissions. In this case, the term " $-\Sigma LEp, y$ " in equations 1 changes to "* 95%".
			Option 2: Allows PD to do an assessment during the pro- ject monitoring to identify and quantify the potential sources of emission leakage. The leakage assessment detailed in 2.5.2 clearly demonstrates the possibilities of leakages from various potential sources are very un- likely and almost nil in the project scenario. Neverthe- less, the UpEnergy will apply an adjustment factor of 0.95 to the mitigation outcome to account for the leak- age, to have a conservative approach.
	3.5 Conservativeness	Section 2.5.4	The conservativeness approach adopted in the mitiga- tion activity is described in section in 2.5.2 in a detailed manner.
	3.6 Overestimation	Section 2.5	The strategies adopted by UpEnergy to avoid overesti- mation of emission reduction are as follows,
			1. Application of 0.95 fraction to account for leakage even though the possibilities of leakages from various potential sources are very unlikely and almost nil in the project scenario.
			2. Use the lower and upper bound value for estimation of fuel consumption in baseline and project scenario respectively instead of mean value even if KPT test results meet the xx%/x% reliability criteria.
			3. Deduction of end of life cycle emissions associated to stove manufacturing, transportation from the realized emission reduction.
	3.7 Permanence		NA
	3.8 Additional infor- mation to the spread sheet		NA.
3.9 <i>Ex-ante</i> calculation (only if ex-ante and fer)	of emission reductions ex-post calculations dif-		NA

4. Additionality (Art. 5.1.b.1, 5.1.b.4, CO₂-O)

This section should provide a concise overview of the different dimensions of additionality, i.e. financial additionality (the activity would not be economically viable without carbon revenue) and regulatory additionality (the activity would not occur based on the national, sector-specific targets and/or development programs).

		Reference to MADD	Comments from the compensation office.
4.1 Financial additionality		Section 2.6	UpEnergy has adopted the option of investment comparison analysis to demonstrate the financial additionality in accord- ance to the "Offsetting CO2 emissions: Projects and Pro- grammes - A communication of the FOEN in its capacity as enforcement authority of the CO2 Ordinance. Status as of 2024". As per the analysis, IRR is negative (N/A) when there is no revenue inflow from ITMOs and on the other hand with the aid of carbon revenue the IRR works out to be positive.
			The carbon revenue generated from the ITMOs will be used for (a) local technical capacity building; (b) build-out of a large-scale, last-mile distribution network, including CRM tool build-out and training of distribution agents; and (c) set-up of live data monitoring platform to enable digital MRV of ECD usage, experiment design, and intervention planning.
4.2 Regulatory	4.2.1. Nationally Determined Contribu- tions (NDC) (<i>Art. 6.4, PA</i>)	Section 2.1.2	The updated NDC 2021 under the Paris Agreement (2020 - 2030) has listed a conditional mitigation measure, which aims to expand the adoption of market based cleaner cooking solutions. The mitigation activity aims to distribute minimum of XXX,XXX ECD units. Additionally, this initiative is expected to generate approximately is jobs (direct & indirect), thereby contributing to the local economic development. Although the NDC of Ghana lists the adoption of clean cooking as a conditional mitigation measure, it depends on market-based mechanisms and international climate finance support to achieve its NDC goal. The NDC clearly mentions the activities can be adopted contingent to international finance, technology transfer and capacity building. There is no specific target related to the distribution/promotion of efficient cookstoves in the NDC. There is no obligation to distribute such cookstoves, hence the proposed mitigation activity meant to be a regulatory surplus.
Additionality	4.2.2. Assessment of relevant laws in the host country.	Section 2.1.2	Ghana's framework on international carbon markets & non- market approaches: Ghana has created a whitelist and has approved the mitigation activities within the whitelist of the framework as "automatically additional" to Ghana's NDC baseline and does not need to demonstrate technical and fi- nancial additionality. Sustainable cooking which consists of efficient technologies such as Improved Biomass stoves is listed in the first whitelist for 2022 to 2025. Hence, the pro- posed mitigation activity is additional and regulatory surplus. National Energy Policy 2021, Ministry of Ghana: As per the policy, it has a target is to distribute about 3 million Improved Cookstoves by 2030. The NEP 2021 mentions an ambitious target to distribute about 3 million improved cookstoves by 2030, however this target is not enforced by any law, so there is no obligation to distribute improve cookstoves in Ghana. Hence the proposed mitigation activity is deemed to be regu- latory surplus.

4.2.3. Sustainable Development Goals (SDG) (<i>Art. 5.1.b.5,</i> <i>CO</i> ₂ - <i>O; Art. 6.2, PA</i>)	Section 2.4.2	The mitigation activity plans to achieve SDGs such as SDG 1, SDG 5, SDG 7, SDG 8, SDG 13, and SDG 15. The Section 2.4.2 of MADD quantifies the expected impact of the SDGs along with their monitoring plan.
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5. Other Claims

This section explains that the claims of the mitigation activity are not used otherwise. Therefore, potentially overlapping claims have to be addressed.

