



# *PRODUCTION OF BIOGAS FROM ANIMAL MANURE FOR RURAL HOUSEHOLD*

Agricultural Technology Transfer Society



# Energy & food nexuses

- Approximately 89% of the rural households in Sudan rely on biomass, such as fuel wood, charcoal, agricultural wastes to meet their energy needs for cooking
- **UNEP** estimates that fuel wood requirements for 2006 were around 27 to 30 million cubic metres.
- "**UNEP** predicts that within five to ten years, the northern states of Sudan will only be able to obtain sufficient supplies of charcoal from Southern Kordofan and Darfur as all other major reserves will have been exhausted,"

# Fuel wood as energy





# Energy from chacoal



# Growing demand for charcoal



# Land degradation

- Many regions of Northern and Western Darfur are undergoing **desertification** and land degradation at a significant rate.
- Other states facing similar issues are Southern Kordofan, eastern Kassala, northern Blue Nile, northern Upper Nile and northern Unity state.

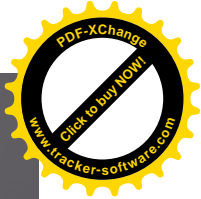


## Famine, conflicts, displacement

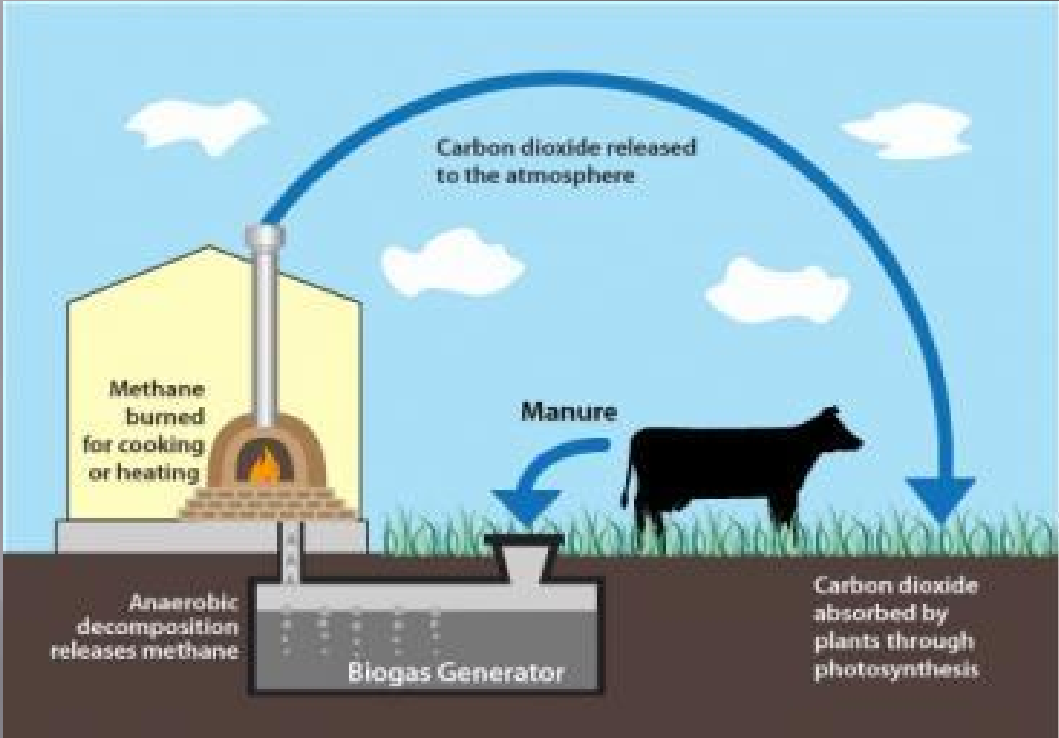
The **lower yield of crops** and the limited grazing area for animals can lead to famines, poverty, death of livestock and conflicts.

This may force people to lose their connection to their lands and affect their cultural traditions and may put pressure on other fragile environments and cause conflict and further relocations.





# Biogas production from animal manure







# Biogas benefits

## Organic Fertilizer from Biogas Plants

- Reduction of soil erosion

The digested sludge provides fast-acting nutrients and serve as primary nutrients for the development of soil organisms.

The humic content is especially important in low-humus tropical soils. The amount of stable humus formed with digested sludge amounts to twice the amount that can be achieved with decayed dung.

