



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.



**Verified Carbon
Standard**

BePEARL

BIO-ENERGY POWERING AGRICULTURE AND RURAL LIVELIHOODS



Document Prepared by Mandulis Energy Limited

Contact Information (optional)

Project Title	<i>BePearl - Bioenergy Powering Agriculture and Rural Livelihoods in Uganda</i>
Version	<i>01</i>
Date of Issue	<i>TBD</i>
Prepared By	<i>Mandulis Energy</i>
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1 PROJECT DETAILS

1.1 Summary Description of the Project

BEPARLE project overview

The project, implemented by Mandulis Energy, involves the construction and operation of eight off-grid bioenergy power plants across rural Uganda. The primary objective is to deliver affordable, sustainable, and reliable energy to farming communities, focusing on both economic development and climate change mitigation.

Technologies/Measures

Each power plant will include a 400kWh battery bank, a 125kW solar photovoltaic (PV) system, a 250kW biogas plant, and a 250kW biomass gasification plant. For reliable power delivery, these solutions combine storage units with renewable energy sources. The initiative will also make use of the waste products from the manufacturing of biogas by utilizing them as fertilizers for nearby fields.

Locations, Services, and Impact of the Project

The following Ugandan sites are scheduled to host the project's implementation: Bungu village, Nwoya District Got Ngur village, Nwoya District Layela village, Nwoya District Ongedo village, Gulu District Bwobonam village, Nwoya District Ongalo village, Lamwo District Nam-Abili village, Agago District Nam-Odio village, Agago District

The energy generated by the power plants will be used by around 1,000 homes, small businesses, and academic institutions at each site. A total of 1,000 farmers will get agricultural value-addition services.

Reductions in GHG Emissions

By using renewable energy technology in place of conventional, carbon-intensive energy sources, the initiative will help reduce greenhouse gas (GHG) emissions. The initiative will reduce the use of biomass fuel (like wood), which produces significant amounts of carbon emissions.

Prior Scenario

Two of the locations (Got Ngur village and PaminOlango site) have some form of energy infrastructure. Got Ngur has a solar-biomass hybrid plant (50kW in total) while PaminOlango site had a 32kW biomass gasification plant. However, these installations are limited in capacity and scope. The remaining locations have no renewable energy installations.

Estimates of GHG Emission Reduction

35.754 tons of GHG reductions are estimated yearly and 357,543.81 tons of GHG reductions during the 10 years of duration of the project. The substitution of fossil fuels for power production, and the carbon sequestration in biomass cultivated for use in biomass gasification facilities will all contribute to this decrease.

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 scopes:

Energy industries (renewable sources): The project involves the creation of bioenergy power plants, integrating biogas and biomass gasification technology alongside solar power.

Energy demand: The project seeks to supply electricity to rural communities, affecting energy demand by offering a sustainable and renewable source of power.

The project is a grouped project.

Sectoral scope:

1- Energy (renewable/non-renewable)

2- Energy distribution

3- Energy demand

Project type: Type 1 Energy

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:

The project is eligible because it generates clean, renewable energy and addresses the reduction of greenhouse gas emissions.

The project aims to provide clean electricity through biogas and management of manure and other waste.

The project activity is supported by methodologies approved by the VCS program and CDM including:

AMS-I.D - Grid connected renewable electricity generation Version 18.0

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

The project is a grouped project.

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.

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).

As a grouped project, some of the important points regarding BEPARLE design and the eligibility criteria for the inclusion of new project activity instances are:

Scalability and Replicability: BEPARLE's design is made to be scalable and replicable across other rural Ugandan locations, and even in similar environments within Africa. As such, every new instance of project activity must be in a location with a comparable need for agricultural value addition services and renewable energy sources to maintain its effectiveness.

Consistent Technology Application: A set of consistent technologies is used across all instances, which include solar PV systems, biogas plants, and biomass gasification plants. For any new project activity instance to be considered, it must implement the same set of technologies in accordance with the project description.

Baseline Scenario: A similar baseline scenario must be applicable to all new project activity instances. The construction of a renewable energy infrastructure typically represents a substantial shift in a field that usually relies on less effective or non-renewable energy sources.

Additionality: It's necessary that new project activity instances demonstrate additionality. This represents the reduction in GHG emissions that result from project activities which

wouldn't have occurred in the absence of the project. Factors demonstrating additionality could include investment barriers, technical hurdles, and other challenges that would have prevented the establishment of a renewable energy infrastructure without the intervention of the project.

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 project owner of the project is Mandulis Energy. The licence of the first site shows the evidence of the legislative right. Feasibility studies are currently being conducted on the 7 other locations. An environmental Impact Assessment was conducted in the first location for the establishment of an hybrid solar power plant of 44kW.

1.8 Project Start Date

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

1/01/2024

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 crediting period comprise 10 years starting the 1/01/2024 and ending the 31/12/2033

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)
2024	5258
2025	15773.99
2026	42063.98
2027	42063.98
2028	42063.98
2029	42063.98
2030	42063.98
2031	42063.98
2032	42063.98
2033	42063.98
Total estimated ERs	357543.81
Total number of crediting years	10
Average annual ERs	35.754

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.

Project Activity for BEPeARL

Eight rural villages in Northern Uganda will get renewable energy infrastructure as part of the BEPeARL initiative. The main goal is to provide these areas access to inexpensive, environmentally friendly energy while also lowering GHG emissions and promoting economic growth. The project makes use of a number of different technologies, including solar PV systems, biomass gasification, and biogas.

Description and Use of Biogas Plants

Cow dung and green biomass will be used in biogas plants as the feedstock for the anaerobic digestion that produces biogas. There will be 250 kW biogas plants at each location. A clean, renewable energy source that may be utilized to produce power is biogas.

Net reductions in GHG emissions

The usage of traditional fossil fuels to generate power will be replaced by the biogas plants. As a consequence, there will be a decrease in GHG emissions since burning biogas emits far less CO₂ than burning fossil fuels. By using cow dung in biogas facilities, methane emissions that would have resulted from the dung's natural decomposition are also avoided.

Implementation and Description of a Biomass Gasification Plant

Each location will also include a 250 kW biomass gasification facility. Using this method, biomass resources are transformed into a combustible gas that may be utilized to produce power. For a continuous supply of power, particularly during times when solar energy is not available, the biomass gasification plant is essential.

Net reductions in GHG emissions

Biomass gasification facilities will take the role of traditional fossil fuel-based energy production, just as the biogas plants did. By generating power from renewable sources, net GHG emission reductions are achieved.

Implementation and Description of Solar PV Systems

A 125 kW solar PV system will be installed at every site. Solar energy systems are a practical approach to use renewable energy since Northern Uganda has an average of six hours of sunlight every day. Solar power produces clean energy with no greenhouse gas emissions.

Net reductions in GHG emissions

By substituting a renewable and clean energy source for the production of electricity from fossil fuels, solar PV systems will lower GHG emissions.

The Equipment and Systems

Primary Production/Manufacturing Technologies

- Anaerobic digesters: Based on the manufacturer's recommendations, these devices have an average lifespan of 20 to 25 years for the generation of biogas.
- Gasification Units: For the gasification of biomass, these devices generally have a lifespan of 15 to 20 years.
- Solar PV panels: According to the manufacturer's specs, they have an average lifespan of 25 to 30 years.
- Generators and turbines: To create power from syngas and biogas. 20 to 30 years on average.
- Battery Banks: 400 kWh of energy storage capacity, 10 to 15 years on average of life.

The Baseline Scenario

According to the baseline scenario, the majority of the villages in Northern Uganda depend on conventional, non-renewable energy sources like diesel generators and biomass (firewood and charcoal) for lighting and cooking. Not only are these sources unsustainable, but they also greatly increase GHG emissions.

