Agricultural Waste as Source of Energy & Income: Making Agriculture More Rewarding

By
Abdulkadir HASSAN
ZHE Africa
www.zheafrica.com
a.hassan@zheafrica.com

Presented at
Africa Climate Resilient Infrastructure Summit (ACRIS), Jointly Oraganised by African Union Commission and Entico Event Limited London, at AUC Conference Centre April 26- 29, 2015

Introduction

- Traditionally agricultural wastes are discarded without necessarily generating value from them.
- From the wastes, several products of economic importance could derived, thus returning more income.
- Discarding them as in the old way , contributes to GHG emissions.
- As African farmer becomes aware of value (s)he would add to his business, he would never return to the old habit

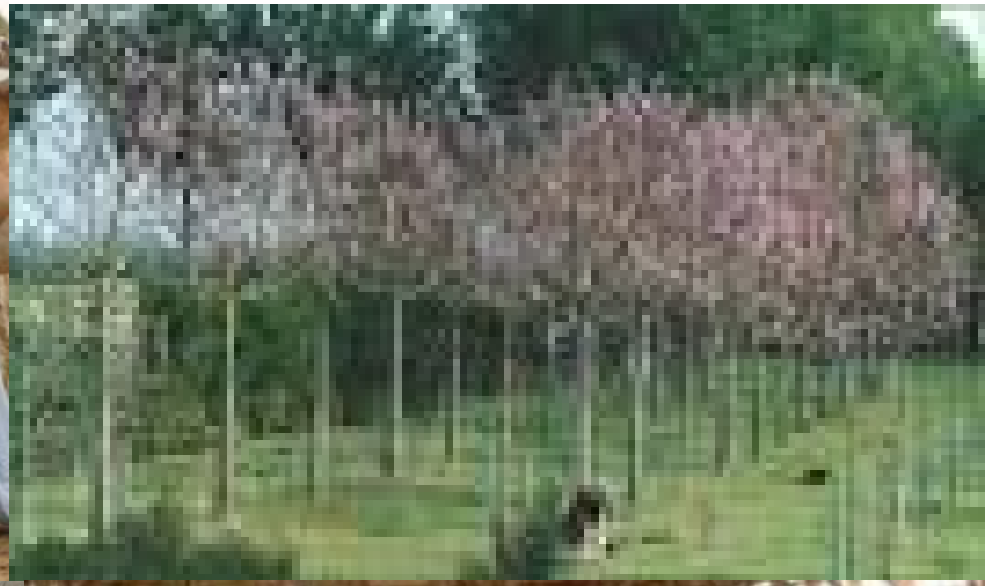
Introduction

- From agric wastes, energy and non-energy products could be produced using simple technologies that rural farmer can comprehend.
- The products would helps in diversifying income and make it easy to expand beyond subsistence levels
- Energy products would help the farmer to reduce reliance on substandard energy & water down utility bills where grid exist.

Agric Waste

- Farm waste
- Wastes from livestock
- Wastes from processing
- Tree shavings
- Wastes from harvested produce
- Wastes generated in the cause of transportation

Opportunities- Agric Wastes



Challenges of Managing Waste by Farmers

- Because of not knowing what to do, the wastes are indiscriminately discharged leading to contamination of soil, air and water.
- Some wastes are also used as cooking fuel or burnt into ashes openly, polluting the air.
- In the case of livestock farmers, wastes pose more dangers to their animal if not properly disposed of.
- Where environmental regulations are being enforced, farmers face further challenges.

Challenges of Managing Waste by Farmers

- These amongst other challenges could be converted into opportunities by using the wastes to generate several products both of own use and sales.
- This also offers farmers a form of shock absorber from likely price fluctuation.
- Where there is fall in price, the income from waste could provide additional support.
- It also makes degree energy dependent to a significant portion

Examples

- United States alone generates about 11 billion pounds of poultry wastes per annum, which is mostly converted into animal feed. With this quantity of waste, US has potential of producing 153 million gallons of Biofuels representing 33% of global potential, estimated at 593 million gallons.

