

# FLEXI BIOGAS SYSTEMS

## OFF-GRID ENERGY SOLUTIONS

**Sustainable Affordable Renewable Green Energy for Every Household**

Flexi Biogas Solutions are the cleanest, greenest, most affordable & sustainable, portable and simple to operate biogas system yet developed.



***Rural Domestic Total Energy Solutions***  
***(Kirehe, Rwanda IFAD Portable Biogas IMI)***



***True Blue - pure energy***



***Assembly – only 1 day***



***Operation within 7 – 10 days***

The systems are fabricated from specially treated robust materials designed to withstand all weather conditions. The fabric is manufactured to last over ten years, and we further enhance its lifespan can be enhanced by applying a sunscreen UV block solution every seven years. We further enhance the lifespan by housing the system in a Micro-greenhouse tunnel that not only shields the digester against the harmful effects of direct solar UV rays, but also enhances and maintain high temperatures that increase the fermentation process and hence delivering unmatched efficiency and performance.

The tunnel also shields the system from farm animals and critters such as children who believe the system is their personal bouncing castle ☺



## PORTABILITY



*5 Systems ready for dispatch*



*Boda-boda (motorcycle taxi) to anywhere*

## 3 HOUR INSTALLATION

Flexi systems install in only a few hours and normally will be operational within 7-10 days. For guaranteed sustainability, we request the users to provide us at least 3-4 people for training on operation, troubleshooting and maintenance during the installation.

Otherwise, the system is fully automated and maintenance free with no extra input costs.



*Ground prep*



*Laying the envelope*



*Housing the Micro-tunnel*



*Plumbing*



*Training – loading*



*- “what to” & “what not to”*



*Clean, Green, Serene*

## EFFICIENCY UNMATCHED

With unmatched efficiency, 20 – 25 kg of feed stock, or dung from a single cow will provide all the daily cooking fuel requirements for the typical 4-6 member homestead. This includes cooking “githeri” (traditional maize and beans favourite), which can takes up-to and over 3 hours cooking.



*1 Cow (or No cow)*



*Solar Capture – Micro-Greenhouse Tunnel Technology*



## NO COW NEEDED

Flexi Biogas systems will run on virtually any biodegradable matter - cow, pig, goat, sheep, rabbit or/and chicken dung, kitchen waste, market waste, grass, water hyacinth, farm weed and garden clippings, ... etc

*Points to Ponder - Flexi Biogas Systems are the ONLY Domestic Biogas Systems Globally that will run on 100% chicken poop.*

“In fact you do not need a cow to own the Flexi system.”



*Anything Bio-degradable goes – Animal waste, Garden weeds, Kitchen and market waste, Water hyacinth, Mathenge, ... etc*

## PURE CLEAN ENERGY

Larger capacity systems will produce sufficient gas to run machinery such as chaff cutters, water pumps, generators, etc improving efficiency, productivity and quality of the daily chores on the typical small-scale farms.



*Generator, Chaff cutter etc*



*Biogas Chick Brooding*



*Biogas-Solar Combo Dehydration*

## SUSTAINABILITY

Upon installation, we further train the users on how to run and maintain the system, what does and what doesn't, troubleshooting the system and how to solve hitches. We are also available 24/7 to offer technical support to all our clients via mobile phone and email.



*... the old, the young, the everyone*



## SCALEABILITY



*Institutional and large scale capacity – the sky ...*

## PURE ORGANIC BIO-SLURRY



The large volume of output bio-slurry is a mineral rich, seedbed ready organic fertiliser requiring no further processing or curing. This is an added invaluable asset to every farm ensuring food security in the country. 99% sterilised, the bio-slurry has no smell, and does not attract undesirable flies, maggots etc



*Flexi biogas = Food security*



# BIOSANGAS TOILET SOLUTIONS

## Bio-sanitation Toilets & Biogas System



Hygienic toilets are a major challenge in institutions and children's homes. Flush toilets are a huge waste of fresh water resource.

The BioSanGas Toilet provides a clean hygienic solution whilst producing biogas and a rich fertiliser.