- Effects on crops: crop yield is found to be higher following fertilization with digested sludge

## *climate mitigation*

- Switching from traditional biomass resources or fossil fuels to biogas improves security of energy supply as the feedstock can mostly be acquired locally. The release of methane is avoided thus contributing to *climate mitigation*. A single, small scale biodigester reduces between 3 and 5 tCO<sub>2</sub>-eq./year,

# Biogas Appliances

Biogas is a lean gas that can, in principle, be used like other fuel gas for household and industrial purposes, especially for

- ✓ Gas cookers/stoves
- ✓ Biogas lamps
- ✓ Radiant heaters
- ✓ Incubators
- ✓ Refrigerators
- ✓ Engines





# Stakeholders involved

Farmers who can use it for cooking, lighting, power engine, fertilizer either used in fields or sold to urban areas

Industrial estates can, by processing their waste in a biogas plant, fulfill legal obligations of waste disposal. They can, at the same time, generate energy for production processes, lighting or heating.

Municipalities can use biogas technology to solve problems in public waste disposal and waste water treatment. may respond to public energy demands such as street lighting, water pumping and cooking in hospitals or schools.

Craftsmen, engineers and maintenance workers have long been overlooked as a target group for biogas promotion. Not only does biogas technology open market niches for masons, plumbers, civil engineers and agronomists, they are often the most effective promoters of biogas technology.

Private sector promotion lies in the production of biogas equipment lamps, burners and gas pressure measurement facilities to supply the local market with low-cost high quality products.

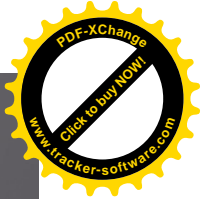


# Biogas project

## Area of the study

- ✚ The target area is West Kordofan State  
Livestock is estimated at 465,000 cattle, 22,265,000 sheep, 2,064,000 goats and 747,000 camels.
- ✚ The area suffers from illicit woodcutting deforestation problems; inadequate afforestation activities;





# Public consultation

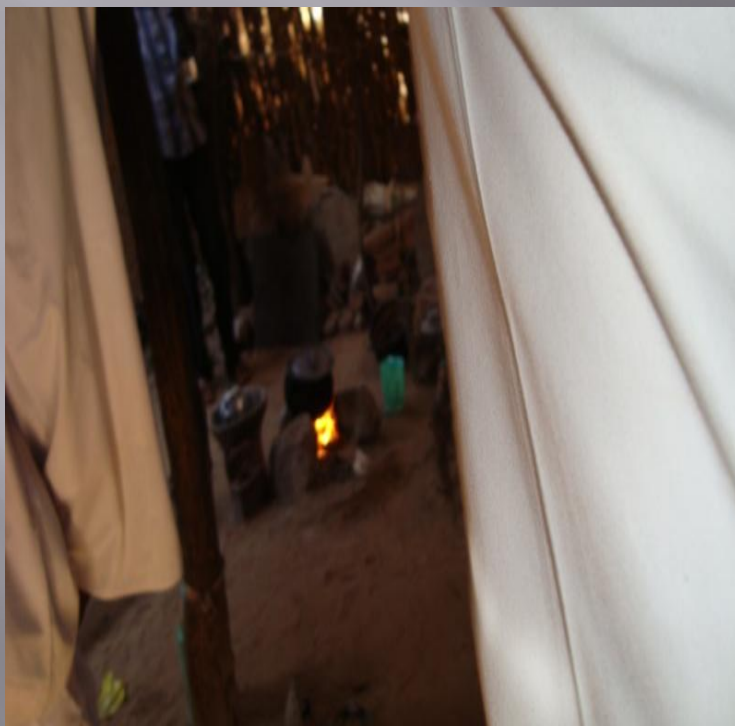




# Village visit



# Traditional kitchen at a rural area



# Biogas units installation





## Biogas contribution towards sustainable development

### Social benefits

· Smoke-free and ash-free kitchen, Women are spared the burden of gathering firewood

### Environmental benefits

· Pollutants are reduced due to accumulation of manure

· Reduction of deforestation

· The sludge is a good fertilizer, increasing land productivity (and farm incomes).

· The release of methane is avoided thus contributing to climate mitigation.

### Economic benefits

· Buying (fossil) fuel resources (e.g. kerosene, LPG, charcoal or fuel wood) is no longer needed



## Women home garden

### Backyard home

The average size of the homestead (locally known as Jubraka) area varies from less than 0.5 feddan to one feddan.

Jubraka crop yields are low-erratic rainfall and poor cultural practices due to poor soil fertility lack of appropriate soil and water conservation.

Crop yields are greatly improved using biogas fertilizer.



