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FACTSHEET

ANAEROBIC MICRO-DIGESTER PROJECTS GUIDELINE

A guideline for stakeholders involved in the procurement, development and maintenance of anaerobic micro-digesters and their subsequent operation and maintenance.

WHAT ARE MICRO-DIGESTERS?

Conventional anaerobic digestion (AD) to produce biogas is a proven, well known technology in the renewable energy and waste management sectors. During AD, microorganisms break down biodegradable material to create biogas, which is then combusted to generate electricity and heat or that can be processed into renewable natural gas or fuels. Benefits of this technology include waste management, cost savings, and a sustainable source of carbon-neutral energy for heat and power generation. AD is widely applied on a large scale at municipal or industrial wastewater treatment plants. Smaller "micro-digesters" are designed to produce less than 0.5 kilowatts (kW) of power or less than 2 kW of biogas per day and can be used at the household level. These micro-digesters are promising for South Africa to provide heat, gas for cooking, and organic fertiliser. A successful micro-digester project depends on many technical, environmental, and social aspects of a given site.

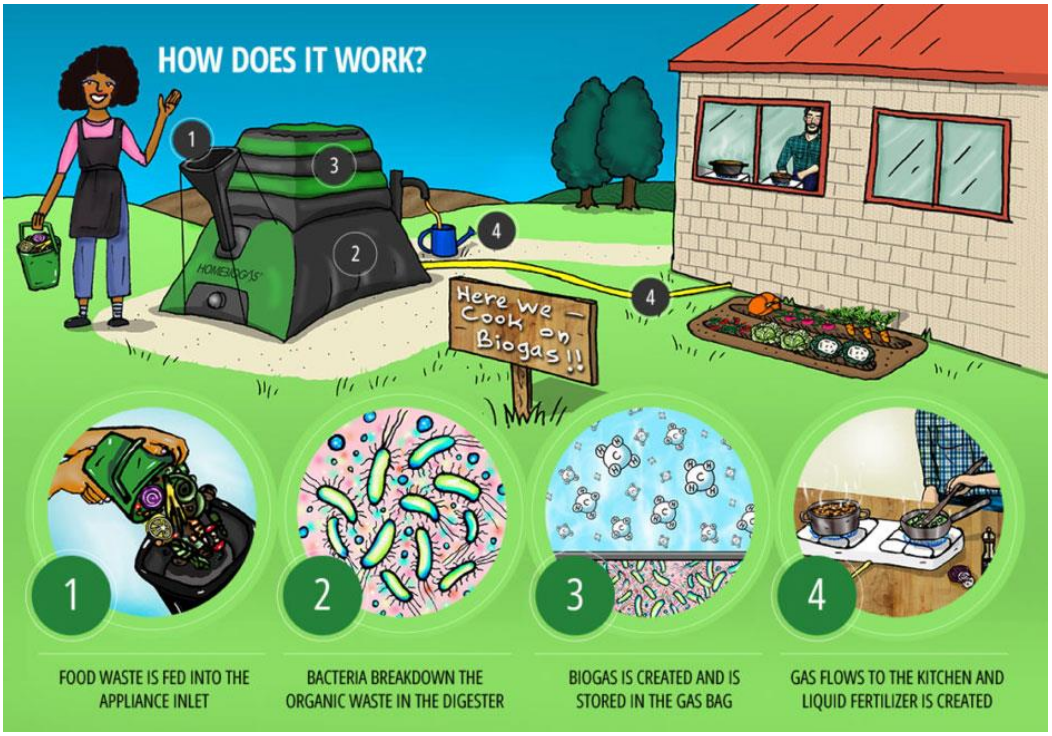

Illustration of a household micro-digester system

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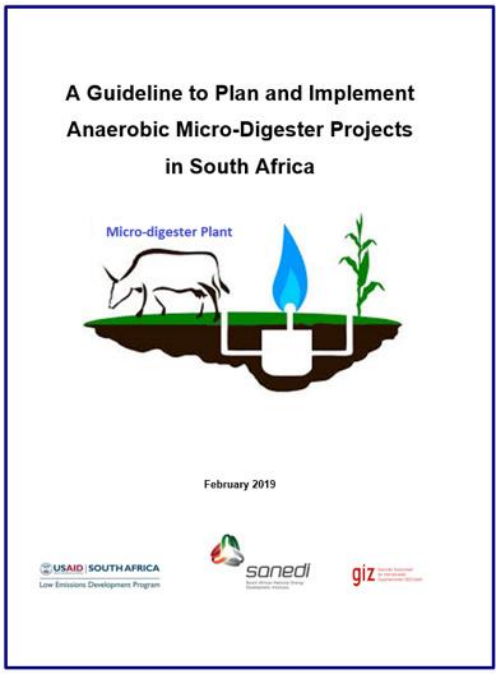
CHALLENGES WITH MICRO-DIGESTERS