- Governor of Bank of Bangladesh reported that the country could generate 2,000 MW from poultry waste at much lower cost than from the fossils. It would also reduce the amount being spent on fertilizer imports, thereby strengthening the local currency.

- With about 120,000 to 130,000 poultry farms and investments worth over US$2 billion, the sector can easily energise the economy of Bangladesh and improve access to energy, if the poultry waste is utilised.

Failure to use wastes as economic resources

Why Adopting Modern Waste Management in the Agric Sector

- Optimisation of value and usage
- Contribute to mitigation against climate change
- Provide for likely shock and market challenges
- Derive socio-economic benefits
- Turning waste into economic resources
- Provide for alternative raw materials

Energy products from Waste

- Biogas
- Other biofuels
- Electricity
- Cooking energy
- Steam for heating and drying
- Pellets
- Feedstocks waste power plant

- Most of these products might not be consumed by the farmer.
- They could be sold to earn income and boost the business
- A farmer could use his facility to process wastes for third parties. Examples are given below

Opportunities – Cooling system for Agro produce, laboratories etc

Non-Energy products

- Biofertilizer
- Animal feed
- Construction materials
- Industrial and household items
- Decoratives
- Beddings for animal

- The products that are not needed are sold to other parties.
- Products like fertilizer and animal feed could be used by the farmer if they are required.
- It allows farmers to increase level of self-reliance

Examples

- **The Be'er Tuvia Council Biogas facility Israel**

The facility when completed is expected to process & convert about 10-15% of cattle dung in Israel into electricity, thereby minimising flies and contamination of ground water. Its output is expected to be 4MW of electricity, enough to power 6,000 houses. Two other Biogas plant are already operating in the Northern Israel.

- **Karachi Organic Energy Limited (KOEL)**

KOEL, a joint venture with Karachi Electric Supply Company Limited, Is working with the IFC to develop waste conversion plant that would convert cow manure into electricity and organic fertilizer. The plant when completed will generate up to 22MW of electricity from animal waste, which is currently being discharged into the sea and will be the largest Biogas plant in the country.

Examples

- A farmer in Pennsylvania Diary Farm, Steve Reinford installed a digester in his farm in 2007 to treat waste from his 500 diary cows farm. The investment is already making him smile as it provides heating and electricity for the farm, powers about 100 households in Central Pennsylvania valley. It also provides heat for his house and milking facilities, heat for drying of his corn, manure for his crops thereby saving significant amount of money. In 2009, when the diary business had its worst year, the biodigester helped him to absorb the shock. That year, he also earned $200,000 for processing food waste from Wal-Mart in the form of fee from the power companies and the Wal-Mart.

Examples

- Based on the examples, if a farmer does not have facility to process waste, (s)he could contract another party to process the waste or sells the waste to the processing plant.
- However there exist affordable equipment that a small farmer could afford
- On the other hand through farmer organisation, farmers could form cooperative to process their wastes, avail with energy and other products