Although the biogas produced is perfectly good for cooking, most people would rather not. We therefore suggest the gas be utilised for hot water systems, to run machinery such as chaff-cutters, hammer mill, generate power for running computer lab, etc.

Again, although the bio-slurry from this system is a perfectly good fertiliser, most people are unwilling to use it for food production. We therefore suggest it used for tree planting programs. These include fruit trees, around the compound, live fencing and hedgerows, etc.

The BioSanGas systems are designed and fabricated as complete knockdown kits, and on-site assemble in only a few minutes. Each system as pictured will cater for an average of 50 children or 30 adults per day.

## STOP BURNING OUR CHILDREN'S TOMORROW



- *“Nearly 2 million people die prematurely from illness attributable to indoor air pollution from household solid fuel use.*
- *More than 1 million people a year die from Chronic Obstructive Respiratory Disease (COPD) that develop due to exposure to such indoor air pollution”*

Source - <http://www.who.int/mediacentre/factsheets/fs292/en/>



*... Charcoal, the cancer of poverty ...*

*95% of homesteads in the developing world rely on wood-fuel for their domestic energy*

*We are depleting our forests at a rate of 40% per year*

*If we do not act NOW, in 10 years there will be no trees*



## LIVE TESTIMONIES



*... pictures speak mountains*

## MONEY BACK GUARANTEE



*... look familiar??? (Abandoned failed conventional systems)*



## FLEXI BIOGAS LOCAL PRICE

Model	Production / day - Lts.	Recommended usage	Ksh
<b>BG5</b>	1500-2500	Recommended Domestic model Will supply sufficient cooking fuel for family of up to around 12 member.	61,000.00
<b>BG6</b>	4000-5000	X Large capacity for domestic use and other small farm energy requirements such as chaff cutters, hammer mill, water pumps etc	76,000.00
Turn-Key Technology		All Kits are inclusive of a Flexi Biogas system, all gas-line plumbing and fittings, Kits do not include transport, burners or other accessories. Different models are at user discretion	

### KARIBU (welcome to) ERC - Karen

Biogas International Limited or BIL, a limited liability company was founded in Kenya in the year 2011 and operates from Karen in Nairobi. We have designed our offices as an Eco Resource Centre - ERC, where we design simple appropriate technology tools to alleviate daily challenges on the typical rural farm.

We have spent more than 15 years in research and development, and our products have gone through rigorous development stages to guarantee sustainability. We focus on simplicity, affordability and ease of operation in solutions to daily challenges that will benefit the people and assist in poverty eradication.

We design the tools to use locally available materials and where necessary, off the shelf components. All of our gadgets and tools can easily be assembled by the average local technician.

Tools and equipment are designed to make life ~~a little bit~~ **a lot** simpler for the rural farmer, offer sustainable and affordable total energy solutions, and all in Green mode. Many of our products are custom designed to suit the particular needs of a clients, and we are always designing new gadgets on suggestion of the users.

Our product portfolio includes but not limited to Flexi-Biogas digesters, Biosangas waste management systems, Evapo-coolers, Chick incubators & brooders, Biogas/Solar Combo Fruit & vegetable dryer, Vertical gardens... the list goes on



*Fruit dryers*



*Vertical garden*



*Evapo-cooler*



*Biogas Brooders*



*Gunia Gardening*

### ALL EARS

If you have a challenge or an idea to simplify a task or solve a problem, we are up for the challenge and will more than likely be able to design a gadget or find a solution.

We are all ears to your suggestions and queries, and also appreciate constructive criticism.

**FOR MORE INFO, VISIT OUR ECO-RESOURCE CENTER AT, NGONG ROAD, MWITU CLOSE (NO 33),  
KAREN**

*“... keeping it simple”*

## CONTACTS

Biogas International Ltd  
33 Mwituu Rd, Karen  
Nairobi, Kenya

[www.biogasco.ke](http://www.biogasco.ke)

[info@biogas.co.ke](mailto:info@biogas.co.ke)

[biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com)

Tel

+254 (0) 722 700 530

+254 (0) 724 316 992

Skype: simplylogic

Contact persons Dom & Alfred



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

## FLEXI BIOGAS TECHNOLOGY POSSIBILITIES AND OPPORTUNITIES



Rather than a mere cooking solution, Flexi Biogas has been developed more as an off-grid energy solution rural domestic thermal energy solution & tool for the millions of rural homesteads challenged with a basic commodity and human right, cooking fuel.