Equipment in Use Before Implementation

Prior to the BEPARLE project's execution, the villages have little to no access to contemporary energy facilities. For illumination and cooking, the bulk used kerosene lights and conventional biomass. They rely on diesel engines for milling.

Relations and Services

The BEPARLE project's systems will provide energy for lighting, supporting academic institutions, and powering small companies. Additionally, the initiative would provide 1,000 farmers with services for agricultural value addition.

The same services would have been offered in the baseline scenario using less eco-friendly methods such as diesel engines, burning wood, charcoal, or kerosene, leading to greater GHG emissions. These services will be delivered sustainably and environmentally-friendly thanks to the BEPARLE initiative.

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.

1. Got Ngur Village, Paromo Parish, Purongo Sub County, Nwoya District (2.60191, 31.84013)
2. Laleya village, PaminOlango Parish, Gotapwoyo Sub County, Nwoya District (2.629911, 31.699074)
3. Ongedo village, Mede Parish, Palaro Sub County, Gulu District, Uganda (3.153167, 32.316950)
4. Bwobonam village, Alero Sub County, Nwoya District, Uganda (2.677517, 31.988533)
5. Ongalo village, Ogwech Parish, Lokung Sub County, Lamwo District, Uganda (3.557283, 32.741467)
6. Nam-Abili village, Nam Parish, Adilang Sub County, Agago District, Uganda (2.674633, 33.434167)
7. Nam-Odio village, Nam Parish, Adilang Sub County, Agago District, Uganda (2.647250, 33.441850)
8. Bungu village, Lii Parish, Lii Sub County, Nwoya District, Uganda (2.485350, 32.215767)

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).

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.

The baseline scenario is the same as the conditions existing prior to the project initiation, refer to Section 3.4 (Baseline Scenario)

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.

Environmental Policies in Uganda

- The National Environment Management Policy, 1994

The overall goal of this policy is the 'promotion of sustainable economic and social development that enhances environmental 'quality without compromising the ability of future generation to meet their own needs. The policy aims at conservation and restoration of the environment, raising public awareness, and ensuring individual and community participation in environmental and development activities.

Relevance of the Policy to the Project: At the national policy level, environment and development are interrelated and this policy requires that environmental aspects are considered in all development projects such as the proposed project. Environmental Impact Assessments (EIA) have been carried out and are under going for the proposed project to ensure sustainable development, as the project is likely to result in environmental impacts.

- The Land Use Policy, 2004

In support of the national objectives on poverty eradication and economic growth, while at the same time ensuring sustainable utilization of natural resources including land and water, the National Land Use Policy's main goal is 'to achieve sustainable and equitable social and economic development through land utilization in Uganda. The specific objectives of the policy include among others to:

- Promote land use activities that ensure sustainable utilization of natural resources for national socio-economic development.
- To ensure planned, environmentally friendly, affordable and well-distributed human settlements for both rural and urban areas.
- To reverse and alleviate adverse environmental effects at local, national, regional and global levels.

Relevance of the Policy to the Project: the policy requires planned development and environmental protection. Environmental Impact Assessments (EIA) have been carried out and are undergoing aiming at ensuring sustainable operation of the proposed project activities through implementation of the proposed mitigation measures in order to conform to this policy.

- Child Labor policy, 2006

This policy prohibits employment of children. Children are more prone to accidents at workplaces. The policy defines child labor as:

Environmental Project Brief for the proposed Hybrid Solar - Biomass Gasification power plant

- Work that is mentally, physically, socially and/or morally dangerous and harmful to children. In addition, child labor is perceived as work or activities that interfere with children's school attendance.
- Hazardous work, which by its nature or the circumstances under which it is performed jeopardizes the health, safety and morals of a child.

Relevance of the Policy to the Project: Mandulis Energy will ensure strictly no employment of children at the plant in accordance with this policy.

National legislations in Uganda

- The Constitution of Uganda, 1995

The 1995 Constitution of the Republic of Uganda provides for state protection of important natural resources such as land, water, wetlands, minerals, fauna and flora on behalf of the people of Uganda under Objective XIII. It provides for creation and development of Parks, Reserves, recreation areas and conservation of natural resources by central and or Local Governments under Objective XXVII. The same objective further obligates the state to promote the rational use of natural resources so as to safeguard and protect the biodiversity of Uganda.

Relevance to the Project: The constitution is the cardinal law in Uganda upon which all environmental laws and regulations are founded. All environmental impact actions of the

project are therefore meant to conform to the broader objectives of the Constitution which requires a health environment for all citizens. Mandulis Energy will ensure that the project does not affect this right.

- The National Environment Act, No.5 2019

The object of the National Environment Act is to further the principles of environmental management by facilitating the conservation and enhancement of the environment. The Act provides for wildlife protection and contains provisions which can be applied to the protection and sustainable use of wildlife. It includes provisions for the conservation of biological resources in situ, and the selection and management of protected and buffer areas. The act under Section 3(a) Schedule 4 provides a basis for environmental impact assessment at the level of Environment and Social Project brief for this nature of project.

Relevance to the Project: The Act governs and guides environmental management in Uganda. The environment and Social project brief has been prepared in compliance to the requirements of this Act.

- The Environmental Impact Assessment Regulation, 1998

The EIA regulations of 1998 holds for all projects/activities listed under the third schedule of the National Environment Act of 1995. The regulations state in part III, section 10 that environmental impact studies shall be conducted in accordance with terms of reference developed by the developer in consultation with the Authority and the lead agency and that the study shall be conducted in accordance with the guidelines adopted by the Authority in consultation with the lead agency under subsection (8) of section 19 of the National Environment Act. Section 12 of these regulations also requires that the public participate in the Environmental Impact Assessment process.

The regulations make it an offence for any person to commence, proceed or execute any project with significant impact on the environment without approval from NEMA.

Relevance to the Project: EIA has been made in compliance with this requirement.

- The National Environment (Waste Management) Regulations S.I No. 49 of 2020

The regulation provides for a person who owns or controls a facility or premises; which generate waste, to minimize the waste generated by adopting cleaner production methods. Subsection 1 (b) Identify and eliminate potential negative impacts of the product/waste. Subsection (c) Incorporate environmental concerns in the design and disposal of a product.

Relevance to the Project: These regulations apply to both construction and operation-phase waste which should be managed in a way such as to avoid

environmental and public health impact. Mandulis Energy will ensure there is proper contractual agreement with licensed solid waste handlers and that solid wastes are disposed in the manner prescribed.

- The National Environment (Standards for Discharge of effluent into Water or on Land) Regulations, 1999

This regulation under section 3(standards for effluent), states that the standards for effluent or waste water before it is discharged into water or on land shall be as prescribed in the Schedule to these Regulations. Section 4 (1) states that every industry or establishment shall install at its premises, antipollution equipment for the treatment of effluent, chemical discharge emanating from the industry or establishment. Section 4(2) appeals for the installation of the anti-pollution equipment in a practice that is environmentally friendly.

Relevance to the Project: All effluent produced from the proposed project operations will be treated prior to discharge.

- The National Environment (Noise Standard and Control) Regulations, 2002

Section 7(1) states that "No person shall emit or engage in any activity that emits or likely to emit noise above a maximum permissible level specified in Section 6 and Schedule 1 of these Regulations, unless permitted to do so by these regulations.

Section 8(1) provides for the duty to control, noise. It shall be the duty of the owner or occupier of a facility or premise or machinery to use the best practicable means of ensuring that the emission of noise from the premises does not exceed the standards and limitations set in these regulations.

Relevance of the law to the Project: Both during construction and operation of the proposed plant, noise generated shall not exceed limits prescribed by these regulations.