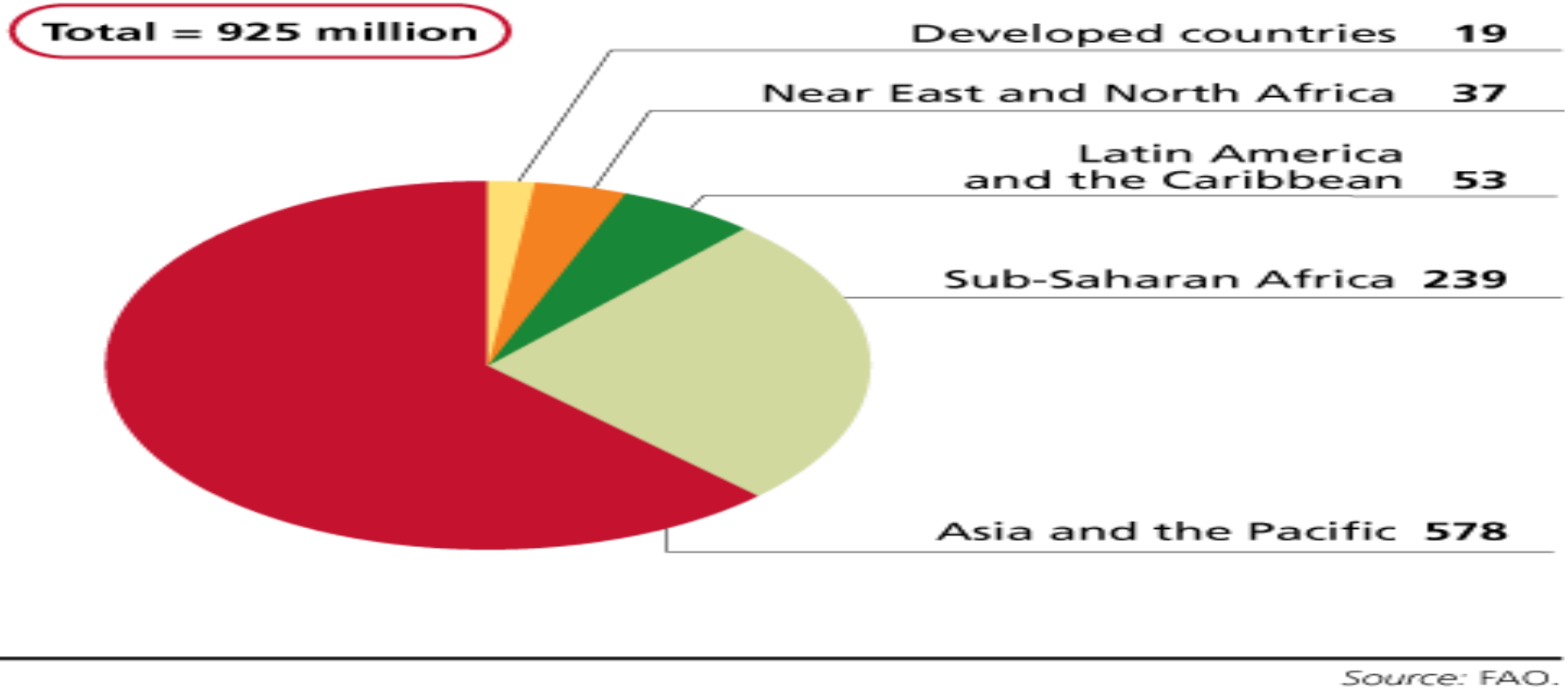
Table1: No and percentage of people without access to clean energy in Africa as at 2009

	Without Access to Electricity		Without access to clean cooking	
Country/Region	No. of Affected (millions)	% of its population	No. of Affected (millions)	% of its population
Africa	587	59	657	66
Nigeria	76	49	104	67
Ethiopia	69	83	77	93
DRC	59	89	62	94
Tanzania	38	86	41	94
Kenya	33	84	33	83
Other SSA	310	68	335	74
N/Africa	2	1	4	3

Source: IEA World Energy Outlook 2011

Diagram 1 showing No of people affected by hunger

239m in Sub-Saharan Africa



Waste Resources could be applied to improve the situation by creating wealth and employment

