SOIL VALUES
MAINSTREAMING SUSTAINABLE SOIL MANAGEMENT IN THE SAHEL

TECHNICAL FACTSHEET

BIODIGESTER

A biodigester is a sealed (airtight) system that facilitates the anaerobic (oxygen-free) breakdown of organic materials, including manure and animal waste. This device represents an ecological, economical, and sustainable solution for small-scale farms. It aligns seamlessly with strategies for climate resilience and food security while also enhancing soil fertility and supporting the rural energy transition.

The manufacturing process of a biodigester results in two primary products:

1. Biogas serves as a renewable energy source for various applications, including cooking, lighting, and pumping.
2. Biodigestate, an organic fertilizer in liquid or solid form that is abundant in nutrients, can enhance soil fertility.

Utilizing the biodigester enables you to:

- Create a biofertilizer that is abundant in nitrogen, phosphorus, and potassium to enhance soil fertility and health while also improving soil structure and water retention.
- Utilize organic waste, minimizing pollution and environmental disturbances.
- Minimize deforestation and lower greenhouse gas emissions (prevent methane release and offset CO_2).
- Provide a clean and renewable energy source, decreasing household costs while fostering energy independence and enhancing rural resilience.
- Decrease the burden on women and youth (reduced wood collection).
- Establish local economic opportunities through the manufacture, installation, and maintenance of digesters.

However, the sustainability of this technology relies significantly on enhancing local capacities, ensuring access to funding, and offering ongoing technical assistance.

BIODIGESTER OPERATION

The biodigester system comprises three sections: a tank, a sealed pit, and an open pit. It functions through a biological process known as anaerobic fermentation.

The tank receives the raw materials (cow dung and/or small ruminant manure), which are mixed with water and subsequently transported to the hermetically sealed pit. In this pit, the waste undergoes anaerobic decomposition facilitated by microorganisms. This process generates biogas (mainly methane), which is then collected and directed to either a gas stove or a lamp. The residue (solid digestate) and the effluent (liquid digestate) are gathered in the second open pit and/or third compartment, depending on the design.

UTILIZATION OF BIODIGESTATE

Biodigestate refers to the byproduct produced by the biodigester. This substance serves as a natural fertilizer, abundant in essential nutrients including nitrogen, phosphorus, potassium, calcium, magnesium, and beneficial microorganisms that support crop growth. Biodigestate is primarily utilized as:

- Direct fertilizer for crops: Vegetables, grains, and fruit-bearing trees.
- Compost: Combined with other organic materials to improve soil health.
- Soil structure enhancer: Facilitating water retention and minimizing compaction.

Note: Avoid direct application to sensitive crops without dilution and wear gloves during handling.

STEPS FOR INSTALLING A BIODIGESTER

- Select a site near a water source and organic material.
- Build the primary reservoir (digester) utilizing local materials (concrete, bricks, etc.).
- Install the pipes for the intake of organic matter and the discharge of biogas.
- Incorporate a safety mechanism for gas pressure (safety valve).
- Install a biogas storage vessel (tank, flexible container, etc.).
- Establish a system for the recovery of biodigestate.

As part of the Soil Values program, a business model has been developed to be implemented in collaboration with farmer organizations (community model) or on an individual basis, focused on the utilization of the biodigester to:

- Encourage the adoption of the technology.
- Create revenue for producers and/or cooperatives.
- Lower energy and fertilizer expenses.
- Enhance soil fertility and boost agricultural productivity.

The value chain related to the biodigester involves:

- Waste collection: Manure, organic materials, sludge.
- Transformation: Biodigester (production of biogas and digestate).
- Utilization and improvement:
  - Biogas: Household cooking, agricultural drying, water pumping.
  - Liquid/solid digestate: Application in fields or local resale.
- Marketing: the sale of digestate to market gardeners and rice cultivators.

REFERENCES

- *Final report on field activities for the Soil Values program in Mali, in partnership with Solar Plus. Project to build eight biodigesters in the Sikasso region. September 2025*
- *Activity report on the construction of seven biodigesters in the Sikasso region, as part of the field activities of the Soil Values program, in partnership with the company SPEC MALI. September 2025*
- *Salou Daouda. Regional Chamber of Agriculture of Tillabéry, Technical Note: Present Condition of Biodigesters in the Tillabéry Region. December 2019*

Actor	Role
Producer groups, women, youth	Production and management of the biodigester, waste collection, use of biogas, and sale of digestate
Soil Values program	Installation support, technical support, training and assistance with installation and maintenance, liaison with financial institutions
Local enterprises, artisans	Installation support, technical support, training and assistance with installation and maintenance, liaison with financial institutions
Financial institutions, Village Savings and Loan Associations (VSLAs)	Financing through micro-loans, leasing, or deferred payment
Local authorities, technical services, local NGOs, etc.	Awareness raising, technical support, and close monitoring

SUGGESTIONS FOR SUCCESSFUL EXECUTION

- Conduct training and awareness-raising: Provide hands-on training sessions focused on the design, installation, management, and maintenance of the biodigester; increase awareness among producers, youth, and women regarding the numerous advantages of the biodigester; establish community demonstration sites to illustrate its operation and benefits.
- Enable access to kits, creating inclusive financing options such as micro-loans, targeted subsidies, and similar initiatives.
- Educate and assist local artisans in production, installation, and upkeep to promote local employment,
- Encourage the participation of agricultural cooperatives, women's organizations, and youth in the management and enhancement of biodigestate.
- Offer continuous technical assistance and establish a participatory monitoring and evaluation system to assess the effects of biodigestate utilization, energy self-sufficiency, and more.

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