



VCS PROJECT DESCRIPTION TEMPLATE

This template is for the design of projects using the VCS Program.

Instructions for Completing the Project Description

TITLE PAGE: Complete all items in the box on the title page using Arial or Century Gothic 10.5 point, black, regular (non-italic) font. This box must appear on the title page of the final document. Project descriptions may also feature the project title and preparers' name, logo and contact information more prominently on the title page, using the format below (Arial or Century Gothic 24 point and Arial or Century Gothic 12 point, black, regular font).

PROJECT DESCRIPTION: Instructions for completing the project description template are under the section headings in this template. Adhere to all instructions, as set out in the *VCS Standard*. Instructions relate back to the rules and requirements set out in the *VCS Standard* and accompanying VCS Program documents. The preparer will need to refer to these documents in order to complete the template.

Note: The instructions in this template are to serve as a guide and do not necessarily represent an exhaustive list of the information the preparer must provide under each section of the template.

Unless applying a merited deviation, please complete all sections using Arial or Franklin Gothic Book 10.5 point, black, regular (non-italic) font. Where a section is not applicable, explain why the section is not applicable (i.e., do not delete the section from the final document and do not only write "not applicable"). Submit the project description as a non-editable PDF.

Delete all instructions, including this introductory text, from the final document.



Biochar-Producing Cookstoves and Biomass Briquettes

as

Affordable, Reliable, and Sustainable Clean Cooking Alternatives in Uganda



Document Prepared by Mandulis Energy Limited

Contact Information (optional)

Project Title	Biochar-Producing Cookstoves and Biomass Briquettes as Affordable, Reliable and Productive Clean Cooking Alternatives in Uganda
Version	01
Date of Issue	TBD
Prepared By	Mandulis Energy Limited
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CONTENTS

1	PROJECT DETAILS	5
1.1	Summary Description of the Project	5
1.2	Sectoral Scope and Project Type	5
1.3	Project Eligibility	5
1.4	Project Design	6
1.5	Project Proponent	6
1.6	Other Entities Involved in the Project	6
1.7	Ownership	7
1.8	Project Start Date	7
1.9	Project Crediting Period	7
1.10	Project Scale and Estimated GHG Emission Reductions or Removals	7
1.11	Description of the Project Activity	8
1.12	Project Location	9
1.13	Conditions Prior to Project Initiation	9
1.14	Compliance with Laws, Statutes and Other Regulatory Frameworks	9
1.15	Participation under Other GHG Programs	9
1.16	Other Forms of Credit	10
1.17	Sustainable Development Contributions	12
1.18	Additional Information Relevant to the Project	12
2	SAFEGUARDS	13
2.1	No Net Harm	13
2.2	Local Stakeholder Consultation	13
2.3	Environmental Impact	13
2.4	Public Comments	13
2.5	AFOLU-Specific Safeguards	13
3	APPLICATION OF METHODOLOGY	14
3.1	Title and Reference of Methodology	14

3.2	Applicability of Methodology	14
3.3	Project Boundary	14
3.4	Baseline Scenario	15
3.5	Additionality	15
3.6	Methodology Deviations	16
4	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	16
4.1	Baseline Emissions	16
4.2	Project Emissions	16
4.3	Leakage	17
4.4	Net GHG Emission Reductions and Removals	17
5	MONITORING	18
5.1	Data and Parameters Available at Validation	18
5.2	Data and Parameters Monitored	18
5.3	Monitoring Plan	19
APPENDIX		21

1 PROJECT DETAILS

1.1 Summary Description of the Project

Mandulis Energy is a clean-tech start-up and social enterprise focused on developing and deploying new technologies and approaches to deliver energy that is affordable, reliable, sustainable, and capable of driving economic development, alongside with agricultural value addition services, in urban and rural communities, contributing to poverty alleviation and climate change mitigation.

Mandulis Energy supplies clean cooking solutions in order to mitigate climate change and alleviate poverty. Our non-carbonised clean briquettes are a replacement for firewood and charcoal leading to the reduction of deforestation, but also are made out of agricultural residues bought from farmers generating a new revenue stream. The availability of affordable alternative fuel 1) unlocks time for productive and educative purposes, preventing women and girls for fetching firewood (estimated 3h/day); 2) generate savings, since briquettes last double than charcoal for the same price; 3) protects ecosystems and 4) avoids greenhouse gas emissions through preventing agricultural waste burn, reduction of smoke and reduction of deforestation. Mandulis manufactures biochar-producing gasifier cookstoves and our customers are able to earn as they cook. By using our stoves along with our biomass pellets they are able to sell back biochar to Mandulis or spread it in their gardens as a carbon sequestration soil enhancer.

Mandulis Energy is providing clean cooking alternatives in Northern and Western Uganda as well as the capital, city Kampala, to rural and urban households, businesses and institutions. Mandulis plans to supply through this project 64,000 gasifier cookstoves and 43,000 tonnes of clean cooking briquettes per year reaching 277,900 tons of CO₂ offset per year.

Provide a summary description of the project to enable an understanding of the nature of the project and its implementation, including the following (no more than one page):

- *A summary description of the technologies/measures to be implemented by the project.*
- *The location of the project.*
- *An explanation of how the project is expected to generate GHG emission reductions or removals.*

- A brief description of the scenario existing prior to the implementation of the project.
- An estimate of annual average and total GHG emission reductions and removals.

For projects undergoing crediting period renewal, include the audit history of the project using the table below. For the project validation, state the validation date in the Period column. This table should include all monitoring periods, including the period of this monitoring report.

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	(DD-Month-YY YY-- DD-Month-YY YY)			
	Year...			
Total				

1.2 Sectoral Scope and Project Type

Indicate the sectoral scope(s) applicable to the project, the AFOLU project category and activity type (if applicable), and whether the project is a grouped project.

Sectoral scope:

- 1- Energy (renewable/non-renewable)
- 3- Energy demand
- 13- Waste handling and disposal
- 16- Carbon capture and storage

Project type: Type I Energy, Type II Energy Efficiency Improved Cookstove Project, Type III Others

Grouped Project: Yes

1.3 Project Eligibility

Describe and justify how the project is eligible under the scope of the VCS Program.

As per section 2.1.1 of the VCS Standard, V.4.2, the project implemented by Mandulis Energy is eligible under the scope of the VCS (Verified Carbon Standard) Program:

1. The project is eligible because it generates clean, renewable energy and addresses the reduction of greenhouse gas emissions.
2. The project aims to provide clean briquettes and biochar-producing cookstoves, preventing deforestation, decreasing levels of toxic smoke inhalation during cooking, and avoiding agricultural waste burning.
3. The project activity is supported by methodologies approved by the VCS program and CDM including:
 - VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.0
 - CDM AMS I.I - Biogas/biomass thermal applications for households/small users, v6.0
 - VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, v1.1

Hence, the project is eligible under the scope of the VCS program.

4. Furthermore, it cannot reasonably be assumed that the project generates GHG emissions primarily for the purpose of their subsequent reduction, removal or destruction. All the households involved in this project activity are fully independent from the project proponent.

1.4 Project Design

When completing a draft project description for the purpose of listing on the pipeline as under development, complete the following information; otherwise, delete this text:

☐ *The project includes a single location or installation only*

☐ *The project includes multiple locations or project activity instances, but is not being developed as a grouped project*

☒ *The project is a grouped project*

In all other cases, indicate whether the project has been designed to include a single location or installation only, multiple locations or project activity instances, but is not being developed as a grouped project, or as a grouped project.

This is a grouped project under which different project activity instances will be developed.

Eligibility Criteria

For grouped projects, provide additional information relevant to the design of the grouped project (e.g., the eligibility criteria for the inclusion of new project activity instances).

The inclusion of new project instances related to the clean cooking briquettes and biochar-producing cookstoves shall be documented. The project proponent shall ensure that it meets the eligibility criteria as denoted below.

Number	Criterion	Compliance of new project activity instances
1.	Meet the applicability conditions set out in the methodology applied to the project	New project activities instances (biomass clean cooking briquettes and biochar-producing gasifier cookstoves) will meet the applicability conditions set out in section 3.2 where the target end users are households and the cookstoves which are distributed have at least 37% of thermal efficiency.
2.	Use of technologies or measures specified in the project description	Biomass clean cooking briquettes and biochar-producing gasifier cookstoves will be used in the project
3.	Apply the technologies or measures in the same manner as specified in the project description	Biomass clean cooking briquettes will replace firewood and charcoal use while biochar-producing gasifier cookstoves will replace traditional 3-stone cooking stoves and other inefficient wood-fuel and charcoal cookstoves
4.	Project activities are subject to baseline scenario determined in the project description for the specified project activity and geographic area	The new project activity instances (biomass clean cooking briquettes and biochar-producing gasifier cookstoves) shall be distributed within Uganda and subject to same baseline scenario as determined in section 3.4
5.	Meet the validation and verification requirements for grouped projects	New project activity instances shall be reported in the monitoring report against the applicable set of eligibility criteria. Rigorous monitoring and tracking of all emission reductions from new instances will eliminate double counting
6.	Have characteristics with	Demonstration of additionality shall be based

	respect to additionality that are consistent with the initial instances for the specified project activity and geographic areas	upon the initial project activity instances
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1.5 Project Proponent

Provide contact information for the project proponent(s). Copy and paste the table as needed.