- The Land Act, Cap 227 of 2000

The Land Act provides for the tenure, ownership and management of land in Uganda, and amends and consolidates related legislation. The Land Act provides for four forms of land tenure; freehold, leasehold, customary and mailo. The Act enables government (national or local) to acquire land, for the purpose of wildlife protection. The Act also has provisions which oblige an occupier of land to manage and utilize the land in an environmentally sound manner, and in accordance with provisions of the National Environment Act, the Forestry and Tree Planting Act, the Wildlife Act and other relevant legislation. The provisions of the Act are compatible with the allocation of wildlife use rights on private and community held land.

Relevance of the law to the Project: Key considerations on this law are that, the land owner has to use the land consistently with the existing laws and that; all forms of land tenure are recognized on matters of land acquisition for the project.

- The local Government Act, Cap 243, 1997

The Local Government Act, 1997 provides for decentralization and devolution of Government functions, powers and services from the central to local governments and sets up the political and administrative functions of local governments. The local governments are responsible for the protection of the environment at the district level. This therefore, implies that local governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment.

Relevance of the law to the Project: The project will be under jurisdiction of Nwoya District, which is mandated under the Local Governments Act, Cap 243 to sanction and oversee development projects in the local government. The District Environmental Officers is mandated to inspect and monitor environmental considerations for development projects in their areas of jurisdiction. The local authorities have been consulted during the first EIA process and will do the same for the rest of the sites. Mandulis Energy will work with the local authorities throughout the operation of the project.

- The National Environment (audit) Regulations S.I No.47 of 2020

Section 14 of this Regulation provides for the preparation of an Audit 12months after start of works hence, this project will commission an Audit after 12 months of its start.

Relevance of this regulation in this project: Once if this project is issued with NEMA approval certificate, the developer is mandated to undertake an Environment compliance audit and submit the results of the audit to NEMA 12 months from the time the certificate is issued.

Health and Safety Legislation

- The Occupational Safety and Health Act, 2006

The Occupational Safety and Health Act of 2006 consolidate, harmonize and update the law relating to occupational safety and health and repeal the Factories Act of 1964. It makes provisions for the health, safety, welfare and appropriate training of persons employed in work places. The Act provides for safe access to the workplaces and safe work practices which applies to this project as well.

Relevance of the law to the Project: The Act is applicable in relation to protection of the construction workers and operation staff against secondary injuries during execution of

their duties or work. Mandulis Energy must provide for the protection of workers from adverse weather, provision of a clean and healthy work environment, sanitary conveniences, washing facilities, First Aid and facilities for safe drinking water and meals.

- The Public Health Act, Cap 281, 1964

The Public Health Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. It gives local authorities powers (Section 103) to prevent pollution of watercourses in interest of public good.

Relevance to the project: This Act relates to disposal of waste from the proposed project in so far as improper handling, disposal of solid waste and effluent some of which will be classified hazardous, could potentially impact the public health. The project will be maintained according to standards to prevent activities that would be a nuisance to the public.

- The Employment Act, 2006

The Employment Act 2006 is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management and compensation of workers. The Employment Act 2006 is based on the provisions of Article 40 of The Constitution of Uganda. The Act mandates Labor officers to regularly inspect the working conditions of workers to ascertain that the rights of workers and basic provisions are provided and workers' welfare is attended to.

Relevance to the Project: The Act will govern labor type and conditions under which the people hired by the project work. It prohibits Child labor (a condition the contractor must comply with) as well as providing guidance on work rights during the operation phase.

- The Workers Compensation Act, Cap 225

Section 28 of the Workers' Compensation Act of 2000 states that; where a medical practitioner grants a certificate that a worker, is suffering from a scheduled disease causing disablement or that the death of a workman was caused by any scheduled disease; and the disease was due to the nature of the worker's employment and was contracted within the twenty-four months immediately previous to the date of such disablement or death, the worker or, if he or she is deceased, his or her dependents shall be entitled to claim and to receive compensation under this Act as if such disablement or death had been caused by an accident arising out of and in the course of his or her employment.

Relevance of the law to the Project: A workers' compensation policy will be implemented as stipulated.

Institutional Framework

- National Environment Management Authority (NEMA)

NEMA is a regulatory authority responsible for coordinating, monitoring and supervision of environmental protection activities in Uganda. NEMA also enforces regulatory compliance during and after implementation of projects.

Relevance of the Institution to the Project: NEMA will approve this report and issue guidelines for project implementation and operation.

- Electricity Regulatory Authority (ERA)

Electricity Regulatory Authority (ERA) is a Statutory Body established in the year 2000 in accordance with the Electricity Act 1999 (Chapter 145 Laws of Uganda). ERA licenses competent operators and owners of Electricity Companies in Uganda's electricity supply industry. It approve equitable prices leading to fair return on investments and sustainability of electricity supply and ensure reasonable prices for end-users.

Relevance of the Institution to the Project: ERA will license Mandulis energy limited to supply electricity to designated people. They will also guide Mandulis on how to apply for the license and participate in the review and approval of the Environment Project brief through giving comments to NEMA as part of stakeholders' consultations.

- Ministry of Gender, Labour and Social Development (MoLGSD).

The Ministry is responsible for ensuring workers are protected while at work and have good working conditions. The Ministry is also responsible for the welfare of workers including enforcing workplace laws and regulations, worker compensation and disputes, Child protection and management of Gender based violence.

Relevance of the Institution to the Project: MoLGSD will register the power generation site as a place and also monitor to ensure that the workers' rights and welfare is well taken care of during the project construction and operation phases.

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.

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).

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 Mandulis Energy for clean energy generation and biochar application" 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 with the commission of the first site on the 1/01/2024.

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.

Has the project proponent posted a public statement saying, “VCUs may be issued for the greenhouse gas emission reductions and removals associated with the clean electricity generation and its byproducts such as biochar in each of the sites established by Mandulis Energy in Northern Uganda.”

☐ 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 with the commission of the first site on the 1/01/2024.

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.*

Uganda has one of the lowest electricity consumption rates per inhabitant in Africa, with access to energy even worse for those living in rural communities. Whereas Uganda's electricity access has reached nearly two thirds of the population in urban areas, in rural areas it is still limited to around one fifth of households only.

Due to this inconsistent supply of energy and electricity, households rely on alternative sources of energy, such as kerosene, firewood, charcoal, and diesel. Agribusinesses rely on diesel-fueled generators. The majority of Uganda's population are rural smallholder farmers, who suffer post-harvest losses and sell crops unprocessed at minimum prices. They cannot afford to process their crops which would allow them to sell at higher prices, because off-grid electricity is expensive and carbon intensive. This perpetuates the vicious cycle of poverty.

The project aims to provide affordable, reliable and sustainable clean electricity to households, businesses and institutions while each of the sites powers an agricultural processing hub for value addition.

This adds a new problem to the crop production already affected by land degradation. The gradually declining soil fertility is the greatest constraint to agricultural production in Uganda. Nutrient loss from Ugandan soils amounts to 87 kg of nutrients (NPK) per hectare per year; in ratios of 38 kg of nitrogen; 17 kg of phosphorus and 32 kg of potassium (Sunday & Ocen, 2015). This loss is hardly compensated by fertilizers, the very low prevalence of fertilizer use by Ugandan farmers—well below 5 percent—is evidence that farmers find it difficult to access fertilizers. As part of this project, Mandulis will supply to farming communities bioslurry, the byproduct of the digestion process, contributing to soil fertility, soil structure and yields of crops improvement.

The project contributes to different SDG: 13 Climate Action , 7 Affordable and Clean Energy, 8 Decent Work and Economic Growth, 12. Ensure Sustainable Consumption and Production Patterns.

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.