The scale of micro-digester failures in South Africa is of concern in the biogas industry. Micro-digester failures are difficult to remedy and can affect the overall long-term success of a biogas rollout program and the general perception and acceptance of biogas technology. Micro-digester failures have been attributed to sub-standard designs, poor materials selection, improper bio-digester construction, inadequate digester management, poor digester feeding habits, incorrect substrate-water mixing ratio, and improper site selection. Many project owners, both in the private and public sectors, also lack the ability or knowledge to compile comprehensive procurement documents with the required level of specifications and scopes of work for project developers and bidders.

THE SOUTH AFRICA MICRO-DIGESTER GUIDELINE

The "Guideline to Plan and Implement the Anaerobic Micro-Digester Projects in South Africa" (seen at right) was developed in response to a recommendation from a 2016 study by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, conducted on behalf of South Africa's National Biogas Platform's: Micro-digester Working Group, which highlighted that:

> "*a sustainable response to the biogas failures would be to develop and communicate a comprehensive guideline which covers the full life-cycle of a micro-digester project, starting from project inception to the decommissioning and disposal of the bio-digester.*"



The Guideline details all aspects to consider throughout the lifecycle of a biogas digester project in order to assist the user in project design, planning, procurement, implementation, and monitoring of a project. The Guideline draws from international and local South Africa experience with similar projects.

The Guideline focuses on the major and most commonly implemented digester types, which form the basis and fundamentals of micro-digester design and implementation upon which other designs are developed.

THE GUIDELINE COVERS

- Identification of early adopters
- Profiling qualifying criteria
- Project appraisal
- Coaching of beneficiaries
- Procurement guidelines
- Implementation of micro-digester projects
- Monitoring of biogas projects
- Opportunities and support for SMMEs

WHY IS THE GUIDELINE IMPORTANT?

The Guideline presents the biogas industry of South Africa with clear specifications for contractors to ensure high quality and ethical service delivery for more successful small-scale biogas projects in the country.

The Guideline aims to achieve this by providing information on the critical aspects of implementing a micro-digester project. It

constitutes an essential source of information for individuals or entities involved in the planning, procurement, financing, design, construction, operation, maintenance, and monitoring of micro-digester systems.

THE NATIONAL BIOGAS PLATFORM

The Department of Mineral Resources and Energy (DMRE), formerly the Department of Energy (DoE), together with the GIZ established the National Biogas Platform in order to address challenges associated with implementing biogas projects.

The National Biogas Platform has the following working groups: streamlining of environmental licensing, marketing of digestate for fertiliser, commercial viability, information gathering and awareness creation, research on waste-to-energy (W2E), and micro-digesters, led by the South African National Energy Development Institute (SANEDI) and the DMRE. The National Biogas Micro-Digester Working Group was formed by combining the "Small Scale"- and "Rural Digesters" Working Groups. Its mandate is the advancement of the micro-digester industry in South Africa. The micro-digester project steering committee included: DMRE, SANEDI, SA-LED, GIZ, United Nations Industrial Development Organization, The Innovation Hub, and the South African Local Government Association.

WHO SHOULD USE THE GUIDELINE?

The micro-digester guideline was developed primarily for stakeholders involved in the procurement, development, and maintenance of anaerobic micro-digesters and the production chain. A special focus is placed on the following stakeholders:

- Service providers responsible for the development and implementation of the anaerobic micro-digester project(s)
- Municipal technical officials responsible for service delivery and promotion of the country's developmental and sustainable objectives, e.g., energy provision
- Beneficiaries (e.g. households) responsible for the day-to-day operation of the anaerobic micro-digester, in order to sustain its performance

HOW TO APPLY THE GUIDELINE

The Guideline covers the full lifecycle of an anaerobic micro-digester project, from inception, feasibility study, implementation, operation, maintenance, and even to the decommissioning or mothballing of the micro-digester, should the need arise. The Guideline is aimed at helping individuals or entities improve the performance of anaerobic micro-digesters. The Guideline also recommends the most suitable digester type and operation mode based on the climate and weather conditions in different regions of South Africa by using a multi-criteria decision analysis approach.

ACKNOWLEDGEMENTS

The Guideline was developed by Dr. Charity Mbileni-Morema (NM Envirotech Solutions) and Professor Golden Makaka (Physics Department, University of Fort Hare, South Africa) with support and guidance from the National Biogas Platform's Micro-Digester Working Group's Steering Committee composed of SANEDI, DMRE, The Innovation Hub, GIZ, and SA-LED.