Organization name	Mandulis Energy Limited
Contact person	Peter BenHur Nyeko
Title	CEO
Address	GF, Course View Towers, Yusuf Lule Avenue, Nakasero, P.O.Box 36382, Kampala, Uganda
Telephone	+256702347023
Email	peter@reparle.co.uk

1.6 Other Entities Involved in the Project

Provide contact information and roles/responsibilities for any other entities involved in the development of the project. Copy and paste the table as needed.

Organization name	
Role in the project	
Contact person	
Title	
Address	
Telephone	
Email	

1.7 Ownership

Provide evidence of project ownership, in accordance with the VCS Program specifications on project ownership.

The entitlement of the clean biochar-producing gasifier cookstoves and biomass clean briquettes distributed under this project activity is owned by Mandulis Energy Limited.

1.8 Project Start Date

Indicate, and provide justification for, the project start date, specifying the day, month and year.

Project start date is 01-August-2023

1.9 Project Crediting Period

Indicate the project crediting period, specifying the day, month and year for the start and end dates and the total number of years.

The project crediting period will be ten (10) years – renewable 1 time for a total of 20 years. Starting from the 1st of August, 2023, and ending 31st of July, 2033.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

When completing a draft project description for the purpose of listing on the pipeline as under development, complete the following information; otherwise, delete this text.

The estimated annual GHG emission reductions/removals of the project are:

- ☐ <20,000 tCO₂e/year
- ☐ 20,000 – 100,000 tCO₂e/year
- ☒ 100,001 – 1,000,000 tCO₂e/year
- ☐ >1,000,000 tCO₂e/year

In all other cases, indicate the scale of the project (project or large project) and the estimated annual GHG emission reductions or removals for the project crediting period.

Project Scale	
Project	x
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
August 2023 - December 2023	1,290
2024	34,742
2025	104,255
2026	277,935
2027	277,935
2028	277,935
2029	277,935
2030	277,935
2031	277,935
2032	277,935
2033	277,935
Total estimated ERs	2,363,746
Total number of crediting years	10
Average annual ERs	236,374

1.11 Description of the Project Activity

Describe the project activity or activities (including the technologies or measures employed) and how it/they will achieve net GHG emission reductions or removals.

For non-AFOLU projects:

Include a list and the arrangement of the main manufacturing/production technologies, systems and equipment involved. Include in the description information about the age and average lifetime of the equipment based on manufacturer's specifications and industry standards, and existing and forecast installed capacities, load factors and efficiencies.

Include the types and levels of services (normally in terms of mass or energy flows) provided by the systems and equipment that are being modified and/or installed and

their relation, if any, to other manufacturing/production equipment and systems outside the project boundary. Clearly explain how the same types and levels of services provided by the project would have been provided in the baseline scenario.

Where appropriate, provide a list of facilities, systems and equipment in operation under the existing scenario prior to the implementation of the project.

For AFOLU projects:

For all measures listed, include information on any conservation, management or planting activities, including a description of how the various organizations, communities and other entities are involved.

In the description of the project activity, state if the project is located within a jurisdiction covered by a jurisdictional REDD+ program.

Mandulis Energy's clean cooking project involves two primary activities: the manufacture and distribution of biochar-producing gasifier cookstoves and the production and distribution of biomass clean cooking briquettes. The project aims to reduce greenhouse gas (GHG) emissions and sequester carbon, thereby achieving net GHG reductions.

Manufacture and Distribution of Biochar-Producing Gasifier Cookstoves: Mandulis Energy will produce gasifier cookstoves that burn biomass pellets efficiently and produce biochar as a byproduct. Compared to traditional open fires or inefficient cookstoves, these gasifier cookstoves reduce the amount of biomass needed for cooking, leading to lower GHG emissions. The cookstoves also burn the biomass more cleanly, resulting in fewer emissions of black carbon, a potent short-lived climate pollutant.

Production and Distribution of Biomass Clean Cooking Briquettes: The cooking briquettes will be made from agricultural residues, for example rice husks, groundnut shells, and maize cobs, which are renewable and abundant in Uganda. Using these briquettes for cooking instead of non-renewable biomass (like firewood or charcoal) reduces deforestation and the associated GHG emissions. The process of creating these briquettes also avoids the burning of agricultural waste, which would release GHGs into the atmosphere.

Carbon Sequestration: The biochar produced by the gasifier cookstoves will be used as a soil amendment, sequestering carbon in the soil. This process removes CO₂ from the atmosphere, providing an additional pathway to achieving net GHG reductions.

Overall, the project shall achieve net GHG reductions through a combination of GHG emission reductions (from more efficient and cleaner combustion, and from avoiding deforestation) and carbon sequestration (through the use of biochar as a soil amendment). This integrated approach allows for substantial climate benefits, in addition to delivering other social and environmental benefits, such as improved air quality and soil health.

Furthermore, the project activities align well with the United Nations Sustainable Development Goals, addressing affordable and clean energy (Goal 7), and climate action (Goal 13), among others. This further highlights the broader impact and value of the project beyond GHG emissions reductions.

Number	Technologies / Systems	Equipment	Age and average lifetime of the equipment based on manufacturer's specifications and industry standards	Existing and forecast installed capacities, load factors and efficiencies.
1.	Biomass briquette manufacture	- Crusher - Dryer - Briquette production machines	10 years	Production capacity of 1tonne/ hour Agri-waste used includes groundnut shells, maize cobs, rice husks
2.	Gasifier cookstove production	Gasifier cookstove	5 years	37% thermal efficiency 0.25kg of biochar produced per kg of clean briquette

In the baseline scenario (before project implementation), rural farming communities have relied on more traditional, less efficient, and more environmentally harmful sources of energy, such as open burning of biomass for cooking and heating and use of inefficient cookstove technologies for example the 3-stone cookstoves. The clean cooking products provided by the project are affordable, reliable, sustainable and productive replacements for existing traditional cooking technologies.

1.12 Project Location

Indicate the project location and geographic boundaries (if applicable) including a set of geodetic coordinates. For grouped and AFOLU projects, coordinates may be submitted separately as a KML file.

The project is located in the geographic boundaries of Uganda, specifically in the Northern, Western and Central Region including the capital city, Kampala.

Pamin Olango 2.62949, 31.69915

Got Ngur 2.60191, 31.84013

Kyambura -0.22832, 30.09811

Kampala 0.28344, 32.61656

1.13 Conditions Prior to Project Initiation

Describe the conditions existing prior to project initiation and demonstrate that the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

Where the baseline scenario is the same as the conditions existing prior to the project initiation, there is no need to repeat the description of the scenarios (rather, just state that this is the case and refer the reader to Section 3.4 (Baseline Scenario).

Over 90% of households in Uganda and the sub-Saharan region use firewood and charcoal. The use of these fuels is one of the major driving factors of deforestation and forest degradation in the region, Uganda has lost 63% of its forests over 25 years. This is also exacerbated by poor methods of wood fuel use, such as the use of old traditional and inefficient cookstoves.

The use of these polluting and inefficient cooking solutions leads to GHG and significant health risks particularly for women and children who are normally tasked for firewood fetching and cooking.

The proposed project activity aims to decrease the demand for fossil fuels by providing affordable, reliable and sustainable clean cooking alternatives. These innovative solutions enable the reduction of GHG emissions through the reduction of deforestation, prevention of agricultural waste burnt and decrease of cooking smoke. Consequently, the project activity is implemented to reduce GHG emissions. Refer to section 3.4 for more information on the Baseline Scenario.

For AFOLU projects completing a draft project description for the purpose of listing on the pipeline as under development, complete only the following section; otherwise, delete this text:

- **Ecosystem type:** *Provide a brief (1–2 sentence) description of the ecosystem type.*
- **Current and historical land-use:** *Provide a brief (2–4 sentence) description of the current and historical land use of the project area.*

- **Has the land been cleared of native ecosystems within 10 years of the project start date?**

☐ Yes

☐ No

If yes, explain.

For AFOLU projects in all other cases, include the present and prior environmental conditions of the project area, including as appropriate information on the climate, hydrology, topography, relevant historic conditions, soils, vegetation and ecosystems.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Identify and demonstrate compliance of the project with all and any relevant local, regional and national laws, statutes and regulatory frameworks.

The project activity does not have any regulatory requirements within the republic of Uganda and all activities associated with the project will be undertaken in compliance with local business and social regulations and requirements. A review of relevant laws of Uganda did not highlight any specific concerns or requirements around biochar-producing gasifier cookstoves and biomass clean cooking briquettes or any aspects related to this project activity.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

Indicate whether the project has been registered, or is seeking registration under any other GHG programs. Where the project has been registered under any other GHG program, provide the registration number and details.

The project activity has not been registered and is not seeking for registration under any other GHG emissions program.

1.15.2 Projects Rejected by Other GHG Programs

Indicate whether the project has been rejected by any other GHG programs. Where the project has been rejected, provide the relevant information, including the reason(s) for the rejection and justification of eligibility under the VCS Program.

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

When completing a draft project description for listing on the pipeline as under development, complete the following information; otherwise, delete this text:

Does the project reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading?