Combined with Solar Voltaic, one has a Total Off Grid Energy Solution, and an instant road out of poverty.

### The Lack of Energy is the Driver of Poverty.

Flexi Biogas Technology is designed to do far more than just cooking, with unmatched efficiency, will surplus gas can be used anywhere everywhere conventional fuels are used.

I'm sure you will agree that the lack on energy is the driver of poverty. So the more energy you have, the more work you can do, and the more income you will generate.

## Women & Children

Also know is that in most all developing countries, woman and children do a large majority of the work. I do not think I need to expand here.

In Africa as an example, from the age of 5 to the grave, women spend an average of 3-4 hours in search of and collecting firewood. This translates to 1/3rd of the daylight hours, 1/3<sup>rd</sup> doing domestic chores, and 1/3<sup>rd</sup> in agricultural activities. So you could say, firewood collection consumes half of the time available for woman to be productive in income generating activities. Put another way, women spend half their lives collecting firewood.

By introducing domestic flexi biogas systems, you eliminate the task of fire wood collection and women gains 3 - 4 more hours a day to be more productive. Combine this with excess biogas energy, excess fertiliser, some education and training in how to generate incomes from improved agro practices - value addition to farm product, mechanisation of agro tools etc, and you have elevated her and her family out of poverty forever.

I do believe this is our common goal.

BETA Agro Practices that can introduced and ran on biogas and may include -

1. Water pumping for irrigation etc
2. Heating water for better hygiene in milking parlour etc
3. Grain milling and grinding



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

4. Animal feed chopping
5. Food preservation and value addition by dehydration, pasteurising, processing etc
6. Poultry chick and piglet brooding
7. Electricity generation etc
8. Direct sale of the excess gas
9. Sale of fertiliser
10. ...

The list of possibilities with biogas as the energy source does not end here. Examples of low energy entrepreneurial micro enterprises can include -

1. Phone charging stations
2. Hair dressing
3. Cyber café's
4. Community kitchens
5. Restaurants
6. ...

By default, a direct resultant is mass job creation and employment with endless opportunities.

## BioSanGas – sanitary human waste management and biogas

As the name suggests, the Biosangas Solution is a sanitary human waste management tool that also produces biogas. The system is designed for institutional application such as schools, children's homes, slums, IDP camps, and in general where ever there are large and normally crowded populations without hygienic toilet facilities. In such locations dirty pit latrines are normally adopted that spread disease and contaminate the ground water.

The biosangas system retains the solid matter in an anaerobic environment for extended periods destroying pathogens and fully breaking down into a useable fertiliser.

Without a doubt, flush toilets are by far the most sanitary toilets yet. We have developed a variety of flush water system that separates the water from the solids, then treats the grey water and pumps it back into the cisterns for re-flushing time and time again. Clean water is never flushed down the loo. The solid waste is treated in the digester, and the resultant bio-slurry used as a fertiliser

## Portability & Scalability

In today's day and age, the demand for energy is ever increasing, even at a domestic level. Flexi Biogas systems are 100% prefabricated making them portable and therefore also resalable. Dependant on his / her budget, a farmer can invest in a smaller model, then as and when their energy demand increases, they can sell it on and upscale to a larger model.

## Adaptability

At Biogas International, we produce a wide range of different capacity models, from Small domestic systems primarily for cooking, to Medium-Large domestic systems for cooking with extra energy for other domestic activities, and XL Domestic systems for small farms, and will run small scale machinery and generators for a limited number of hours per day.

On a commercial scale, we have our "Cub" or baby commercial model, Mid Commercial and Large Commercial models.



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

## Applicability

All our systems are 100% prefabricated requiring no construction or brick work on site. Domestic models install in as few as 2 hours, and a few days for the larger commercial models.