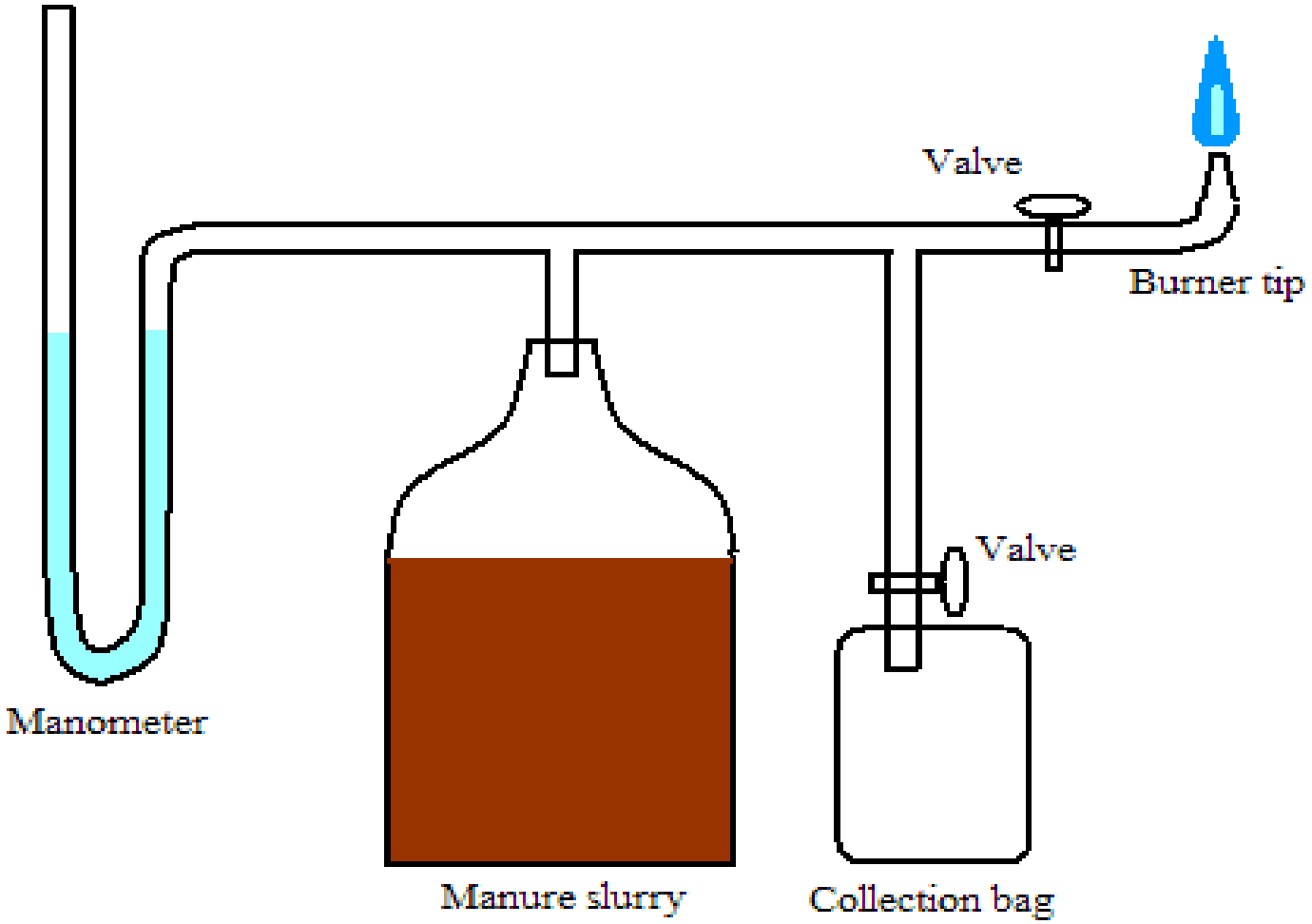
Waste Processing & Conversion Technologies