☐ Yes

☐ No

If yes, provide the name of the emissions trading program or other mechanism that allows GHG allowance trading.

In all other cases, indicate whether the project reduces GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading, and include details about any such programs or mechanisms. Where applicable, demonstrate that GHG emission reductions and removals generated by the project will not be used for compliance under such programs or mechanisms. Examples of appropriate evidence are provided in the VCS Standard.

The project activity has no components included in any emissions trading program nor any other binding limits

1.16.2 Other Forms of Environmental Credit

When completing a draft project description for the purpose of listing on the pipeline as under development, complete the following information; otherwise, delete this text:

Has the project sought or received another form of GHG-related credit, including renewable energy certificates?

☐ Yes

☒ No

If yes, provide the name of the other program(s) under which the project has sought or received another form of GHG-related credit.

In all other cases, indicate whether the project has sought or received another form of GHG-related environmental credit, including renewable energy certificates. Include all relevant information about the GHG-related environmental credit and the related program.

List all other programs under which the project is eligible to participate (to create another form of GHG-related environmental credit).

The project is not seeking registration in whole or in part under any other form of environmental credit.

Supply Chain (Scope 3) Emissions

A supply chain is a network of organizations (e.g., manufacturers, wholesalers, distributors, and retailers) involved in producing, delivering, and selling a product or service to the consumer. Scope 3 inventory emissions are all indirect upstream and downstream GHG emissions in an organization's supply chain. Carbon project activities may impact the emissions of goods and services in a supply chain and, therefore, Scope 3 emissions.

When completing a draft project description for the purpose of listing on the pipeline as under development, complete the following information if the project impacts emissions associated with a good or service. Otherwise, delete this text, state this section is not applicable and explain why.

Have the owner(s) or retailer(s) of the impacted goods and services¹ posted a public statement saying, "VCUs may be issued for the greenhouse gas emission reductions and removals associated with [organization name(s)] [name of good or service]" since the project's start date?

☐ Yes

☒ No

Explain your response.

Mandulis Energy will post a public statement saying "VCUs may be issued for the greenhouse gas emission reductions and removals associated with Mandulis Energy for clean energy generation and biochar application" when the project starts on August 1, 2023.

Has the project proponent posted a public statement saying, "VCUs may be issued for the greenhouse gas emission reductions and removals associated with [name of good or service][describe the region or location, including organization name(s), where practicable]."

☐ Yes

☒ No

Explain your response.

¹ Impacted goods and services are all goods and services directly impacted by the technologies and measures specified as project activities in the project description. Please see the VCS Program document *VCS Program Definitions* for additional information.

Mandulis Energy will post a public statement saying “VCUs may be issued for the greenhouse gas emission reductions and removals associated with Mandulis Energy for clean energy generation and biochar application” when the project starts

Have the producer(s) or retailer(s) of the impacted good or service been notified of the project and the potential risk of Scope 3 emissions double claiming via email?

☐ Yes

☒ No

Explain your response.

The producer of the goods and services is the project proponent so Mandulis Energy is fully aware of the potential risk of Scope 3 emissions double claiming.

In all other cases, demonstrate that a public statement(s) by the owner(s) or retailer(s) of the impacted good(s) or service(s) or project proponent (as applicable) has been made throughout the project crediting period. Where applicable, also demonstrate that the impacted good or service's producer(s) or retailer(s) have been notified of the project and the potential risk of Scope 3 emissions double claiming via email. Evidence of the public statement(s) and email(s) must be provided in this report or attached as an appendix.

1.1 Sustainable Development Contributions

Provide a brief description that includes the following (no more than 500 words):

- *A summary description of project activities that result in sustainable development (SD) contributions (i.e., technologies/measures implemented, activity location).*
- *An explanation of how project activities will result in expected SD contributions.*
- *Describe how the project contributes to achieving any nationally stated sustainable development priorities, including any provisions for monitoring and reporting same.*

Mandulis Energy supplies clean cooking solutions in order to mitigate climate change and alleviate poverty. Our clean briquettes are a replacement for firewood and charcoal leading to the reduction of deforestation, but also are made out of agricultural residues bought from farmers generating a new revenue stream. The availability of affordable alternative fuel has different benefits:

1) unlocks time for productive and educative purposes, preventing women and girls for fetching firewood who normally spend 3h/day on this activity encountering different dangers like wildlife attacks, injuries or gender and sexual based violence;

- 2) generate savings, since briquettes last double than charcoal for the same price and also retailing job opportunities are created;
- 3) enhance well-being by reducing the toxic smoke inhaled by women and children while cooking
- 4) protects ecosystems, by reducing deforestation and forest degradation as well as mitigating the human wildlife conflict by reducing the encounters of the population with wildlife during firewood fetching and
- 5) avoids greenhouse gas emissions through preventing agricultural waste burn, reduction of smoke and reduction of deforestation.

Mandulis manufactures biochar-producing gasifier cookstoves and our customers are able to earn as they cook. By using our stoves along with our biomass pellets households are able to sell back biochar generated after cooking to Mandulis or spread it in their gardens as a carbon sequestration soil enhancer, leading to improvement of productivity.

1.17 Additional Information Relevant to the Project

Leakage Management

Where applicable, describe the leakage management plan and implementation of leakage and risk mitigation measures.

There is no leakage for this project activity and project activity is already including 0.95 as a discount factor.

Commercially Sensitive Information

Indicate whether any commercially sensitive information has been excluded from the public version of the project description and briefly describe the items to which such information pertains.

Note - Information related to the determination of the baseline scenario, demonstration of additionality, and estimation and monitoring of GHG emission reductions and removals (including operational and capital expenditures) cannot be considered to be commercially sensitive and must be provided in the public versions of the project documents.

Commercial sensitive information will be made available to the Validation and Verification Board when requested.

Further Information

Include any additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

Not applicable.

2 SAFEGUARDS

2.1 No Net Harm

Summarize any potential negative environmental and socio-economic impacts and the steps taken to mitigate them.

No potential negative environmental or socio-economic impacts have been identified for the project.

2.2 Local Stakeholder Consultation

Describe the process for, and the outcomes from, the local stakeholder consultation conducted prior to validation. Include details on the following:

The procedures or methods used for engaging local stakeholders (e.g., dates of announcements or meetings, periods during which input was sought).

The procedures or methods used for documenting the outcomes of the local stakeholder consultation.

The mechanism for on-going communication with local stakeholders.

How due account of all and any input received during the consultation has been taken. Include details on any updates to the project design or justify why updates are not appropriate.

For AFOLU projects, also demonstrate how the project has or will communicate the following:

The project design and implementation, including the results of monitoring.

The risks, costs and benefits the project may bring to local stakeholders.

All relevant laws and regulations covering workers' rights in the host country.

The process of VCS Program validation and verification and the validation/verification body's site visit.

In December 2022, the Mandulis Energy team, in collaboration with the local community leaders, organized a project preparatory mission to Northern Uganda, one of the proposed regions for project implementation.

The team visited Nwoya district, one of Mandulis' mini-grid project sites where over 100 households and small businesses are accessing affordable clean electricity generated by a hybrid solar biogas power plant.

The project locations are specifically in Got Ngur village and Paminolango where the majority of the community are smallholder farmers and the predominant crops cultivated are maize, rice, and groundnuts. Over 90% of the community use traditional cooking fuels, firewood and charcoal.

The objectives of the mission were to;

1. Conduct a consultative meeting with the local communities in the proposed project areas of implementation in Northern Uganda.
2. Introduce and onboard the local farming communities in Nwoya district, Got Ngur village and Pamiolango to alternative clean cooking solutions i.e. the biomass clean cooking briquettes and the biochar-producing gasifier cookstoves.
3. To establish accountability and project participant feedback mechanisms that will be employed during the life of the project.

Stakeholders from different social categories were invited, the stakeholders include

- Traditional cookstove users
- Women from the villages
- Field assistants working in the project
- Local community leaders

Stakeholders were invited through community mobilisation efforts led by the local leaders primarily through word of mouth and phone calls.

A total of 54 participants attended the Local Stakeholder Consultation, and participants were encouraged to participate in the discussion.

Methodology

1. Capacity building pilot project
 - In Nwoya district, Got Ngur village, the team initiated and implemented a capacity building pilot project wherein selected smallholder farming households were onboarded and trained on the use of Mandulis Energy's clean cooking solutions.
 - In addition, the pilot had the objective to understand the cooking needs of the community and test acceptability of the biomass clean cooking briquettes and gasifier cookstoves as solutions towards climate change mitigation and adaptation.
 - Through consultations and guidance from the local community leaders, 10 smallholder farming households were randomly selected to participate in the pilot. Each household received a gasifier cook stove, a bag (5kgs each) of non-carbonized briquettes and were trained on their effective and efficient use.

- During the pilot, which is scheduled to conclude in July 2023, the Mandulis field team will conduct a survey through individual household visits and focus group discussions with the data collected and uploaded using KoboToolbox. The data to be collected includes cooking time taken when using the gasifier cook stove and briquettes, accountability and beneficiary feedback mechanisms.
- The findings will be used to inform the most effective and efficient strategies to promote the uptake of Mandulis' innovative solutions during project implementation.