As per the applied methodology, there are no leakage emissions envisaged. Hence, leakage emissions are not applicable

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.

N/A

2 SAFEGUARDS

2.1 No Net Harm

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

Potential Negative Environmental Impacts

Change in Land Use

Off-grid bioenergy power plant installation may need land modification, which might result in deforestation or the damage of natural ecosystems.

Mitigation

Land with little or no ecological value or deteriorated land will be used for the project. Whenever necessary, compensatory afforestation will be done to make up for any losses.

Biomass Sourcing

While it is typically sustainable to utilize biomass for energy generation, improper sourcing may result in deforestation and the damage of regional ecosystems.

Mitigation

In order to reduce the negative effects on forests, sourcing methods for biomass will favor waste biomass, such as agricultural wastes. When required, sustainable harvesting methods will also be used.

Recycling and Waste Disposal

To avoid contaminating land and water, the bioenergy process will produce organic waste that has to be appropriately handled.

Mitigation

The biogas plants' waste will be handled carefully. The digestate and other byproducts of the biogas producing operations will be supplied as organic fertilizer to nearby agricultural crops.

Potential Socio-Economic Impacts

Job Displacement

Modern energy systems might replace employment in conventional energy industries like firewood gathering and charcoal manufacture.

Mitigation

During the project's building and operation stages, the BEPARLE project will generate new job possibilities. Long-term, the availability of dependable electricity may encourage regional economic growth, perhaps resulting in the creation of even more employment.

Energy Pricing

Even though the initiative is intended to provide inexpensive energy, there may still be problems with pricing, particularly for low-income residents.

Mitigation

The project's design places a priority on addressing social issues, and the price of electricity will be carefully planned to assure affordability. Additionally, the initiative will seek to ensure that the neighborhood is aware of the long-term financial advantages of converting to cleaner energy sources, such as decreased health expenditures due to less pollution.

Rights to Land

Land ownership may be a complicated subject in rural settings. If land is seized for project purposes without appropriate consultation and compensation, there is a risk of conflict.

Mitigation

Negotiations for any necessary land with local communities will be open and inclusive thanks to the initiative. The procedure shall uphold the rights and traditions of the local people, and where required, fair compensation will be given.

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.

Mandulis Energy recognizes the importance of open and transparent engagement with project stakeholders. Success of any project is hinged on level and quality of stakeholder engagement which is an inclusive process expected to occur throughout the project life cycle. Engagement is more useful when introduced in the early phases of project development and is mainstreamed into all levels of decision-making.

As a requirement by the National Environment Act, No.5 of 2019, the EIA Regulations 1998, Conduct of Environmental Practitioners Regulations, 2001 and Guidelines for EIA in Uganda, stakeholder consultations were carried out during the assessment process of

the first small scale power solar hybrid gasification; the same process will be followed for the new sites:

Interactive interviews were used during consultation. The contacted people fully participated in the identification of impacts (both positive and negative) the proposed project is likely to have on the environmental, social, and economic conditions as well the ecosystem as a whole.

Objectives of the consultations and public participation

The purpose for the consultation process was to identify the positive and negative concerns of the project stakeholders and subsequently suggest mitigation measures. It also helps in identifying other miscellaneous issues which may bring conflicts during project implementation phase. The objectives of the stakeholder consultations as required in the National Environment Act, 1995 was to: 1- Disseminate and inform the public and other stakeholders about the proposed project with special reference to its key components, location and expected impacts. 2- Create awareness among the public on the need for the EIA for the proposed project. 3- Gather comments, concerns and suggestions of the affected parties. 4- Ensure that the concerns of the affected parties are known to the decision-making bodies and the developer at an early phase of project development planning. 5- Establish a communication channel between the interested, would be affected parties, the team of consultants and the developer. 6- Incorporate the information collected in the study by EIA Experts.

Stakeholder identification

The stakeholders, affected persons and beneficiaries of the project were identified after undertaking preliminary consultations. The people to consult were selected on the basis of their closeness to the site, their administrative responsibility in the area and any other who is likely or whose activities are likely to be affected by the proposed project. These included the site neighboring community, residents of Got Ngur village, and Local Government Authorities and the relevant lead agencies such as the Electricity Regulatory Authority (ERA) and the National Environment Management Authority (NEMA)

Findings from community consultations

- Stakeholders consultations

Stakeholder consultation and engagement for Project Brief for planned Establishment of 44KW Hybrid Solar Gasification project in Got Ngur village, Paromo Parish, Purongo Sub County, Nwoya district was undertaken in accordance with the NEMA guidelines for seeking opinions and views on the environmental aspects of project(s). The local legal framework of consultation activities and project disclosure requirements, particularly in respect of public consultation activities that are directly required, were also consulted. In this regard, the key steps within the overall stakeholder consultation and engagement process include –

- Identifying and notifying stakeholders of the EIA;
- Holding meetings (formal and informal);
- Making provision for stakeholders to review and comment on all reports; and
- Making a record of responses to comments and concerns available to stakeholders.

- Consultation meetings

During the stakeholders consultation phase, formal and informal meetings were held with some of the stakeholders, who were available at the time of the site visit conducted on 12th-Nov- 2020. The stakeholders consulted during the scoping mission included among others; the farming community of Got Ngur site and the project proponents to seek their views, opinions and ideas regarding the project. Below pictures show sampled pictures from the stakeholder's meetings held during the scoping phase



Figure 5-1: consultation at Got Ngur Village



Figure 5-2: Getting views and opinions of community members

- Comments Register

A register containing all available contact details of stakeholders was compiled and a record of all comments and observations made during the entire ESIA process for the

proposed project maintained. Next table provides a summary of the issues and concerns raised thus far during the study.

Raised by	Raised When and Where	Occupation and Contact	Concerns/Comments
Akello Agnes Ebong	12 th -11-2020 At office the Residential District Commissioner	RDC Nwoya 0772651545	- This project is welcome and hopes that it will provide alternative power to the community of Got Ngur and surrounding area - Pledges to support the developer with necessary support for faster project realization - The key technical staff of the district should be consulted and their guidance followed - Hopes that the project will help the farming community to add value to their produce - Has no objection to the proposed development in the area
Jesca Ongeientho	12 th -11-2020 At office of the Chief Administrative Officer	ACAO Nwoya 0772587643	- Welcomes the project to Got Ngur in Nwoya - Highlighted that the stakeholders will cooperate to ensure project success - Suggested that the district key stakeholders should be engaged for appropriate guidance - Implored the team to engage the community to own the solar power project - Highlights the need for capacity building on solar power Interventions - Pointed out the need for routine engagement of the District leaders
Akena Geoffrey	12 th -11-2020 At office of the District Community Development officer	Nwoya District CDO 0772309960	- The intentions of the project are very welcome - Expects that the ESIA process is expedited quickly to enable project implementation. - Ensure to massively educate the area community on the importance and benefits of the solar power project - The Got Ngur community must participate during project implementation for it to succeed - Implores the ESIA team to help identify all impacts and suggest appropriate interventions - Has No objection to the ongoing feasibility studies
Acca Everline	12 th -11-2020 At office of the Senior District Environment officer	Nwoya Senior Environment officer 0777482657	- The Environment and social Impacts assessments process should be speeded so the project is fast implemented - There is urgent need to identify the impacts and mitigation measures and the Environment management plan - The community of Got Ngur needs to be thoroughly sensitized on the impacts of the project - The project should benefit the entire community - Ensure to present a comprehensive report that captures all baseline and impacts
Lakony Lino	12 th -11-2020 At Office of the District Senior Planner	Nwoya District Senior Planner 0772527150	- The project is welcome to Got Ngur - The project is timely and needs to be implemented fast - The project is needed to boost the Energy needs of the community - There is need to standardize the building plans and seek further guidance from the district stakeholders
Otukene Alfred	12 th -11-2020 At the Office of the LC1 Chairman Got Ngur Village	Chairman LC1 0785544453	- Welcomes the ESIA team to the area and hopes all impacts will be well captured. - Expects the project to benefit the community - Mobilize the community and sensitise them on the impacts of the project - Ensure consistent and reliable community engagement - Has no objection to the Solar project in the area and pledges to support it
Aloka Andrew	ERA offices	Senior Environment Officer ERA	- Biomass gasification is associated with emission of gases propose measures in the assessment to mitigate such impacts - Fire eruptions are among impacts expected propose measures to manage such impacts
Albert Kasoba	ERA offices	Engineer ERA	The developer has initiated the process of permitting and is requested to submit all his documents online for further guidance from ERA.