Being modular, the systems can meet any energy demand provided feed-stock is available. This also means a new business investor can reduce his initial capital investment by installing only the capacity he requires at the start-up time, and increase his energy capacity as the business grows.

## Versatility

Flexi Biogas technology is extremely versatile and we expect it will open numerous windows and door of opportunity to many in all different fields. We are looking at all possible ways of brining the cost down while staying in business. Biogas International Ltd -BIL, is a social enterprise with low profits to stay in business. With scales of economy, large volume roll-outs will better determine bring prices down and making our Flexi technology even more affordable to the many.

## Opportunities

In here, we are looking to partner with individuals, organisations and companies in the same space, to reach as many homesteads as possible around the globe in helping them improve their lifestyles, and by default preserve our environment.

### FLEXI BIOGAS YOUTUBE VIDEO LINKS

RWANDA – cooking with Flexi Biogas and Lighting by Solar

<https://www.youtube.com/watch?v=5iRk1UBDUCQ>

Flexi biogas technology makes a highlight at the South South Development Expo in Nairobi

<https://www.youtube.com/watch?v=hYHfmgltdB8>

Poo Power - BioDC Genset

<https://www.youtube.com/watch?v=KOXYP6exjkc>

Video interview with Dominic Wanjihia

<http://www.youtube.com/watch?v=qh3mmgiybTw>

GBS TV

<https://www.youtube.com/watch?v=qLjrtXBikaM>

KENYA - Shamba ShapeUp

<https://www.youtube.com/watch?v=vVuogKirJ54>

Ted Talk Dom Rural Off Grid Renewable Energy Solution

<https://www.youtube.com/watch?v=S9rDgybOWkl>

IFAD brochure on Flexi Biogas Technology

<http://www.ifad.org/pub/thematic/biogas.pdf>



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

## GENERAL INFO



*Permaculture Garden by Grete Davies*

## INPUT MATTER

An easy method of understanding the flexi system, one can view it as a “stomach” much the same as our own stomachs. The Flexi Biogas design and operation allows the use of any biodegradable organic matter. **Anything biodegradable goes**, with the anaerobic micro-organisms within the “stomach” doing the rest. The feedstock is “digested” or fermented and broken down into micro elements. Gases, primarily methane and carbon dioxide given off during this fermentation process are termed as Biogas.

So apart from only animal dung, the system will run on any biodegradable matter including kitchen waste & plate leftovers, market place waste, garden weeds, water hyacinth, grass etc. As a standard rule of thumb,

With Flexi Biogas Technology **YOU DO NOT NEED TO HAVE A COW.**

## FEEDING

Plant matter and kitchen waste should be supple, fleshy or leafy. **Avoid dry, fibrous matter and bones.** Finely chop the matter or 'mash' using a large traditional pestle and mortar. The chopped, ground or crushed matter can be mixed with dung if available or simply washing down the inlet funnel with an equal volume of water.

## EFFICIENCY

**20 kg's or a single 20 litres bucket of dung** will produce sufficient gas for domestic cooking for the average 4-6 member family. A well-kept healthy cow produces 20 - 30 kg's of dung daily, so a single cow will produce enough gas for the average domestic household. Such small volumes of dung can be bought from neighbouring farmers, barter trading with farm produce or the rich bio-fertiliser produced by the digester.

# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

## FOOD VALUE AND GAS PRODUCTION

Different inputs will produce varying volumes of gas and the user soon gets attuned with what's available and works best for them.

The higher the “food value” or calorific value of the feedstock, the higher the gas production. Dungs and grasses are at the lower end, and animal fats and oil crops producing the highest.