Fig 1: Stakeholder consultations in Got Ngur



Fig 2: Stakeholder consultations in Got Ngur



Fig 3: Women smallholder farmers representing the 10 households selected for the pilot project

2. Participatory data collection techniques

To set robust baselines, the Mandulis team employed participatory interview techniques interviewing 10 smallholder farming households and 1 focus group. The participatory approach facilitated the effective generation of data and, at the same time, promoted open dialogue between the Mandulis team and the identified interviewees.

Furthermore, the participatory approach informed the ongoing development, by the Mandulis team, of a robust project activity monitoring and evaluation system in preparation for project activity implementation. For example, through onboarding and training 10 households in Got Ngur village, the Mandulis team is going to monitor the impact, relevance, and sustainability of climate-smart clean cooking technologies and resultant livelihoods amongst rural farming communities in Northern Uganda.

The findings from the stakeholder consultations organized by the Mandulis team provided additional insight into emission reduction and avoidance strategies that will be employed during the project activity implementation. These include;

Engaging all stakeholders, including local NGOs, local community leaders, individuals, households and institutions (e.g. refugee reception centres), in dialogue is a necessary activity to understand their perspectives, needs, and interests. This will support reaching a joint

consensus in developing and implementing sustainable climate-smart locally suitable practices, and enhancement of the resultant climate-resilient livelihoods e.g. through the sales of biomass feedstock and biochar.

The utilization of a participatory learning approach in project preparatory activities by the Mandulis team through creating a joint learning response where existing knowledge and experiences are shared on the spot by all stakeholders present is an effective strategy which will be employed during project implementation.

By providing a basis for informed commitment to project interventions, this is envisioned to catalyse project ownership by target groups.

Over the next couple of months, the Mandulis field team will continue working with the 10 smallholder farming households in Nwoya district, and tracking their use of the clean cooking solutions. In August 2023, the households will be interviewed and any behaviour change towards clean cooking documented and the findings shared.

If any concerns are received during operation of project activity, it will be addressed by Mandulis Energy trained field staff.

2.3 Environmental Impact

Summarize any environmental impact assessments carried out with respect to the project, where applicable.

The project has not identified any environmental negative impact.

Will the activities...	YES	NO
Natural Resources		
Accelerate erosion by water or wind?		x
Reduce soil fertility and/or permeability?		x
Alter existing stream flow, reduce seasonal availability of water resources?		x
Potentially contaminate surface water and groundwater supplies?		x
Involve the extraction of renewable natural resources?		x
Lead to unsustainable use of renewable natural resources such as forest products?		x
Involve the extraction of non-renewable natural resources?		x
Restrict customary access to natural resources?		x

Reduce local air quality through generating dust, burning of wastes or using fossil fuels and other materials in improperly ventilated areas?		x
Affect dry-season grazing areas and/or lead to restricted access to a common resource?		x
Lead to unsustainable or unnecessarily high water extraction and/or wasteful use?		x
Ecosystems and Biodiversity		
Drain wetlands, or be sited on floodplains?		x
Harvest wetland plant materials or utilize sediments of bodies of water?		x
Lead to the clearing of forestlands for agriculture, the over-harvesting of valuable forest species?		x
Promote in-forest bee keeping?		x
Lead to increased hunting, or the collection of animals or plant materials?		x
Increase the risks to endangered or threatened species?		x
Introduce new exotic species of plants or animals to the area?		x
Lead to road construction or rehabilitation, or otherwise facilitate access to fragile areas (natural woodlands, wetlands, erosion-prone areas)?		x
Cause disruption of wildlife migratory routes?		x
Agricultural and Forestry Production		
Have an impact on existing or traditional agricultural production systems by reducing seed availability or reallocating land for other purposes?		x
Lead to forest plantation harvesting without replanting, the burning of pastureland, or a reduction in fallow periods?		x
Affect existing food storage capacities by reducing food inventories or encouraging the incidence of pests?		x
Affect domestic livestock by reducing grazing areas, or creating conditions where livestock disease problems could be exacerbated?		x
Involve the use of insecticides, herbicides and/or other pesticides?		x
Community and Social Issues		
Have a negative impact on potable water supplies?		x
Encourage domestic animal migration through natural areas?		x
Change the existing land tenure system?		x

Have a negative impact on culturally important sites in the community?		x
Increase in-migration to the area?		x
Create conditions that lead to a reduction in community health standards?		x
Lead to the generation of non-biodegradable waste?		x
Involve the relocation of the local community?		x
Potentially cause or aggravate land-use conflicts?		x

This is why the project does not require an environmental impact assessment

2.4 Public Comments

Demonstrate how due account of all and any comments received during the public comment period has been taken. Include details on any updates to the project design or demonstrate the insignificance or irrelevance of comments.

Mandulis Energy shall take due account of any and all comments received during the public comments consultation.

2.5 AFOLU-Specific Safeguards

For AFOLU projects, provide details on the following:

Local stakeholder identification process and a description of results.

Risks to local stakeholders due to project implementation and how the project will mitigate such risks.

Risks to local stakeholder resources due to project implementation and how the project will mitigate such risks, including the plans to ensure the project will not impact local stakeholder's property rights without the free, prior and informed consent.

Processes to ensure ongoing communication and consultation with local stakeholders, including a grievance redress procedure to resolve any conflicts which may arise between the project proponent and local stakeholders.

For AFOLU projects with no impacts on local stakeholders, provide evidence of such.

For non-AFOLU projects, this section is not required.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Provide the title, reference and version number of the methodology or methodologies applied to the project. Include also the title and version number of any tools applied by the project.

Methodologies:

VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.0

CDM AMS I.I - Biogas/biomass thermal applications for households/small users, v6.0

VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, v1.1

Tools:

CDM TOOL30: Calculation of the fraction of non-renewable biomass"; Version 04

TOOL16: Project and leakage emissions from biomass

CDM Tool 1: Tool for the demonstration and assessment of additionality Version 07.0.0

3.2 Applicability of Methodology

Demonstrate and justify how the project activity(s) meets each of the applicability conditions of the methodology(s), and tools (where applicable) applied by the project. Address each applicability condition separately.

Methodology criterion	Project justification
VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, v1.1	
Project activities shall be implemented in domestic premises, or in community-based kitchens.	The biochar-producing gasifier cookstove will be supplied at household level
The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove	The biochar-producing gasifier cookstove has a thermal efficiency above 25%, specifically it has 37%.

replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	
Both 'Projects' and 'Large Projects' can use this methodology	This project enters in the "Project" category
Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics	Non-renewable biomass has been in use since 31 December 1989 as evidenced by various government and international agencies like FAO statistical data. The Global Forest Resources Assessment 2010 (FAO) states that forest areas are reduced yearly. Between the years 1990 and 2010, Uganda lost on average 88,200 hectares of forest per year.
For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded	a) The clean briquettes are made out of agricultural waste such as rice husks, groundnut shells and maize cobs, normally discarded as residues from crops that are produced in the country on a high scale. b) Mandulis Energy monitors the consumption of the clean briquettes during the project implementation c) Energy use for renewable biomass processing will be calculated to account for emissions reductions associated with their manufacture using clean electricity generated by the solar hybrid biogas power plants
CDM AMS I.I - Biogas/biomass thermal applications for households/small users, v6.0	
The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal	The total thermal energy capacity of the project is less than 45MW
Each unit (e.g. cook stove, heater) shall have a rated capacity equal to or less than 150 kW thermal. Projects that include units with rated capacity greater than 150 kW thermal may explore "AMS-I.C.: Thermal energy production with or without electricity".	The biochar-producing gasifier cookstove has a rated capacity less than 150 kW thermal.
For projects utilizing biomass residues processed as a fuel (e.g. briquettes, wood chips), project participants shall be	a) The clean briquettes are made out of agricultural waste such as rice husks, groundnut shells and maize cobs,

demonstrated that: (a) It is produced using solely renewable biomass (more than one type of biomass may be used). Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded; (b) Leakage emissions associated with biomass are estimated based on the provisions from the “TOOL16: Project and leakage emissions from biomass”; (c) The project participant can monitor the mass, moisture content and NCV of the resulting biomass fuel, through sampling that meets the confidence/precision level of 90/10; (d) Where the project participant is not the producer of the biomass residue, the project participant and the biomass residue producer are bound by a contract that shall enable the project participant to monitor the source of the biomass residues to account for any emissions associated with biomass production (as per 4(b) above). Such a contract shall also ensure that there is no double counting of emission reductions.	normally discarded as residues from crops that are produced in the country on a high scale. b) Leakage emissions associated with biomass are estimated based on the provisions from the “TOOL16: Project and leakage emissions from biomass” c) Mandulis Energy monitors the mass, moisture content and NCV of the resulting biomass fuel, through sampling that meets the confidence/precision level of 90/10 d) The majority of the biomass is produced by Mandulis Energy in its agricultural processing hubs, but in the case of using other sources Mandulis makes sure to be bound by a contract with the biomass residue producer that enables Mandulis Energy to monitor the source of the biomass residues to account for any emissions associated with biomass production and ensuring that there is no double counting of emission reductions.
VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.0	
The methodology is applicable when biochar is produced from eligible waste biomass through a thermochemical process such as pyrolysis, gasification, and biomass boilers and the biochar is subsequently applied to an end-use (soil or non-soil applications). Torrefaction and hydrothermal carbonization as processes of biochar production are excluded⁷ from this methodology.	The biochar is produced through a gasification process in a gasifier-producing gasifier cookstove.
The methodology is applicable to projects using either low or high technology production facilities to produce biochar, as per the definitions of each provided in Definitions of this methodology	The biochar is produced in a low technology production facility.
The biochar producers must have a health	Mandulis Energy has a health and safety