- Perceived benefits

Employment opportunities: Several respondents indicated that the project will provide several employment opportunities during the project cycle from construction to operation. They also requested that the developer considers the several local youths in the area that are currently jobless. In the social sense these young and energetic labor force will be engaged in productive employment other than remaining idle which may lead them into unproductive activities.

Infrastructural development: Community members are happy about the project and they are optimistic that it will bring infrastructural development in the area i.e. Roads and building; it will also help them to have internet access and. other services that require electricity most of the time.

Market for the farm waste as plant raw material: most residents are farmers and they were excited at the fact that they will get market for their farm waste products that would otherwise be thrown as waste. They anticipate to benefit greatly since the plant will require constant supply of these materials.

Increased Market / business opportunities: Throughout the construction period, the proposed project shall provide a sustained market for the supply of various building materials by various businessmen and women from the area such as sand, building blocks, cement and steel metals among others. This will help improve their businesses as well as improve their living standards.

Opening up the place to other investors: The residents noted that the entire area where the proposed project site is located has not yet been fully developed and with the establishment of the proposed project, several absentee land owners in the area may also plan to invest in several other ventures hence opening up the place. With the ever increasing value for land in the area, the land owners may also opt to sell their land to other serious investors who are willing to put up ventures in the area creating employment opportunities and business ventures hence improved living standards of the people in the area.

General area development: the local residents are optimistic that once the project is completed and commissioned, the general development of the area will rise since electricity will support several businesses.

- Concerns raised

Expensive electricity: The residents consulted had concerns over the prices of the electricity and wondered if the wiring won't be expensive.

Project sustainability concern: Most residents asked what would happen should the area run out of the maize cobs and rice husks or in case it's a bad season and there's no maize or rice, would they have no electricity supplied from the plant?

Project area of coverage: Residents asked if the Power Plant will be able to supply the whole area without many power shutdowns.

In general, with support from Rural Electrification Agency and local community in the project area, it is suitable to say that the stakeholders support the development of the project at the proposed site with a few requests, expectations and concerns as mentioned above. Measures to address stakeholder concerns are given below. The list of people consulted is attached in Appendix II of this report.

Measures to address the stakeholder concerns

The wiring will be done by REA on Behalf of Mandulis Energy Limited and Payments will be included on the standard tariffs which means people will be able to pay in installments. Power will also be given through using tokens and each time you pay, a small amount is deducted to take care of the wiring or motor used at the Mill. This arrangement is

anticipated to be affordable. The project will be sustainable. A feasibility study has been conducted prior to the proposal to establish the plant in this particular area. Nwoya District as a whole is one of the leading maize and rice producers. The project is therefore anticipated to have constant supply of raw material. The project area of coverage is a 10km grid in Got Ngur village.

Find below some examples of the people consulted:

ENVIRONMENT AND SOCIAL IMPACTS ASSESSMENT FOR THE PROPOSED 44KW HYBRID SOLAR GASIFICATION PROJECT IN GOT NGUR VILLAGE, PAROMO PARISH, PURONGO SUB COUNTY, NWOYA DISTRICT

CONDUCTED BY:  AERIAL-ENVIRON CONSULTS LTD

CHAIRMAN I.C.I
GOT NGUR VILLAGE
DATE: 12/11/2020
SIGN: [Signature]

COMMUNITY AND DISTRICT STAKE HOLDERS CONSULTATION
DATE: 12TH NOV 2020
NWOYA DISTRICT

No	Names	Sex	Village	WARD	Title / Designation	Telephone contacts	Signature
1.	JESKA OSEIEMTO	F	NDOLE		DCO	0772587643	[Signature]
2.	AKELLO ADENAS ESONG	F	NWOYA		RDC	0772651545	[Signature]
3.	ALONA GEOFFREY	M	NWOYA		ACSO	0772309960	[Signature]
4.	ACCA EVERLINE	F	NWOYA		S.EW.O	0777450657	[Signature]
5.	LAKONY LINO	M	NWOYA		S. PLANNER	0772527192	[Signature]
6.	CHUKENC ALRED	M	GOINGUR		L.C.I. CHAIRMAN	0785544453	[Signature]
7.	ONONGO GODFREY	M	GOINGUR		Student	0786693696	[Signature]
8.	OPITO DENIS	M	GOINGUR		TRICOR	0785271594	[Signature]
9.	ODOK WALTER EUNYISO	M	GOINGUR		VHT	0782302650	[Signature]
10.	OYAT SIMON	M	GOINGUR		FARMER	0774560000	[Signature]
11.	OPRO MAXWEL MASABA	M	GOINGUR		FARMER	0789911327	[Signature]
12.	KWAMA DARI	M	GOINGUR		FARMER	077405553	[Signature]
13.	ODONDA SAMUEL	M	GOINGUR		neighbour	0789831917	[Signature]
14.	WATSON JAMES	M	GOINGUR		student	0793227877	[Signature]
15.	OPOTA DERRICK	M	GOINGUR		student	077636512	[Signature]
16.	ODON JAMES PRIDECK	M	GOINGUR		FARMER		[Signature]
17.							

CHAIRMAN I.C.I
GOT NGUR VILLAGE
DATE: 12/11/2020
SIGN: [Signature]

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED 946.9 SOLAR HYDRO CLASSIFICATION PROJECT IN GOT NGUR VILLAGE, PAROMO PARISH, PURONGO SUB COUNTY, NWOYA DISTRICT

CONDUCTED BY:



AERIAL-ENVIRON

CONSULTS LTD

DATE: 19TH NOV 2020

NATIONAL STAKE HOLDERS CONSULTATION

No	Names	Sex	DEPT	ORGANIZATION	Title / Designation	Telephone contacts	Signature
1	Omino Joseph Oteu	M	ESIA	Aerial-Environ Consults Ltd	ESIA Team leader And Auditor	0774426637	
2	Emmanuel Edupitai Ota	M	Environment & Social Impacts Assessment (ESIA)	Aerial-Environ Consults Ltd	Sociologist	0784787062	
3	Alaka Andrew	M	TAD	GRA	SEO	0988386880	
4	ALBERT KACABA	M	TAD	GRA	PE-CIVIL	0784642829	
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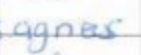
AERIAL-ENVIRON CONSULTS LTD: - "Towards integrated approach for sustainable development"

**STAKEHOLDER CONSULTATION LIST FOR THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE
PROPOSED HYBRID SOLAR - BIOMASS GASIFICATION POWER PLANT IN GOT NGUR VILLAGE, PAROMO
PARISH, PURONGO SUB COUNTY, NWOYA DISTRICT**