	Reference to MADD	Comments from the compensation office.
5.1 Double-Counting	Section 1.2.4.VII & 2.3.1, 2.3.2 & 2.3.3	This mitigation activity has only a single source of carbon rev- enue from selling of ITMOs to KliK Foundation or any other potential buyer. UpEnergy duly declares that this mitigation activity is not part of any emissions trading program or any other mechanism that includes GHG allowance trading. The programme has not sought or will receive any governmental support and any another form of GHG-related environmental credit.
		Each ECD disseminated through this activity shall have a unique identifier number that is attached to each end user to ensure that double-counting does not occur. For each unit dis- tributed, the transfer of the ITMO Rights from the end user to the UpEnergy is done through a voluntary and irrevocable agreement in the form of warranty card signed by the end user (cookstove user) conferring project ownership to the activity proponent. UpEnergy has several mechanisms in place to en- sure there is no double counting. At the point of distribution, distribution receipts are signed by the customers having a declaration that they are not part of any other programme. Customers are made aware about this clause before they sign the receipts. During the project implementation period, if it has been found that any of the end user is part of other mitigation activity, that particular end user will not be considered in the ITMO calculation and will not be part of any of the mitigation activity's ex-post surveys.
5.2 Double-Issuance	Section 2.3	To prevent the double counting of emission reductions by the key stakeholders involved in this programme viz., ECD man- ufacturer and end users, the carbon waiver agreements will be signed. This will prevent the other involved parties to claim the carbon credits generated by this Mitigation Activity. The carbon waiver agreements will be shared with VV during vali- dation & verification. UpEnergy duly declares that this mitigation activity is not part
		of any emissions trading program or any other mechanism that includes GHG allowance trading. The programme has not sought or will receive any governmental support and any an- other form of GHG related environmental credit.
		The resulted ITMOs solely belongs to UpEnergy Ghana 1, represented by UpEnergy Group PCC and will be sold to Switzer-land through KliK Foundation or any other potential

		buyer, hence there will not be any attribution of the mitigation out-comes.
5.3 Interfaces to other compensation projects, national funding or other funding sources	Section 2.3.1, 2.3.2 & 2.3.3	This programme does not have any interactions with any other similar compensation projects since it focusses on the dedicated project regions and specific socio-economically backward Ghanaian population. This mitigation activity has only a single source of carbon revenue from selling of ITMOs to KliK foundation or any other potential buyer.

6. Signatures for publication of the documents

On behalf of all persons concerned, the applicant agrees to the publication of the following documents on the mitigation activity ("compensation project") on the website of the Swiss Federal Office for the Environment FOEN:

Consent to publication (please check what applies)
I agree to the publication of this document (this MAS and the associated MADD version and date as stated under 1.4). The document contains neither my own business or manufacturing secrets nor those of third parties. I confirm that I have contacted the third parties concerned and that, from their point of view, no trade or manu- facturing secrets are contained in this document. I agree that my contact details may be published.
☑ I agree to the publication of a partially redacted version of the MADD, which protects the business or manufac- turing secrecy of all persons concerned. I confirm that I have contacted the third parties concerned and have made the redactions with their consent. The third parties concerned agree to the publication of the partially redacted version. This version intended for publication will be submitted with the application documents.
Validation report document
Consent to publication (please check what applies)
□ I agree to the publication of the validation report (version and date as stated under 1.5). The document contains neither my own business or manufacturing secrets nor those of third parties. I confirm that I have contacted the third parties concerned and that, from their point of view, no trade or manufacturing secrets are contained in this document.
☑ I agree to the publication of a partially redacted version of the validation report that protects the business or manufacturing confidentiality of all persons concerned. I confirm that I have contacted the third parties con- cerned and have made the redactions with their consent. The third parties concerned agree to the publication of the partially redacted version. This version intended for publication will be submitted with the application documents.

Location, Date	Chennai, India – 06.01.2025	
Name	Anantha Karthik Rajagopalan	
Signature	R. Ananth?	

7. Legal framework

The legislative framework for international CO₂-compensation activities is mainly defined through the following documents; The Swiss CO_2 -Law³⁷, CO_2 -Ordinance (CO_2 -O)³⁸, Paris Agreement (PA)³⁹ and the respective bilateral agreement⁴⁰ between Switzerland and the country, in which the activity is taking place. More information can also be found in the communication published by the compensation office of the Swiss Federal Office for the Environment (FOEN) on *Offsetting CO₂ emissions: projects and programmes (admin.ch)*

8. Checklist for a complete application

 Document	Electronic submission to carbonoff- set@bafu.admin.ch	By Post ⁴¹
This MAS (latest version and duly signed as part of the MADD- Document)	X	
MADD (latest version as stated under 1.4 and duly signed)	Х	Х
Other annexes of MADD (including at least a spread sheet following the template from the compensation offices guideline, Annex M 42)	x	
Validation report based on the MADD with the version and date as stated under 1.4 and signed by the Validator	X	
Project or program authorization granted by the partner country, duly signed (can be sent to the compensation office after other documents have been sent, but it is required for Switzerland to grant authorization)	x	

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³⁷ SR 641.71 - Federal Act of 23 December 2011 on the Reduction of CO₂ Emissions (CO₂ Act) (admin.ch)

³⁸ SR 641.711 - Ordinance of 30 November 2012 on the Reduction of CO₂ Emissions (CO₂ Ordinance) (admin.ch)

³⁹ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

⁴⁰ www.bafu.admin.ch/bilateral-climate-agreements

⁴¹ Address: Federal office for the environment FOEN, Compensation office, Sector climate, 3003 Bern, Switzerland ⁴² www.bafu.admin.ch/uv-1315-e