and safety program to protect workers from airborne pollutants and other hazards.	program and equips with the required skills and knowledge to its customers to protect them from airborne pollutants and other hazards
The feedstock used to produce biochar must meet all following conditions to be eligible: a) Feedstock must be purely biogenic waste biomass and not purpose-grown, b) Feedstock must have been otherwise left to decay or combusted for purposes other than energy production. Additional guidance on how to demonstrate fate of waste biomass in the absence of the project activity is provided in APPENDIX 2: FATE of feedstock biomass, c) Feedstock must not have been imported from other countries, and d) Feedstock must meet the sustainability conditions provided in Table 1.	a) The feedstock for generating biochar are the clean briquettes produced from agricultural waste like rice husks, maize cobs and groundnut shells, discarded when processed the crops. b) The residues used for the briquettes manufacturing would otherwise be combusted as occurs in the mills c) The feedstock is manufactured in Uganda d) The feedstock meets the sustainability conditions in Table 1.
Biochar made from a single or mixed eligible feedstock types must comply with the latest version of the IBI Biochar Testing Guidelines or the EBC Production Guidelines.	The biochar produced complies with the IBI Biochar Testing Guidelines or the EBC Production Guidelines.
The waste biomass used as feedstock to produce biochar and the resulting biochar to be utilized in soil or non-soil applications may be transported via ships, boats, and vehicles other than road transportation up to a distance of 200 km. However, it must only be transported by vehicles (i.e., road transportation) for distances more than 200 km as defined under CDM Tool 12: Project and leakage emissions from transportation of freight.	The primary feedstock source of the clean briquettes are the agro-processing mills on-site which eliminates the need to transport the feedstock over long distances. The briquette production sites are geographically located in farming zones that produce high volumes of the required waste biomass easily accessible with bicycles, on foot, and electric vehicles. Mandulis Energy strategically deploys electric vehicles in the proposed geographic locations to transport the feedstock and biochar from the farmers with each EV covering a radius of at least 70 km.
Mineral additives such as lime, rock minerals, and ash may comprise up to 10 percent of the mass when added. If the addition exceeds 10 percent on a dry weight basis, the biochar producer must present laboratory tests indicating that	In this project, mineral additives are not added.

the final product meets IBI Biochar Testing Guidelines or EBC Production Guidelines thresholds for organic and inorganic contaminants.	
Other evidence that may be used to demonstrate compliance with waste biomass sustainability criterion are biomass certification schemes such as the Roundtable on Sustainable Biomaterials (RSB), International Sustainability and Carbon Certification (ISCC) or any other certification scheme approved and/or endorsed by a relevant legislative body or international body such as the European Union, ¹³ CORSIA, ¹⁴ and national/state governments	Mandulis Energy will use biomass certification schemes to demonstrate compliance with waste biomass sustainability
Biochar is eligible to be utilized and accounted for under the methodology if it is being utilized within one year of its production. Biochar is subject to natural decay and the permanence of biochar is calculated for a period of 100 years. To adhere to the decay factor established for 100 years and prevent any decay before application, biochar must be utilized in soil or non-soil applications, as appropriate, within the first year of its production.	The biochar generated in the project is applied in its first year of production.
Biochar is eligible to be used as a soil amendment on land other than wetlands. Eligible land types include cropland, grassland, and forest. Biochar is eligible to be applied either to the soil surface or subsurface. For surface application, the biochar must be mixed with other substrates such as compost, manure or digestate from anaerobic digestion. For subsurface application, the biochar may be applied either as a unique soil amendment or mixed with other substrates. For any soil application, the biochar must comply with biochar material standards to avoid the risk of transferring unwanted heavy metals and organic contaminants to soil. Project proponents must meet the IBI Biochar Testing Guidelines or EBC Production Guidelines, or relevant	The biochar is applied in croplands both in soil surface and subsurface, for the first scenario, the biochar is blended with other substrates. The biochar applied to the soil complies with biochar material standards. And Mandulis Energy meets the IBI Biochar Testing Guidelines or EBC Production Guidelines, or relevant national regulations for avoiding soil contamination

national regulations for avoiding soil contamination	
Biochar is eligible to be used in non-soil applications including but not limited to cement, asphalt, and any other applications where long-term storage of the biochar is possible. Only biochar produced in high technology production facilities, as defined under the methodology, is eligible to be used in non-soil applications.	The biochar is used in soil applications.
Project proponents must demonstrate that biochar and/or final products are longlived via credible evidence such as laboratory results, peer reviewed research papers or any other third party-evaluated product assessment, such as decay rate analysis, as applicable. The information provided must include the lifetime of the product in which biochar is stored long term. The resultant product must be compliant with national/international product quality standards/specifications as applicable (e.g., the American Concrete Institute Standards in the US).	
The methodology must not be applied if biochar is used for energy purposes, burned as a fuel (e.g., as a substitute for charcoal or coke) or used in other soil or non-soil applications where biochar cannot be demonstrated to be a long-lived and persistent carbon sink. Permanence through eligible utilization of biochar must be documented accordingly	The biochar is not used for energy purposes and is a long-lived and persistent carbon sink.
Biochar must not be used in applications in which substantial amounts of the biochar are oxidized (e.g., burned or used as a reduction agent in steel production, processed into activated carbon, or other uses that are fossil fuel-intensive.)	In this project the biochar is not be used in applications in which substantial amounts of the biochar are oxidized
Non-soil applications are ineligible under the methodology if there is a loss of more than 50 percent of the carbon measured by dry weight basis (e.g., some activated carbon, due to excessive fossil fuel input,	N/A. The biochar is applied in the soil

results in a loss of more than 50 percent of the original biochar carbon material and therefore would not be eligible).	

3.3 Project Boundary

Define the project boundary and identify the relevant GHG sources, sinks and reservoirs for the project and baseline scenarios (including leakage if applicable).

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from use of nonrenewable biomass /Fossil fuel	CO ₂	YES	Major source
		CH ₄	YES	Major source
		N ₂ O	YES	Major source
		Other	NO	No other source identified
	Production & Transport of Fuel	CO ₂	YES	Can be a major source
		CH ₄	YES	Can be a major source
		N ₂ O	YES	Can be a major source
		Other	NO	No other source identified
	Feedstock production	CO ₂	NO	Excluded. Waste biomass is considered CH renewable per eligibility conditions
		CH ₄	NO	
		N ₂ O	NO	
	Feedstock transportation	CO ₂	NO	Expected to be de minimis if distance between sourcing sites and production facility is less than 200 kilometers. Only CO2 considered as per the provisions of CDM Tool 12
		CH ₄	NO	
		N ₂ O	NO	
	Combustion, aerobic and anaerobic decomposition of	CO ₂	NO	Possible emissions from decay or combustion of biomass in the absence of project activity are excluded. Baseline emissions are assumed to be zero (a conservative assumption).
		CH ₄	NO	
		N ₂ O	NO	

Source		Gas	Included?	Justification/Explanation
	feedstocks			
Project	Emission from use of nonrenewable biomass	CO ₂	YES	Major source
		CH ₄	YES	Major source
		N ₂ O	YES	Major source
		Other	NO	No other source identified
	Production & Transport of Fuel	CO ₂	YES	Major source
		CH ₄	YES	Major source
		N ₂ O	YES	Major source
		Other	NO	No other source identified
	Feedstock production	CO ₂	NO	Purpose-grown crops are ineligible, hence there are no emissions from feedstock production. Waste biomass is also considered renewable per the CDM renewable biomass definition (EB23 Annex 18) and applicability conditions (see Table 1.
		CH ₄	NO	
		N ₂ O	NO	
	Pyrolysis, or thermochemical conversion (low technology systems)	CO ₂	NO	Low technology systems are provided a default emission value based on published literature (Cornelissen et al., 2016).
		CH ₄	YES	
		N ₂ O	NO	
	Electricity and/or fossil fuels consumed during eligible thermochemical process	CO ₂	YES	Included. Emissions associated directly with project activity.
CH ₄		NO	Excluded as per provisions of CDM Tool 03 and Tool 05.	
N ₂ O		NO		
Biochar transport	CO ₂	YES	CO2 considered as per CDM Tool 12.	

Source	Gas	Included?	Justification/Explanation
tation	CH ₄	NO	Expected to be de minimis if distance between production facility and end-use destination is less than 200 kilometers
	N ₂ O	NO	
	CO ₂	YES	Included. Emissions associated directly with project activity.
	CH ₄	NO	Excluded as per provisions of CDM Tool 03 and Tool 05.
	N ₂ O	NO	
	CO ₂	YES	Included. Emissions associated directly with project activity.
	CH ₄	NO	Excluded as per provisions of CDM Tool 03 and Tool 05.
	N ₂ O	NO	
	CO ₂		Expected to be de minimis per 5 percent diversion requirements.
	CH ₄		
	N ₂ O		
	CO ₂		* If the biochar facility sells electricity to the grid under an existing renewable energy program, project electrical generation that displaces fossil fuel-based electricity should not be counted in the calculations (to avoid double counting)
	CH ₄		
	N ₂ O		

In addition to the table, provide a diagram or map of the project boundary, showing clearly the physical locations of the various installations or management activities taking place as part of the project activity based on the description provided in Section 1.11 (Description of the Project Activity) above.

