

# Beyond the pit latrine

developing new tools for  
organic waste management in  
the global south



**SOWTech**

Sustainable OneWorld Technologies

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# What I am going to talk about



- Introduce who we are
- Explanation of the terms Anaerobic Digestion and Composting
- One problem we are working to address - Sanitation
- How we are trying to change things by
  - developing new tools to help people to help themselves
    - Making AD more accessible through the Flexigester
  - Case study of a Flexigester in Malawi
  - What are planning to do next....

# By way of introduction....



- SOWTech – a Community Interest Company with a mission to:
  - promote sustainable farming and improve sanitation in low-income countries by developing and supplying, in partnership with others, innovative products and processes for the recycling of organic waste.
- Prior experience of designing, building and operating large scale >25,000 t/a waste recycling facilities using both composting and anaerobic digestion processes
- Partners include Butyl Products Ltd who build and distribute products which we design including “Flexigester”

# Biological decomposition of waste

- There are two basic processes of biological decomposition
  - 1. With Air or **Aerobic**                      2. Without air or **Anaerobic**
- **1. Aerobic**    The leaf that falls to the forest floor where it lies in a layer of leaf litter will decompose in the presence of air – it will break down by the process we call COMPOSTING.
- Gas outputs are primarily CO<sub>2</sub> and H<sub>2</sub>O. A biological fire which oxidises the carbon and the process generates heat derived from microbial respiration

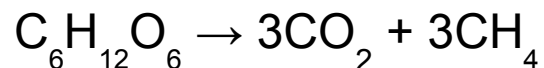
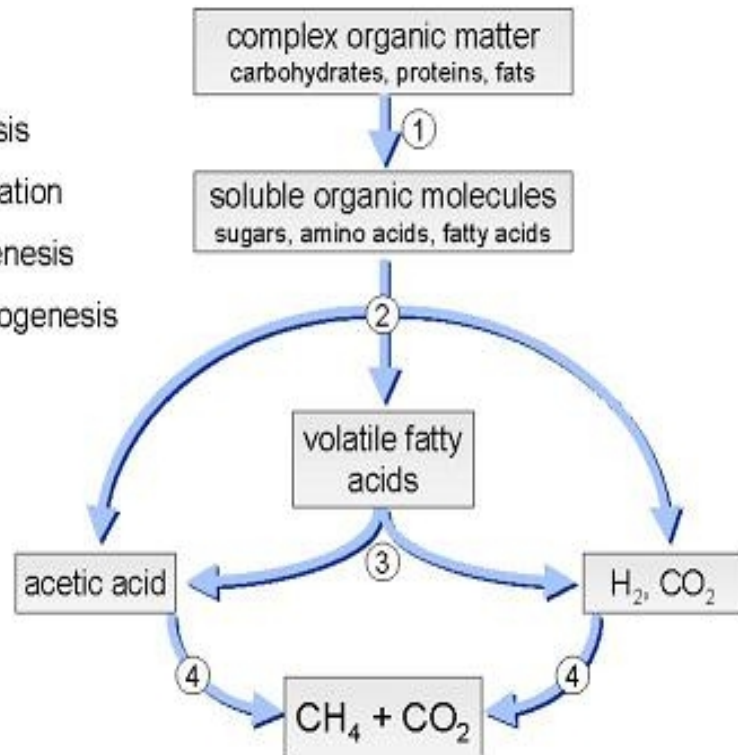
# Anaerobic Decomposition

- If the same leaf falls into a pond it will be deprived of air (oxygen) and therefore decomposes by an **Anaerobic** process
- This process releases a mixture of gases (Biogas) including methane (55% - 80%) and some carbon dioxide plus other trace compounds.



# Basic Biochemistry of the process

- ① hydrolysis
- ② fermentation
- ③ acetogenesis
- ④ methanogenesis



1m<sup>3</sup> Biomethane =

- 0.93 litres diesel
- 10.1 kWh

Human waste

	Output per 100 persons kg/d	Biogas yield litres/day
Faeces	40	2244
Urine	120	0.25
<b>Total</b>	<b>160</b>	<b>2244.25</b>

Source: IBBK Speedkits EU.FP7

1 tonne food waste = 300 kWh

Source: Biogas-info.co.uk

# Why find ways to make a change



- Sanitation – choose your statistics
  - “2 M tons of sewage, industrial and agricultural waste is discharged every year
  - A child dies every 20 seconds from water related disease every year
  - Half the worlds hospital beds are occupied with people suffering from illnesses linked to contaminated water
  - More people die as a result of polluted water than are killed by all forms of violence including wars”

Corcoran, E., C. Nellemann, E. Baker, R. Bos, D. Osborn, H. Savelli (eds). 2010. ***Sick Water? The central role of wastewater management in sustainable development***. A Rapid Response Assessment. United Nations Environment Programme, UN-HABITAT



# Human sewage – the current status



- Open defecation
  - doing it in on the land around your accommodation
  - 1 billion people have no option 15% of the worlds population ([www.UN.org](http://www.UN.org))
- Pit latrines
  - The “improved” sanitation that most have or can expect to have



# Pit Latrines

- Smell, fill up, contaminate water courses, exceedingly difficult to empty, make no use of the resource.....



**2 out of 3 people in Africa, cannot access improved sanitation as simple as this pit toilet.**

# Example of a good pit latrine

A well constructed pit latrine with secure concrete base, supporting pole and painted walls

But

Down that hole is the output of several years of use

Try to image emptying this pit

But before you can you have to literally fish out the things which cant be pumped. X-ray plates included....



Or in some places - done by getting someone in to empty with bare hands

# So what have we done so far

- Built pour flush latrines which serve c. 50 children a day
- Connected it to an affordable anaerobic digester with solar heating “Pasteu” tubes
- Demonstrated pathogen reduction
- Made renewable energy in the form of Biogas for cooking
- Demonstrated the improvement in smell and nuisance
- Demonstrated the practicality of the idea

# Case Study:

## Namisu Orphanage, Malawi



- Objective:
  - To demonstrate the potential of a Flexigester for emergency sanitation applications, such as flood relief and refugee camps
- Sponsor:
  - International Federation of the Red Cross & Red Crescent
- Location:
  - Orphanage near Blantyre Malawi, funded by Aquaid Lifeline





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F14 - FLEXIGESTER  
KIT

JOB NO.  
200610

CASE

MAINTENANCE KIT  
FOR THE  
FLEXIGESTER KIT

GROSS WT 127 KG  
147 X 71 X 75 CM

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KIT













- Photo taken beginning of April – 2 months after installation
- Flexigester inflated as it is producing biogas
- Now receiving human waste from the latrine block, animal waste and waste cooking water















# What next....



- Redesigned to reduce cost (c 60% reduction) and improve ease of use
- Attracted more “partners” in Uganda, Chennai, Sierra Leone for demonstration projects
- Working on more efficient larger scale cookers for institutional use (catalysts, heat exchangers etc)
- Trying to improve pathogen kill without use of unaffordable inputs
- Demonstrate beneficial use of Biofertiliser for soil sustainability



**“We need to  
feed the soil...  
if we expect it to  
feed the people”**

**JAJM**

*Thank you for your attention*

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