Date: 21/07/2020

Location: GOT NGUR VILLAGE

Developer: MANDULIS ENERGY LIMITED

Name	Designation/Address	Contact	Signature
ORYEM JUSTO	GOT NGUR	0783798672	
OLAKA BENIS	GOT NGUR	—	
OMANY PATRICK	GOT NGUR	0789320563	
OLICA ERIC	GOT NGUR	8776429691	
AKANG SARAH	GOT NGUR	0771965081	
OKETTA RICHARD	GOT NGUR	0783795818	
OPIYO GEOFFREY	GOT NGUR	—	
OKOT BENIS	GOT NGUR	077643712	
Aciro Nighty	GOT NGUR	—	
Nyamungu Hellen	GOT NGUR	—	
Opiyo Micheal	GOT NGUR	0786117130	
Lacen Evelyn	GOT NGUR	0772810424	
Anywar Sarah	GOT NGUR	0780107611	
AKELLO BEATRICE	GOT NGUR	—	
OROMA KEVIN	GOT NGUR	0775821646	
AKELLO AGNES	GOT NGUR	0784624458	
MUTHU MURUGAN	GOT NGUR	0787070620	
ADUBU PRISCA	GOT NGUR	0774485725	

**STAKEHOLDER CONSULTATION LIST FOR THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE
PROPOSED HYBRID SOLAR - BIOMASS GASIFICATION POWER PLANT IN GOT NGUR VILLAGE, PAROMO
PARISH, PURONGO SUB COUNTY, NWOYA DISTRICT**

Date: 1.7.2020

Location: GOT NGUR VILLAGE

Developer: MANDULIS ENERGY LIMITED

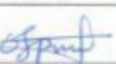
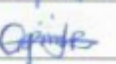
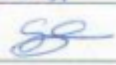
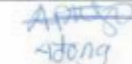
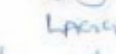
Name	Designation/Address	Contact	Signature
ADL CHRISTINE		07712874512	Adl
ARINGO SUSAN		0776151117	ARINGO
KARAMELLA AKONG		0789322890	Karamella
Adong Fiona		0786813153	Adong
OKELLO ROBERT		0774520256	Okello
LABOL BRENDA		-	brenda
ALUMA TRACY		-	aluma
APIYO JENET		-	Jenet
AKELLO ROSE		-	Akello
ADONG SANTO		0771820826	Adong
OJOK BENIS BINTU		-	Ojok
LAWINO BRENDA		-	Lawino
KUMAKECH KENNETH		-	Kumakech
OJOK ROBINSON			Ojok
APIYO JACKLINE			APIYO
ALANTO JOCK		-	Alanto
LACUM VICKY		-	Vicky

**STAKEHOLDER CONSULTATION LIST FOR THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE
PROPOSED HYBRID SOLAR - BIOMASS GASIFICATION POWER PLANT IN GOT NGUR VILLAGE, PAROMO
PARISH, PURONGO SUB COUNTY, NWOYA DISTRICT**

Date: 1.07.2020

Location: GOT NGUR VILLAGE

Developer: MANDULIS ENERGY LIMITED

Name	Designation/Address	Contact	Signature
Ayella Joel		0780554782	
DATMON JAMES		0793227877	
OKENT ANDREW		0780174520	
UPOKA DERICK CHARLES		0776316512	
ORAN JAMES PATRICK		—	
Okello Reforick Nono		—	
Okello Emmag		0777179788	
Okello Simon Reber			
OPIYO JAMES BILEN		0777932727	
OPIYO VINCENT		075986658	
OKELLO ROBERT		0789390784	
ODONG ISTA		0781752221	
KILASH NELSON		0791022865	
Kilama Michael		0771268198	
OLANGA PATRICK		0776891455	
OKOK David Jory		0772195068	
ARMORIOOTH PATRICIA NANCY		0785293210	
APIYO JACKY		0787979611	
ADONG SHARON		—	
LACUM PRISCILLA		0778428221	

Appendix 3: LC1 Letter of No objection

CHAIRMAN LCI GOT NGUR VILLAGE DATE 01/07/2020 SIGNATURE	PAGE NO. : DATE : / /
THE OFFICE OF LCI GOT-NGUR-VILLAGE. PAROMO PARISH. PURONGO SUB-COUNTY. NWOYA DISTRICT. 01/07/2020.	
TO THE EXECUTIVE DIRECTOR NATIONAL ENVIRONMENTAL MANAGEMENT AUTHORITY PO BOX 22255 JINJA ROAD KAMPALA (U)	
Dear Sir/MADAM	
RE LETTER OF NO OBJECTION FOR THE SET UP OF THE HYBRID SOLAR BIOMASS GASIFICATION PLANT BY MANDULIS ENERGY LIMITED WITH HER PARTNERS.	
I am writing to you to confirm that I have been contacted concerning the socio economic and most importantly the Environmental impacts of the set of the hybrid solar - Biomass gasification plant in our village.	
I have met with the project developer and the various teams and as a community look forward to working together with them to bring power and development to our area.	
We have no objection and recommend your support for this project.	
Thank- You Chairman L.C.1 OTUKENE AIFRED Telephone no 0785544453	
CHAIRMAN LCI GOT NGUR VILLAGE DATE 01/07/2020 SIGNATURE	

2.3 Environmental Impact

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

Mandulis Energy has carried out an Environmental Impact Assessment for a Hybrid Solar Biomass Gasification power plant established by Mandulis Energy Limited in Got Ngur Village, Nwoya District (GPS Coordinates: N2 36.100 E31 50). Involving the

following activities: site preparation, construction of project structures and operation of a modern hybrid Solar - Biomass Gasification power plant with a total production capacity of 44kW.

The ESIA was conducted in compliance with the requirements of the National Environment Act, No.5 of 2019. The objective of this ESIA study was to evaluate the potential environmental and social impacts of the proposed plant and develop mitigation measures that aim at avoiding or minimizing the negative impacts while optimizing the positive impacts. The positive impacts identified include job creation, contribution to government revenue, provision of market for project raw materials, provision of reliable and affordable source of electricity for the local community and optimal use of land among others while the anticipated negative impacts include; soil erosion, air and soil pollution, poor human, domestic and process waste disposal, possible fire outbreaks, occupational safety and health impacts, poor storm water management, and impacts of security. The mitigation measures for the anticipated negative impacts are discussed in detail in the EMMP in Section 8 of this EIS.

Study findings indicate that the project activities are not likely to generate any irreversible or permanent negative impacts as long as the proposed mitigation measures for the anticipated negative impacts are implemented.

Based on the above findings and analysis, the EIA study team recommended the project and its components for approval by the NEMA and the relevant stakeholders. After the complying process NEMA approved the project.

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 applied to the project:

AMS-I.L - Electrification of rural communities using renewable energy

AMS-I.F - Renewable electricity generation for captive use and mini-grid

AMS-I.D - Grid connected renewable electricity generation Version 18.0

AMS-III.D - Methane recovery in animal manure management systems Version 21.0

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

Applied tools are given below:

- “Project emissions from flaring”, Version 04.0;
- “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, Version 03.0
- “Tool to calculate the emission factor for an electricity system”, Version 07.0;
- “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, Version 03.0;
- “Tool for the demonstration and assessment of additionality”, Version 07.0.0;
- “Methodological tool: Investment analysis”, Version 12.0;
- “Methodological tool: Common practice”, Version 03.1

- Methodological Tool: Tool to determine the mass flow of a greenhouse gas in a gaseous stream, Version 03.0
- “Methodological tool Combined tool to identify the baseline scenario and demonstrate additionality”, Version 07.041