For non-AFOLU projects, include in the diagram the equipment, systems and flows of mass and energy. Include the GHG emission sources identified in the project boundary.

For AFOLU projects, include in the diagram or map the locations of where the various measures are taking place, any reference areas and leakage belts.

3.4 Baseline Scenario

Identify and justify the baseline scenario, in accordance with the procedure set out in the applied methodology and any relevant tools. Where the procedure in the applied methodology involves several steps, describe how each step is applied and clearly document the outcome of each step.

Explain and justify key assumptions, rationale and methodological choices. Provide all relevant references.

The energy access “trilemma” of reliability, sustainability, and affordability. Over 90% of households in Uganda and the sub-Saharan region use firewood and charcoal. The use of these fuels is one of the major driving factors of deforestation and forest degradation in the region. This is also exacerbated by poor methods of wood fuel use, such as the use of old traditional and inefficient cookstoves.

Of the 94% Ugandan households that primarily depend on biomass, 73% use firewood while 21% use charcoal for cooking, electricity (1.4%), kerosene (0.6%), and other sources including LPG, bio-fuels account for 3.9% (UBOS, 2021). According to the Statistical abstract from 2021 by Uganda Bureau of Statistics in 2015, Uganda had a total of 1.9 million hectares of forest land compared to 4.9 million hectares in 1990. This is a reduction of 60 percent over a period of 25 years. In 1990, forests covered 20.4 percent of the land area of the country compared to less than 10 percent in 2015.

3.5 Additionality

Demonstrate and assess the additionality of the project, in accordance with the applied methodology and any relevant tools, taking into account the following:

Project activities must not be mandated by any law, statute, or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory framework

Where a project method is applied to demonstrate additionality and the procedure in the applied methodology or tool involves several steps, describe how each step is applied and clearly document the outcome of each step. Indicate clearly the method selected to demonstrate additionality (e.g., investment analysis or barrier analysis in the case of the CDM Tool for the demonstration and assessment of additionality). Where barrier analysis, or equivalent, is used to demonstrate additionality, only include the most relevant barriers. Justify the credibility of the barriers with key facts and/or assumptions and the rationale. Provide all relevant references.

Where a performance method is applied to demonstrate additionality, demonstrate that performance can be achieved to a level at least equivalent to the performance benchmark metric.

Where the methodology applies an activity method for the demonstration of additionality, use this section to demonstrate regulatory surplus (only) and include a statement that notes that conformance with the positive list is demonstrated in the Applicability of Methodology section above.

Provide sufficient information (including all relevant data and parameters, with sources) so that a reader can reproduce the additionality analysis and obtain the same results.

The methodology uses the activity method for the demonstration of additionality.

1: Regulatory Surplus

There is no mandated government programme or policy in the host country (Uganda) of this project ensuring the distribution of biochar-producing gasifier cookstoves and biomass clean cooking briquettes. The project is not mandated by any law, statute, or another regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory frameworks. Households may only participate voluntarily in this project. It is hereby confirmed that the proposed project is a voluntary coordinated action by Mandulis Energy in different locations across Uganda.

2. Positive List

Mandulis Energy's project aligns with the project types included in the VCS Program's Positive List. The type of project that Mandulis intends to set up i.e. production and distribution of biomass clean cooking briquettes and biochar-producing gasifier cookstoves faces common barriers to implementation and would not be undertaken without the support of carbon finance.

3. Step 3: Project Method

The proposed project intends to distribute the biochar-producing gasifier cookstoves to households at a price slightly above the factory price; hence financial returns from the project will be less than the cost incurred.

Further, the Project Proponent will hire a team for the supply chain of the clean briquettes and gasifier cookstoves including maintenance and repair of the gasifier cookstoves. As each gasifier cookstove has certain costs associated with the production/purchase, distribution, monitoring verification, among others, the project will not occur in absence of carbon revenue. The action is not financially viable without the support of revenues from the sale of VERs. As the end-user does not benefit from direct financial return and procuring gasifier cookstoves requires capital, which is a barrier to rural consumers due to difficulties in accessing capital, a wide dissemination of gasifiers in the Host Country (Uganda) is unlikely.

The actions under the project will alleviate these barriers by promoting the distribution of gasifier cookstoves to end-users at an affordable price. Hence in line with para 10 a) of EB99 Annex--03, the project faces an investment barrier and hence it is considered to be additional.

As each gasifier cookstove and clean briquettes distributed have costs associated with their purchase and distribution and awareness generation, this project will not occur in absence of the VCS revenue. The action is not financially viable without the support of revenues from the sale of VERs. The end-users for the gasifier cookstoves are currently using crude, inefficient cooking devices, which indicates and exacerbates the cycle of poverty/suppressed incomes. The potential users for gasifier cookstoves are typically lower-income with the problem (lack of ICS) seen more as a woman's problem thereby relegating it lower in the priority order for household expenditures/investments.

3.6 Methodology Deviations

Describe and justify any methodology deviations. Include evidence to demonstrate the following:

The deviation will not negatively impact the conservativeness of the quantification of GHG emission reductions or removals.

The deviation relates only to the criteria and procedures for monitoring or measurement, and does not relate to any other part of the methodology.

The project activity has not taken any methodology deviation in the applied approved methodology of;

1. VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.0,
2. CDM AMS I.I - Biogas/biomass thermal applications for households/small users, v6.0
3. VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, v1.1 Tools:
4. CDM TOOL30: Calculation of the fraction of non-renewable biomass"; Version 04
5. TOOL16: Project and leakage emissions from biomass
6. CDM Tool 1: Tool for the demonstration and assessment of additionality Version 07.0.0

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Describe the procedure for quantification of baseline emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

The methodology VMR0006 follows AMS II G and which does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4.

4.2 Project Emissions

Describe the procedure for quantification of project emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

The methodology, VMR0006, does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4. The methodology AMS III BG, the project emission during the use of micro-gasifier cookstove is taken as zero. Project emissions for cookstoves using renewable biomass is taken to be zero for now, as currently only micro gasifiers are employed in the project. When the cookstoves using renewable biomass would be distributed that time we would be calculating the emissions for those.

4.3 Leakage

Describe the procedure for quantification of leakage emissions in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

Leakage shall be considered as default 0.95 in accordance with Section 5.4 of the approved methodology.

4.4 Net GHG Emission Reductions and Removals

Describe the procedure for quantification of net GHG emission reductions and removals. Include all relevant equations. For AFOLU projects, include equations for the quantification of net change in carbon stocks.

Provide the ex-ante calculation (estimate) of baseline emissions/removals, project emissions/removals, leakage emissions and net GHG emission reductions and removals in the table below. Specify the breakdown of GHG emissions reductions and removals by calendar year.

For data and parameters monitored, use estimates. Document how each equation is applied, in a manner that enables the reader to reproduce the calculation. Provide example calculations for all key equations, to allow the reader to reproduce the calculation of estimated net GHG emission reductions or removals.

The improved cookstove is introduced as an energy efficiency measure in the project, therefore equations 1 and 2 of the methodology will be applied to calculate the net GHG emission reductions.

Equation 1

$$ER_y = \sum_i \sum_j ER_{y,i,j}$$

i	= Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-stone fire
j	= Indices for the situation where there is more than one batch of improved cookstove of type i
ER_y	= Emission reductions during year y in t CO ₂ e
$ER_{y,i,j}$	= Emission reductions by improved cookstove of type i and batch j during year y in t CO ₂ e default for wood fuel

Equation 2

$$ER_{y,i,j} = B_{y,savings,i,j} \times f_{NRB,y} \times NCV_{wood\ fuel} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95$$

Where:

$B_{y,savings,i,j}$	= Quantity of woody biomass that is saved in tonnes per improved cook stove of type i and batch j during year y
$f_{NRB,y}$	= Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
$NCV_{wood\ fuel}$	= Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)
EF_{wf,CO_2}	= CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC

default for wood fuel

$EF_{wf,non\ CO2}$ = Non-CO2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO₂/TJ)

$N_{y,i,j}$ = Number of improved cook stoves of type i and batch j operating during year y

0.95 = discount factor to account for leakage

Equation 3

The quantify of woody biomass saved $B_{y,savings,i,j}$ due to implementation of gasifier cookstove can be estimated by Equation 3

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

With $\eta_{new,i,j} = \eta_P \times (DFn)^{y-1} \times 0.94$

Where;

Bold = Annual quantity of woody biomass that would have been used in the absence of the project activity (in tonnes per device) to generate useful thermal energy equivalent to that provided by the improved cook stove. The value of Bold can be sourced from historical data or baseline surveys. Alternatively, a default value of 0.5t/capita/year may be used.