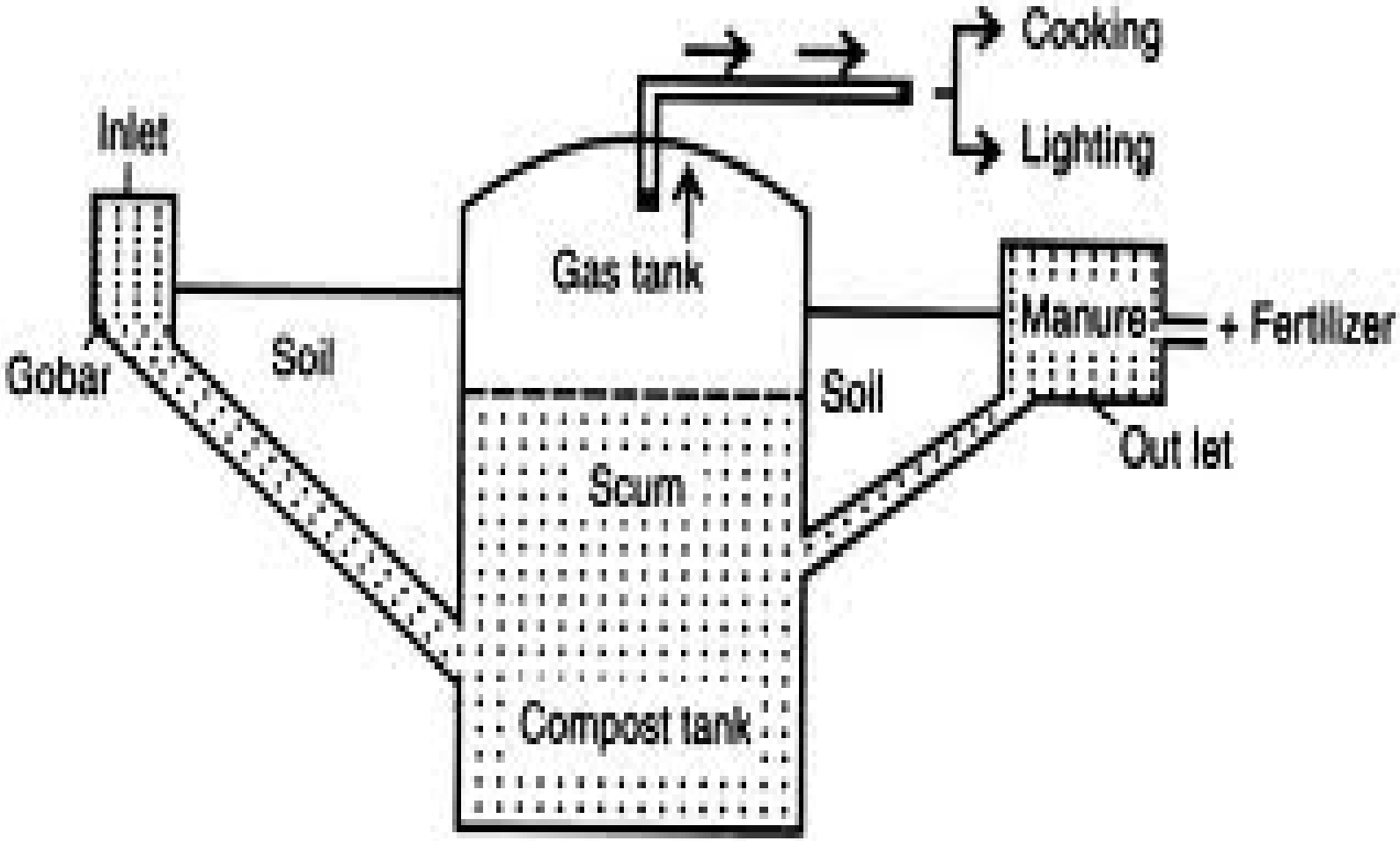
- Simple and easy to use technologies would be shown as the main target is rural and smallholder farmer
  - Biodigester
  - Waste baler
  - Briquette presser
  - Manual briquette production
  - Basic packaging
  - Drying using biogas and solar energy
  - Storage facilities