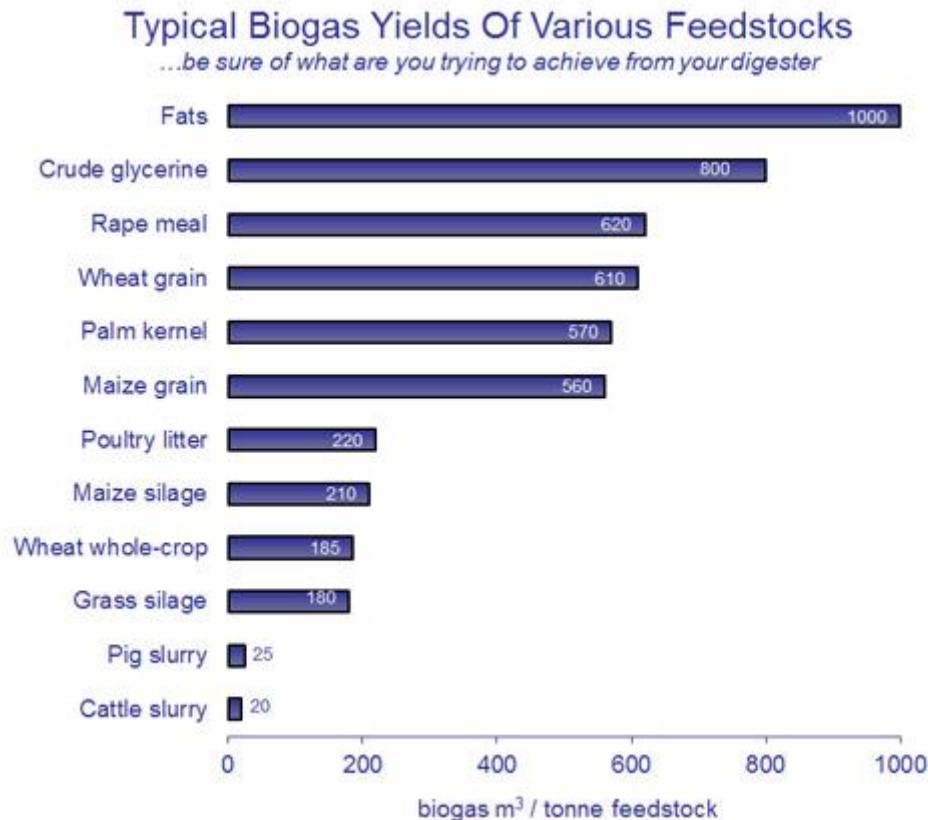


Image courtesy <http://www.fre-energy.co.uk/feedstock.html>

Organic waste material can be collected from the marketplaces, food processors etc

Owing to the high temperatures attainable inside the micro greenhouse tunnel, at a domestic level these levels of efficiency are ONLY achievable with Flexi Biogas Systems.

## OUTPUT BIO-SLURRY

Input matter is not converted into gas, rather biogas is released during the fermentation or decomposition process. In all animals including us humans, after digestion in our stomachs, the freed micro elements are then absorbed in our intestine, and the waste or partially digested remains is passed as stool or dung. The "True Cross-flow" design of the Flexi system ensures the “waste” is retained until the fermentation process is completed and all the micro elements have been released. As the micro elements - now in dissolved form, are not removed from this process, the resultant bio-slurry is a rich organic fertiliser with a high market value.



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

With no more harmful microorganisms, the bio-slurry is seedbed ready requiring no further curing or preparations. As a fertiliser it can be applied as a top-dressed or mixed in with conventional compost. The sieved liquid can be sprayed on as a folia-feed, applied through drip-irrigation or overhead sprinkler irrigation. The solid matter can also be dried, stored, etc. As a liquid or dry, the fertiliser can be sold to generate extra income.

## Models, Application and Costs

**When deciding on a system for your requirements, keep in mind that the average domestic cooking energy consumption is doubled if not tripled when using free flowing biogas.**

### **Domestic - Model DBG**

Designed specifically for cooking fuel for the typical domestic 4 to 6 member family, and the retiring elderly folk challenged with the daily hardship of firewood collection, chopping, smoke, etc

#### **Specifications:**

Cubic capacity - 4m<sup>3</sup>

Application - Mainly cooking and water heating

Minimum daily input requirement – 20-30kg of dung, organic matter or combination of

Maximum daily input - 30kg

Gas output – up to 1,500 lts / day (average weather conditions)

**Cost Ksh 46,000.00 (USD 410)** \*See Kit extras below

### **Domestic - Model BG5**

Designed for the typical domestic 6 to 8 member family, and the retiring elderly folk challenged with the daily hardship of firewood collection, chopping, smoke, etc