η_{old} = Efficiency of baseline cookstove

$\eta_{new,i,j}$ = Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y
Alternatively, efficiency may be determined using Equation 4

η_P = Efficiency of project stove (fraction) at the start of project activity,

$(DFn)^{y-1}$ = Discount factor to account for efficiency loss of project cookstove per year of operation(fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards Alternatively default value of 0.99 efficiency loss per year can be considered

0.94 = Adjustment factor to account for uncertainty related to project cookstove efficiency test

Equation (5)

$$ER_y = BE_y - PE_y - LE_y$$

Where,

E_{Ry} = Emission reductions in year y , tonnes CO₂e

This methodology would be implied in later stages of the project, when the pellet based cookstove would be disseminated for the clean cooking purposes.

Parameter	Value	Unit	Description of the parameter	Source/ reference/ justification
EF _{wf,CO2}	112	tCO ₂ /TJ	CO ₂ emission factor for the use of wood fuel in baseline scenario	IPCC default for wood fuel
EF _{wf,non CO2}	26.23	tCO ₂ /TJ	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario	IPCC default for wood fuel
N _{y,i,j}	64,000	Gasifier cookstoves	Number of cookstoves distributed per year over the project lifetime	Ex-ante estimation of operating cookstoves
NCV _{wood fuel}	0.0156	TJ/tonne	Net calorific value of the non-renewable woody biomass that is substituted or reduced	IPCC default factor for wood
η_{old}	15% (Ex-ante)	fraction	Efficiency of baseline stoves	Estimated ex-ante weighted average efficiencies
$\eta_{new,i,j}$	37%(1st year)	fraction	Efficiency of the improved cookstove type i and batch j . Efficiency may be determined using Equation 4	Calculated
η_p	37% (1st year)	Fraction	Efficiency of project stove (fraction) at the start of project activity	Obtained from WBT (CREEC report)
(DF _n) $y-1$	0.99	-	Discount factor to account for efficiency loss of project	Default value from methodology

			cookstove per year of operation(fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered	
μy	90%	Fraction	Adjustment to account for any continued use of pre-project devices during the year y	Ex-ante estimation
L	95%	Fraction	Leakage adjustment factor	Methodology default
ER	236,374.65	tCO ₂ e	Annual average emissions reduction	Calculated

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Aug 2023 - Dec 2023	1291.13	0	0	1291.13
2024	34,742	0	0	34,742
2025	104,255	0	0	104,255
2026	277,935	0	0	277,935
2027	277,935	0	0	277,935
2028	277,935	0	0	277,935

2029	277,935	0	0	277,935
2030	277,935	0	0	277,935
2031	277,935	0	0	277,935
2032	277,935	0	0	277,935
2033	277,935	0	0	277,935
2024	34,742	0	0	34,742
Total	2,363,746.46			2,363,746.46

5 MONITORING

5.1 Data and Parameters Available at Validation

Complete the table below for all data and parameters that are determined or available at validation, and remain fixed throughout the project crediting period (copy the table as necessary for each data/parameter). Data and parameters monitored during the operation of the project are included in Section 5.2 (Data and Parameters Monitored) below.

Data / Parameter	Biomass input
Data unit	Tonnes
Description	The amount of biomass used in the production of briquettes
Source of data	Project records; operational data
Value applied	XTonnes/TBD
Justification of choice of data or description of measurement methods and procedures applied	Biomass is the primary raw material for briquette production. Direct measurement is at feedstock intake with standard weighing equipment used at intake.
Purpose of Data	Calculation of baseline emissions
Comments	Surveys would be conducted to estimate the baseline quantities of each biomass used in the briquette production machines.

Data / Parameter	Biochar output
Data unit	Tonnes
Description	The amount of biochar produced by the project
Source of data	Operational data
Value applied	xTonnes/TBD
Justification of choice of data or description of measurement methods and procedures applied	Biochar is a significant byproduct with climate relevance. It is a byproduct of the burning of clean briquettes in the gasifier cookstove. Direct measurement during production where the biochar is weighed at production using standard scales
Purpose of Data	Calculation of baseline emissions
Comments	Surveys would be conducted to estimate the baseline quantities of biochar produced per kg of clean briquettes used in the gasifier cookstove.
Data / Parameter	Briquette production
Data unit	Tonnes
Description	The amount of clean briquettes produced by the project
Source of data	Operational data
Value applied	xTonnes/TBD
Justification of choice of data or description of measurement methods and procedures applied	The biomass clean cooking briquettes are a core project output with direct climate relevance. Briquettes are weighed at production using standard scales
Purpose of Data	Calculation of baseline emissions
Comments	Provide any additional comments

Data / Parameter	Biochar-producing gasifier cookstove distribution
Data unit	Number of cookstoves
Description	The number of gasifier cookstoves distributed by the project
Source of data	Distribution logs
Value applied	xNumber/TBD
Justification of choice of data or description of measurement methods and procedures applied	The choice of data source directly relates to the project's scale and impact. Data will be used to calculate the scale of gasifier cookstove adoption and usage. Data will be recorded based on distribution logs maintained by the sales and marketing teams.
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	NHH,y
Data unit	Number
Description	Number of households with functional gasifier cookstoves distributed under the project activity in year y
Source of data	Distribution logs, Surveys
Value applied	-
Justification of choice of data or description of measurement methods and procedures applied	The choice of data source directly relates to the project's scale and impact. Data will be used to calculate the scale of gasifier cookstove adoption and usage. Data will be recorded based on distribution logs maintained by the sales and marketing teams.
Purpose of Data	Calculation of baseline emissions
Comments	This will be determined at each of the VPA

Data / Parameter	Gasifier Cookstove usage
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Data unit	Hours per day
Description	Provide a brief description of the data/parameter
Source of data	End user surveys, feedback forms
Value applied	xHours/TBD
Justification of choice of data or description of measurement methods and procedures applied	Determines the effectiveness of the project. Surveyed periodically among end-users
Purpose of Data	Calculation of project emissions
Comments	Provide any additional comments

Data / Parameter	Bold
Data unit	Tonnes/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices.
Source of data	Historical data Number of person by households-6.4 Woodfuel consumption by capita (Ton/year)-0,78
Value applied	5.021
Justification of choice of data or description of measurement methods and procedures applied	Based on approximate value of woodfuel consumed by person/year times the average numbers of people per household
Purpose of Data	Calculation of Baseline Emissions
Comments	This parameter shall remain fixed for the monitoring periods

Data / Parameter	np
Data unit	Fraction
Description	Efficiency of the project gasifier cookstove at the start of project activity
Source of data	Manufacturer's specification based on Water Boiling Test conducted
Value applied	37%
Justification of choice of data or description of measurement methods and procedures applied	Parameter determined ex-ante
Purpose of Data	Calculation of Baseline Emissions
Comments	-

Data / Parameter	$\eta_{PJ,BL}$
Data unit	Fraction
Description	Both PJ and BL to be measured once prior to validation using the same test procedure. Test results from accredited lab are acceptable if it can be established that it was done as per national/international standards. Alternatively, WBT test on a sample of three cookstoves with three tests conducted for each stove can be used. The test can be carried out by project proponents by themselves or stove manufacturers or other third parties.
Source of data	Calculated
Value applied	-
Justification of choice of data or description of measurement methods and procedures applied	Parameter determined ex-ante
Purpose of Data	Calculation of Baseline Emissions

Comments	-
Data / Parameter	fNRB,y
Data unit	Percentage
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Fraction of non-renewable biomass is calculated as per the fNRB calculation TOOL30 v3: Calculation of the fraction of non-renewable biomass
Value applied	86.4%
Justification of choice of data or description of measurement methods and procedures applied	Any changes/ revisions to this value would be monitored and if new default values are approved by the CDM EB the value of the fraction of NRB used will be updated.
Purpose of Data	Calculation of baseline emissions
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	NCVbiomass
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	Default as per applied approved methodology VMR0006
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006
Purpose of Data	Calculation of baseline emissions

Comments	This parameter shall remain fixed for the monitoring periods.
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Data / Parameter	EFwf, non CO2
Data unit	tCO2/TJ
Description	CO2 emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006
Purpose of Data	Emission reduction calculations
Comments	This parameter shall remain fixed for the monitoring periods

Data / Parameter	EFwf,CO2
Data unit	tCO2/TJ
Description	CO2 emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	Default methodology value
Purpose of Data	Calculation of Emission Reductions

Comments	This parameter shall remain fixed for the monitoring periods
Data / Parameter	Emission factor for biomass
Data unit	kg CO ₂ per GJ
Description	The emission factor for the combustion of biomass
Source of data	IPCC guidelines
Value applied	TBD
Justification of choice of data or description of measurement methods and procedures applied	Based on IPCC guidelines
Purpose of Data	Required for GHG emission reduction calculations
Comments	-

Data / Parameter	Emission factor for biochar
Data unit	kg CO ₂ per tonne of biochar
Description	The emission factor for the production of biochar
Source of data	Scientific literature
Value applied	TBD
Justification of choice of data or description of measurement methods and procedures applied	Relevant scientific literature are referenced for values
Purpose of Data	Necessary for GHG emission and sequestration calculations
Comments	-

5.2 Data and Parameters Monitored

Complete the table below for all data and parameters that will be monitored during the project crediting period (copy the table as necessary for each data/parameter). Data and parameters determined or available at validation are included in Section 5.1 (Data and Parameters Available at Validation) above.