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
AMS-I.L - Electrification of rural communities using renewable energy	
The two categories of applicable project activities are: (a) Implementation of individual, renewable energy systems such as roof top solar photovoltaic systems; (b) Installation or extension of an isolated mini-grid which distributes electricity generated only from renewable energy systems.	The project aims to install a hybrid power generation system which employs mini-grid technologies to generate and distribute electricity
This methodology is applicable in situations where consumers that were not connected to a national/regional grid prior to project implementation are supplied with electricity from the project activity.	The project aims to set up 8 sites of the hybrid solar bioenergy power plants in rural communities across Uganda that do not have access to on-grid electricity and are located in areas not designated for on-grid electricity expansion over the next 10 years.
AMS-I.D - Grid connected renewable electricity generation Version 18.0	
This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The project aims to install a greenfield plant
Hydro power plants with reservoirs that satisfy at least one of the following	The project does not entail hydro power plants

conditions are eligible to apply this methodology: (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m ² ; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m ²	
If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project only involves renewable components
Combined heat and power (co-generation) systems are not eligible under this category	The project plant does not combine heat and power systems
In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Each of the sites entails a 625 kW facility
In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The project does not fall under retrofit, rehabilitation or replacement
In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation	N/A

for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS-I.C.: Thermal energy production with or without electricity” shall be explored.	
In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	The biomass of the project is not sourced from dedicated plantations but from the agricultural residues generated in the agroprocessing hub powered by the power plant.
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 excluded ⁷ from this methodology.	The biochar is produced through a gasification process.
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 high technology production facility.
The biochar producers must have a health and safety program to protect workers from airborne pollutants and other hazards.	Mandulis Energy has a health and safety program and equips with the required skills and knowledge to its customers and staff 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	a) The feedstock for generating biochar are agricultural waste such as rice husks, maize cobs and groundnut shells, discarded when processed the crops. b) The residues left in agroprocessing facilities would otherwise be combusted c) The feedstock is produced in Uganda

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.	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 biomass waste are the agro-processing mills on-site which eliminates the need to transport the feedstock over long distances. 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 the final product meets IBI Biochar Testing Guidelines or EBC Production Guidelines thresholds for organic and inorganic contaminants.	In this project, mineral additives are not added.
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 national regulations for avoiding soil contamination	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
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	Mandulis Energy will demonstrate that the biochar is lonlived via one of the following methods: laboratory results, peer reviewed research papers or any other third party-evaluated product assessmen

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, it 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, results in a loss of more than 50 percent of the original biochar carbon material and therefore would not be eligible).	N/A. The biochar is applied in the soil

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
Base line	Feedstock production	CO ₂	No	Excluded. Waste biomass is considered renewable per eligibility conditions.
		CH ₄	No	

Source		Gas	Includ ed?	Justification/Explanation
		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 feedstocks	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	
Project	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 transportation	CO ₂	NO	CO2 would be considered as per CDM Tool 12. But the biochar transportation in the project is done by electrical vehicles
		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	
	Pre-treatment of feedstocks (e.g., grinding,	CO ₂	YES	Included. Emissions associated directly with project activity.

Source	Gas	Included?	Justification/Explanation
drying)	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		

The spatial extent of the project boundary includes the 8 project hybrid power plants and a radius of 10 km, where the biomass waste is sourced and the byproducts are applied.

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 proposed project activity has two major GHG emission reduction components. The first one is the reduction of emissions resulting from generation of clean electricity for household and productive use, and the second one is the use of biogas recovered from improved animal manure management and biomass waste management for generating and distributing clean electricity in under-served rural communities across Uganda. AM0073 “Approved baseline and monitoring methodology – GHG emission reductions through multi-site manure collection and treatment in a central plant”, Version 01.0, states that “Baseline scenario should be identified from the perspective of the owner of central treatment plant, as well as from the perspective of the multiple livestock farms owners”.

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.

Section 3.14 in VCS Standard v4.4. states that “A project activity is additional if it can be demonstrated that the activity results in emission reductions or removals that are in excess of what would be achieved under a ‘business as usual’ scenario and the activity would not have occurred in the absence of the incentive provided by the carbon markets” (2022:34). Moreover, Section 3.14.1 clearly in VCS Standard v4.4 mandates that “Additionality shall be demonstrated and assessed in accordance with the requirements set out in the methodology applied to the project” (ibid.)

In the case of the proposed project activity, the Methodology of AM0073 “Approved baseline and monitoring methodology – GHG emission reductions through multi-site manure collection and treatment in a central plant”, Version 01.0, is applied to the proposed project activity. Demonstration of additionality is accordingly carried as per the methodological Tool: “Tool for the demonstration and assessment of additionality”, Version 07.053.

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.

No methodology deviation is applied in the project

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).

As per AM0073 “GHG emission reductions through multi-site manure collection and treatment in a central plant”, version 01.0, baseline emissions are calculated as the sum

of CH₄ and N₂O emissions that would occur in the baseline animal waste treatment system and CO₂ emissions arising from heat and consumption.

According to the methodology AM0073, baseline emissions are calculated by using equation (16) and include the following sources:

Equation (1) $BE_y = BE_{AW,y} + BE_{elec\ heat,y}$

Where:

BE_y = Total baseline emissions in year y, in tCO₂e/year

$BE_{AW,y}$ = Baseline emissions attributable to animal waste treatment in year y, in tCO₂e/year

$BE_{elec\ heat,y}$ = Baseline CO₂ emissions from electricity and/or heat enerated/consumed in the baseline, in tCO₂e/year

Emissions from animal waste treatment

As per AM0073 “GHG emission reductions through multi-site manure collection and treatment a central plant”, version 01.0, the baseline is the AWMS identified through the baseline selection procedure

Equation (2)

$$BE_{AW,y} = BE_{AW,CH_4,y} + BE_{AW,N_2O,y}$$

Where:

$BE_{AW,y}$ = Baseline emissions attributable to animal waste treatment in year y, in tCO₂e/year

$BE_{AW,CH_4,y}$ = Baseline methane emissions attributable to animal waste treatment in year y, in tCO₂e/year

$BE_{AW,N_2O,y}$ = Baseline N₂O emissions attributable to animal waste treatment in year y, in tCO₂e/year

CO₂ emissions from electricity and heat within the project boundary ($BE_{elec\ heat,y}$)

In accordance with AM0073 “GHG emission reductions through multi-site manure collection and treatment in a central plant”, version 01.0, CO₂ emissions from electricity and/or heat used in the baseline is calculated as shown in equation (10) below.

Equation (10)

$$BE_{elec\ heat,y} = EGB_{l,y} \times CEF_{Bl,elec,y} + EG_{d,y} \times CEF_{grid} + HGB_{l,y} \times CEF_{Bl,therm,y}$$

Where:

$BE_{elec\ heat,y}$ = Baseline CO2 emissions from electricity and/or heat used in the baseline, in tCO2e/year

$EGB_{l,y}$ = Amount of electricity in the year y that would be consumed in the absence of the project activity (MWh) for operating all AWMs facilities, accounted as zero (please see Section 3.3)

$CEF_{Bl,elec,y}$ = Carbon emissions factor for electricity consumed at the project site in the absence of the project activity (tCO2e/MWh), accounted as zero (please see Section 3.3)

$EG_{d,y}$ = Amount of electricity generated utilizing the biogas collected during project activity and exported to the grid during the year y (MWh)

CEF_{grid} = Carbon emissions factor for the grid in the project scenario (tCO2e/MWh)

$HGB_{l,y}$ = Quantity of thermal energy that would be consumed in year y in the absence of the project activity (MJ) using fossil fuel for operating all AWMSs, accounted as zero (please see Section 3.3)

$CEF_{Bl,therm,y}$ = CO2 emissions intensity for thermal energy generation (tCO2e/MJ), accounted as zero (please see Section 3.3)

In accordance with the methodology of AM0073, the baseline emissions with electricity generation in year y ($CEF_{Bl,elec,y}$) shall be calculated using the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” However, the Tool became inactive in 2015 and is recently replaced with the “Methodological tool – Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, version 03.0.

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).