#### **Specifications:**

Cubic capacity - 6m<sup>3</sup>

Application - Mainly cooking and water heating

Minimum daily input requirement - 20-60kg of dung, organic matter or combination of

Maximum daily input - 60kg

Gas output – up to 2,500 lts / day (average weather conditions)

**Cost Ksh 61,000.00 (USD 610)** \*See Kit extras below

### **Large Domestic, Semi commercial - Model BG6**

Designed for the small farm or the entrepreneurial micro business

The system is easily scaled by doubled, tripling etc to meet any gas and fertilizer requirement, or simply scale-up to our large capacity T-Rex commercial range.

#### **Specifications:**

Cubic capacity - 9m<sup>3</sup>

Application - Cooking, water heating and accessories

Minimum daily input requirement - 20-100kg of dung, organic matter or combination of

Maximum daily input – 100 - 120kg

Gas output – up to 3,500 lts / day (average weather conditions)

**Cost Ksh 76,000 (USD 760)** \*See Kit extras below

# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

## **Institutional and Commercial Models**

### **T-Rex, The Next Generation**

Institutional for NEEDY schools, children's homes and commercial applications.

We hope that growing up with and regular hands-on operation of biogas, the next generation of will automatically be GREEN, with firewood and charcoal becoming "a thing of the passed" and by default alleviate the pressure on the forests.

### **Urban Utility Model**

The system incorporates single or multiple digester piped to a separate gas storage balloon. The system is customized to the users specification. The balloon can be positioned at any distance (within reason) from the digesters. The balloons are "FLAT" and will be positioned in dead space - external wall, attic, rooftop etc.

Examples of potential application

- Schools and institutions where the animal farm is distant from the kitchen. Large balloon near kitchen
- Urban centres where a landlord has multiple renting tenants. For billing and usage control, each tenant has a balloon with a capacity for daily use.
- Apartment and flat blocks, housing estates. Kitchen waste management

## **The Flexi Biogas Micro Greenhouse Tunnel and Gas Storage Balloons**



*External storage balloon*

### **The Greenhouse Tunnel**

We recently designed and fabricated the first prototypes Micro Greenhouse Tunnel or MGT. Fabricated from UV block green house fabric, the tunnel creates a sealed chamber enclosing



# BIOGAS INTERNATIONAL LTD - BIL

[www.biogas.co.ke](http://www.biogas.co.ke) [biogasinternational@yahoo.com](mailto:biogasinternational@yahoo.com) +254 (0) 722 700 530

the digester envelope. Whilst reducing harmful UV through to the envelope, the green house fabric allows solar infra red radiation through to heat up the digester. Being sealed, the tunnel in effect prevents any air movement and hence prevents / reduces heat losses by wind and cold during the night. This raised temperature greatly enhances the efficiency and increase gas production.

The tunnel also provides child / animal protection to the envelope.

## **The Storage Balloons**

Vertically mounted, the balloons "hang" in any "dead space." The weighted bottom line provides sufficient internal pressure to run appliances.

Balloons of varying capacities will be available soon

## **Flexi Kits and installation**

We sell the systems as complete kits that include

- Flexi digester
- Sunscreen Micro Greenhouse tunnel
- Ramtons Whirlwind Technology 501 Double Burner Stove
- All associated components
- Piping and fittings – up to 30 meters per kit
- Training on "How it works" and "How to fix it"

## **EXTRAS** - Not included in the kits costs

- Utilities - stoves, heaters, etc
- Transportation. This will vary according to the location/distance.
- Crew accommodation (where necessary)
- Initial aerobic bacteria or culture starter load. This will depend on the availability volume dung, the proximity of a slaughter house.

**NOTE.** Stomach content from slaughtered livestock is full pre-inoculated with the bacteria and is perfect for starting and periodically boosting your system.

## **Utilities**

- Stoves and ovens
- Engines to drive generators, chaff cutters, posho mills, cattle sprays, etc
- Fruit and Vegetable driers
- Instant hot water systems
- House warmers
- Day-old chick brooders and incubators