Data / Parameter	NCVbiomass
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass, renewable biomass, briquettes or pellets used in the project devices
Source of data	IPCC Default values
Description of measurement methods and procedures to be applied	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in the project device is woody biomass/renewable biomass. For the case of processed renewable biomass (e.g. briquettes), test reports from laboratories according to relevant national/international standards or manufacturer's data or test reports.
Frequency of monitoring/recording	Annual
Value applied	0.0156 TJ/tonne
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of emission reduction
Calculation method	-
Comments	Default values are taken and it is fixed for the monitoring period
Data / Parameter	Date of commissioning of project device

Data unit	Date
Description	Actual date of commissioning of the project cooking device
Source of data	Internal records
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Fixed and recorded at the time of the commissioning/ distribution
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	For the start date of the project
Calculation method	Manual
Comments	Mass distribution has not commenced till date

Data / Parameter	Date of commissioning of batch “j”
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data	Internal records
Description of measurement methods and procedures to be applied	Not Applicable
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning / distribution of the last project device in the batch
Value applied	-

Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	To determine the start date of the cookstove in usage
Calculation method	-
Comments	Mass distribution has not commenced till date

Data / Parameter	$\eta_{PJ,BL}$
Data unit	Fraction
Description	Ratio of the efficiency of the project gasifier cookstove and baseline cookstove
Source of data	Calculated
Description of measurement methods and procedures to be applied	Both PJ and BL to be measured once prior to validation using same test procedure. Test results from accredited lab are acceptable if it can be established that it was done as per national/international standards. Alternatively, WBT test on a sample of three cookstoves with three tests conducted for each stove can be used. The test can be carried out by project proponents by themselves or stove manufacturers or other third parties.
Frequency of monitoring/recording	Once prior to validation
Value applied	-
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reduction
Calculation method	Not Applicable
Comments	This value is fixed for the monitoring periods

Data / Parameter	Brenewable,y
Data unit	Tonnes
Description	Quantity of the renewable biomass used by the project devices in tonnes per cooking device
Source of data	Survey
Description of measurement methods and procedures to be applied	Minimum sample size of the gasifier cookstove should be in line with the latest version of Standard for sampling and surveys for project activities and programme of activities. Determined through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied. (i) Baseline cookstoves have been completely decommissioned and only gasifier cookstoves are exclusively used in the project households; (ii) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of firewood being used by each device. In other words, if more than one device, or another device that consumes firewood, are in use in project households, then the sample survey needs to distinguish the quantity of firewood used by the project device and the other devices that use firewood.
Frequency of monitoring/recording	Annual
Value applied	Not Applicable
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	Not Applicable

Data / Parameter	Ny,i
Data unit	Number
Description	Number of project devices operating during year y
Source of data	Monitoring and surveys
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of Standard for sampling and surveys for project activities and programme of activities Alternately, simplified approach proposed in option (b) under Section 8.4 above may be used for determining the minimum sample size in which case compliance with 90/10 confidence precision is not obligatory
Frequency of monitoring/recording	Annual
Value applied	
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline stove
Source of data	Default value: 0.1; provided in the methodology
Description of measurement methods and procedures to be applied	(c) A default value of 0.1 shall be used if the baseline device is a three-stone fire using firewood (not charcoal), or a

	conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney.
Frequency of monitoring/recording	Fixed for each individual household at the time of project implementation
Value applied	0.1
Monitoring equipment	Default value
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Not Applicable
Comments	This value is fixed for the monitoring period

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device implemented as part of the project activity
Source of data	Third party efficiency calculation at laboratory
Description of measurement methods and procedures to be applied	Project stoves produced in the formal sector do not vary in characteristics such as design, material, critical dimensions, etc. beyond a range of acceptable limits hence efficiency shall be measured as per following i. Conduct WBT test on a sample of three improved cookstoves with three tests conducted for each stove. The test can be carried out by project proponents by themselves or stove manufacturers or other third parties. ii. Efficiency to be tested is high-power thermal efficiency. The high-power thermal efficiency is the average of the Cold Start and Hot Start phases¹². The average of all results for each device type/model and batch shall be taken as the efficiency for each device type and batch.

	iv. If the standard deviation of the test results indicated above is very small¹³ and 90/10 precision requirement is met (in this case, the value of the t-distribution for 90 percent confidence shall be used instead of Z value), the efficiency determined is acceptable, otherwise more sample tests would be required until 90/10 precision is met. v. Efficiency of the improved cookstoves can also be estimated ex-ante using equation 5 above where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored.
Frequency of monitoring/recording	Annually
Value applied	37%
Monitoring equipment	Calculation based on the WBT test
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	Water Boiling Test
Comments	This value of the efficiency shall remain fixed for the monitoring period

Data / Parameter	μy
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Monitoring
Description of measurement methods and procedures to be applied	This parameter should be monitored using one of the following methods: (a) If the baseline cookstoves are decommissioned and no longer used, as determined by the monitoring survey its value is 0 and Bold, adjusted is equal to Bold. (b) If both the gasifier cookstove and baseline cookstoves are used together then surveys shall be conducted to record the average continued operation of baseline cookstoves in a sample of households. The surveys should be designed to

	capture the cooking habits and stove usage of households in the region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidence to determine the frequency of usage of both the gasifier cookstoves and baseline cookstoves. For example, if there were 3 baseline cookstoves in a household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.33 is applied to Bold. Another example would be the case where there was only one baseline cookstove per household and its use during the project period continues along with the gasifier cookstove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.25. Another example would be to interview the household and have them estimate the time of usage of the baseline cookstoves and gasifier cookstove on an average day.
Frequency of monitoring/recording	At least once every two years
Value applied	1
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	Not Applicable
Purpose of data	Calculation of emission reductions
Calculation method	For Projects that opt for By=1,new,i,j,survey, i.e., direct measurement of biomass used in project stoves, then μ_y is not required to be computed.
Comments	For first year the cookstove are disseminated

5.3 Monitoring Plan

Describe the process and schedule for obtaining, recording, compiling and analyzing the monitored data and parameters set out in Section 5.2 (Data and Parameters Monitored) above. Include details on the following:

The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.

The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.

The policies for oversight and accountability of monitoring activities.

The procedures for internal auditing and QA/QC.

The procedures for handling non-conformances with the validated monitoring plan.

Any sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.

Where appropriate, include line diagrams to display the GHG data collection and management system.

To ensure the accuracy, reliability, and reproducibility of the data collected, the following methods and procedures will be used:

Data Measurement and Recording: The project team will use various tools to measure and record data related to the project. For example, the amount of biomass input, the output of briquettes and biochar, the number of cookstoves distributed, and the usage data of the gasifier cookstoves will be measured and recorded on a regular basis. The specific tools and equipment used will depend on the data being measured, but will include tools such as scales, flow meters, and digital data logging devices.

Data Storage and Aggregation: All data collected will be securely stored and organized using digital data management systems, such as Kobo Toolbox, Excel and ClickUp. These systems allow for efficient storage, retrieval, and aggregation of data, ensuring that all data is easily accessible for analysis and reporting purposes.

Data Calibration: Any equipment used to measure and record data will be regularly calibrated to ensure its accuracy. The specific calibration procedures will depend on the equipment used, but will generally involve checking the equipment against a known standard and adjusting it as necessary.

Monitoring Responsibilities: The project team will be organized into various roles, each with specific responsibilities related to data collection and monitoring. For example, the plant operators and briquette machine operators will be responsible for measuring and recording operational data, while the M&E assistant will be responsible for organizing and analyzing this data. The project manager will oversee all monitoring activities, ensuring that they are carried out correctly and on schedule.

Oversight and Accountability: The project manager will provide oversight and accountability for all monitoring activities. This includes ensuring that all data is collected accurately and on time, reviewing and verifying the collected data, and addressing any issues or discrepancies that arise.

Internal Auditing and QA/QC: Internal audits will be conducted on a regular basis to verify the accuracy of the collected data and the adherence to the monitoring plan. This will include checks of the data collection and recording processes, the calibration of equipment, and the storage and organization of data. Any issues identified during these audits will be addressed through a QA/QC process, which involves identifying the cause of the issue, implementing corrective actions, and monitoring the effectiveness of these actions.

Non-conformance Procedures: In the event of any non-conformance with the monitoring plan, a detailed procedure will be followed to address it. This involves identifying the non-conformance, investigating its cause, implementing corrective actions, and reviewing the effectiveness of these actions.

The target population will be the complete number of biomass clean cooking briquettes and biochar-producing gasifier cookstoves distributed under the project activity.

Sampling Approaches: Depending on the data being collected, various sampling approaches may be used. For example, stratified sampling may be used for collecting data on gasifier cookstove usage, with households being selected based on factors such as location, income level, and family size.

Target Population

The project involves distribution of gasifier cookstoves and clean briquettes throughout the project area thereby replacing traditional cooking technologies in the selected households. The population is heterogeneous in nature i.e common technology with similar operating characteristics but spread across the Northern and Western parts of the country.

The populations of each batch will be combined, the sample size is determined, and a single survey will be undertaken to collect data. To ensure the survey result is representative of the entire population, the dissimilarity such as the project area in which they are operating within the project will be taken into account in the sample size calculation. Samples will be drawn by using the random number generator.

APPENDIX

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.