In accordance with AM0073 “GHG emission reductions through multi-site manure collection and treatment in a central plant”, version 01.0, the project activity might include one or a combination of technologies to treat manure.

According to the methodology AM0073, project emissions are calculated by using equation (13) and include the following sources:

Equation (13)

$$PE_y = PE_{AD,y} + PE_{Aer,y} + PE_{comp,y} + PE_{N_2O,y} + PE_{PL,y} + PE_{flare,y} + PE_{elec\ heat,y} + PE_{CO_2,Trans,y} + PE_{storage,y}$$

Where:

PE_y = Project emissions (tCO₂e/yr)

$PE_{AD,y}$ = Leakage from treatment stage that captures methane (tCO₂e/yr)

$PE_{Aer,y}$ = Methane emissions from the aerobic treatment stage (tCO₂e/yr)

$PE_{Comp,y}$ = Total project emissions due to composting (tCO₂e/yr)

$PE_{N_2O,y}$ = Nitrous oxide emission from project treatment system (tCO₂e/yr)

$PE_{PL,y}$ = Physical leakage of emissions from biogas network to flare the captured methane or supply to the facility where it is used for heat and/or electricity generation (tCO₂e/yr)

$PE_{flare,y}$ = Project emissions from flaring of the residual gas stream (tCO₂e/yr)

$PE_{elec\ heat,y}$ = Project emissions from use of heat and/or electricity in the project case (tCO₂e/yr)

$PE_{CO_2,Trans,y}$ = Project emissions from manure road transportation (tCO₂e/yr)

$PE_{storage,y}$ = Project emissions from manure storage (tCO₂e/yr)

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 covers the emissions from land application of treated manure, outside the project boundary. The project activity includes collecting the manure, treating it with anaerobic digesters and spreading the effluent in fields after treatment. These emissions are estimated as net of those released under project activity and those released in the baseline scenario. In accordance with AM0073 Version 01.0, net leakage of N₂O and CH₄ are only considered if, they are positive. CO₂ emissions due to the road transportation of sludge or treated effluent outside the project boundary are also considered as leakage. Such emissions are calculated in the same as depicted in the project emissions section.

Explanation why the leakages are zero:

- Under both the project activity and the baseline, the treated manure is applied as fermented product in agricultural fields.
- While leakage calculations are determined, the net leakage of N₂O and CH₄ are calculated as negative; hence, the net leakage of N₂O and CH₄ are not considered.
- As per the applied Meth., "Such emission shall be considered as project emissions if the final destiny and itinerary between the treatment plant are included in the project boundary. Otherwise, such emission shall be considered as leakage (LECO_{2,Trans,y}). Since this project considers the road transportation within the project boundary, leakage emission from road transportation is considered as zero.

Equation (28)

$$LE_y = (LEP,N_2O - LEB,N_2O) + (LEP,CH_4 - LEB,CH_4) + LECO_{2,Trans,y}$$

Where:

LE_y = Leakage emissions for the year y, in tCO₂e/year

LEP,N_2O = N₂O emissions released during project activity from land application of the treated residues, in tCO₂e/year

LEB,N_2O = N₂O emissions released during baseline scenario from land application of the treated manure, in tCO₂e/year

LEP,CH_4 = CH₄ emissions released during project activity from land application of the treated residues, in tCO₂e/year

LEB,CH_4 =CH₄ emissions released during baseline scenario from land application of the treated manure, in tCO₂e/year

$LECO_2,Trans,y$ = Emissions from treated residues road transportation in tCO₂e/yr

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.

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)
2024	35,754	0	0	35,754
2025	35,754	0	0	35,754
2026	35,754	0	0	35,754
2027	35,754	0	0	35,754
2028	35,754	0	0	35,754
2029	35,754	0	0	35,754
2030	35,754	0	0	35,754
2031	35,754	0	0	35,754
2032	35,754	0	0	35,754
2033	35,754	0	0	35,754
Total	357,540	0	0	357,540

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	FC _{p,t,p}
Data unit	Percent (%)
Description	Organic carbon content of biochar for each biochar type <i>t</i> produced in production facility <i>p</i> per tonne of biochar, on a dry weight basis (%)
Source of data	At validation stage, both types of production facility may use default values provided in Table 4 and taken from IPCC (2019) Appendix 4: Method for Estimating the Change in Mineral Soil Organic Carbon Stocks from Biochar Amendments: Basis for Future Methodological Development or may provide peer-reviewed data
Value applied	value is determined from a material analysis
Justification of choice of data or description of measurement methods and procedures applied	IPCC (2019) states global estimates of organic carbon content of biochar as a function of feedstock and heating temperature, therefore the value must be calculated based on a biochar material analysis or using default values (EBC, 2022).
Purpose of Data	Calculation of project emissions
Comments	None

Data / Parameter	EG PJ,y
Data unit	MWh

Description	<i>Quantity of net electricity generation supplied to the grid in year y by the project unit</i>
Source of data	<i>Meter reading at the power plant unit</i>
Value applied	<i>31257</i>
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of project emissions</i>
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	<i>Q B,y</i>
Data unit	<i>Tonnes / year</i>
Description	<i>Quantity of biomass used in the gasifier units</i>
Source of data	<i>Measured using weigh scale and volume measurement in-site</i>
Description of measurement methods and procedures to be applied	<i>The biomass waste will be fed in the gasifier through a fixed size fuel container. Records will be registered in plant log books by the biomass supervisor</i>
Frequency of monitoring/recording	<i>Continuous monitoring. Daily recording</i>
Value applied	<i>46885</i>
Monitoring equipment	<i>weight scale</i>

QA/QC procedures to be applied	<i>The parameter is tracked and logged in recording sheets. Monthly the biomass supervisor will generate a report to be sent to the project coordinator</i>
Purpose of data	<i>Calculation of leakage</i>
Calculation method	<i>The quantity of biomass used is calculated multiplying the weight of biomass stored in standard size container by the number of times fuel-fed in a shift.</i>
Comments	

Data / Parameter	Moisture _{biomass}
Data unit	%
Description	<i>Moisture contained in biomass</i>
Source of data	<i>Third party laboratory test reports</i>
Description of measurement methods and procedures to be applied	<i>As per the requirements in “Tool to calculate the emission factor for an electricity system”</i>
Frequency of monitoring/recording	<i>Annual</i>
Value applied	<i>30</i>
Monitoring equipment	<i>.Loss on Drying method</i>
QA/QC procedures to be applied	<i>% of biomass will be done from a qualified laboratory</i>
Purpose of data	<i>Calculation of baseline emissions</i>
Calculation method	<i>.</i>
Comments	

Data / Parameter	EG PJ,y
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Data unit	MWh
Description	Quantity of net electricity generation supplied to the grid in year y by the project unit
Source of data	Meter reading at the power plant unit
Description of measurement methods and procedures to be applied	energy meter will be used to measure the gross power from the grid
Frequency of monitoring/recording	Continuous monitoring
Value applied	31257
Monitoring equipment	Energy meter
QA/QC procedures to be applied	The parameter is monitored and logged in log sheets
Purpose of data	Calculation of baseline emissions
Calculation method	
Comments	

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.

The project proponent oversees and manages the project activity. A project team has been formed to ensure the activity is carried out correctly. According to state and federal laws and regulations, the project will adhere to all statutory and regulatory obligations. The project team has been given the task of keeping track of the electricity produced, documenting it, and storing the recorded data securely. The project team is also in charge of accurately and appropriately calculating real creditable emission reductions. The monitoring plan was created in accordance with the guidelines in the monitoring portion of the document titled "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories." Category 1.D, version 18, Type I. As per the requirement of monitoring methodology, following parameters will be monitored:

- Quantity of biomass used in gasifier units.
- Net Electricity Generated by the generators using producer gas.

APPENDIX

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