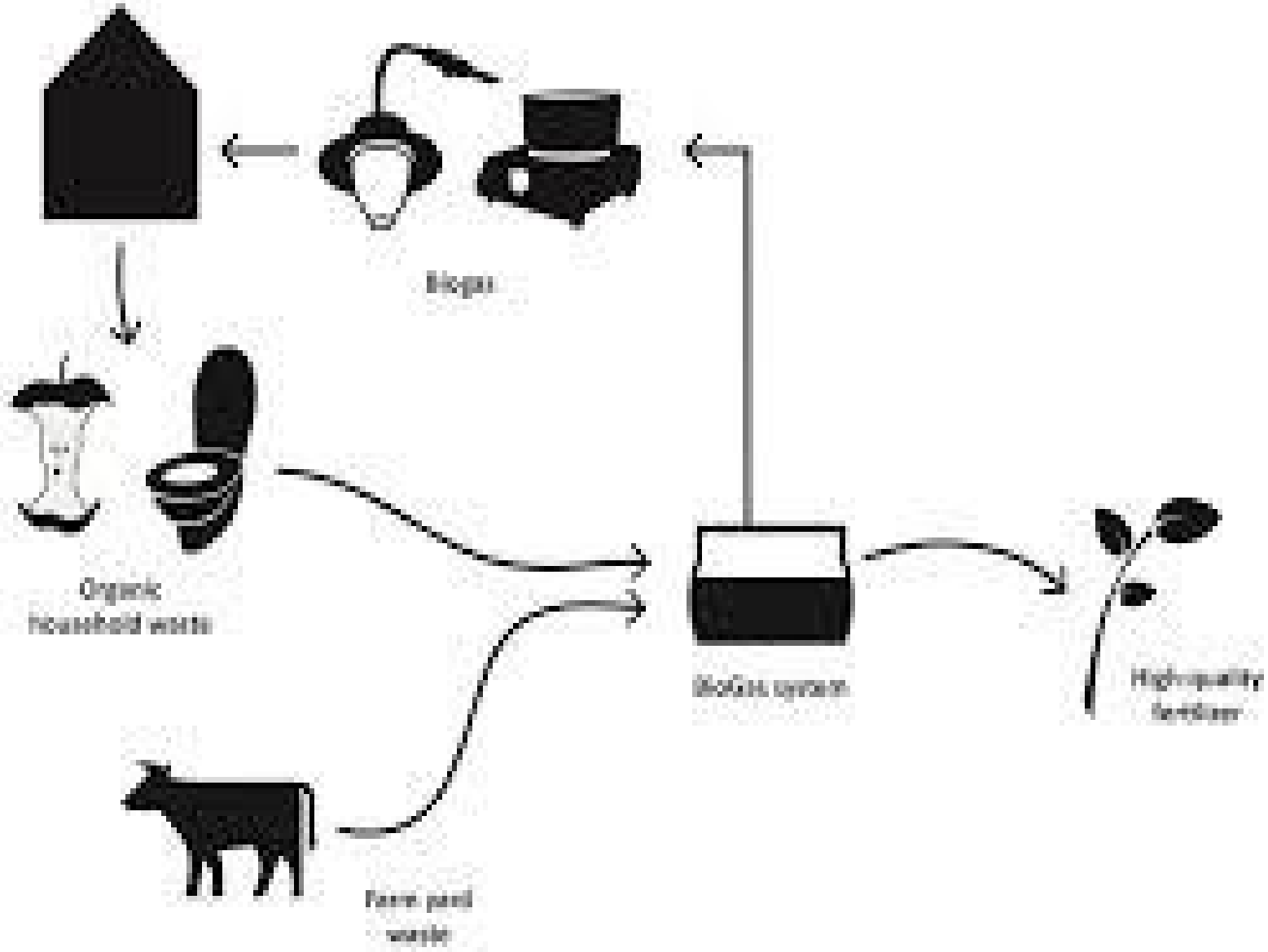
Waste Processing & Conversion Technologies

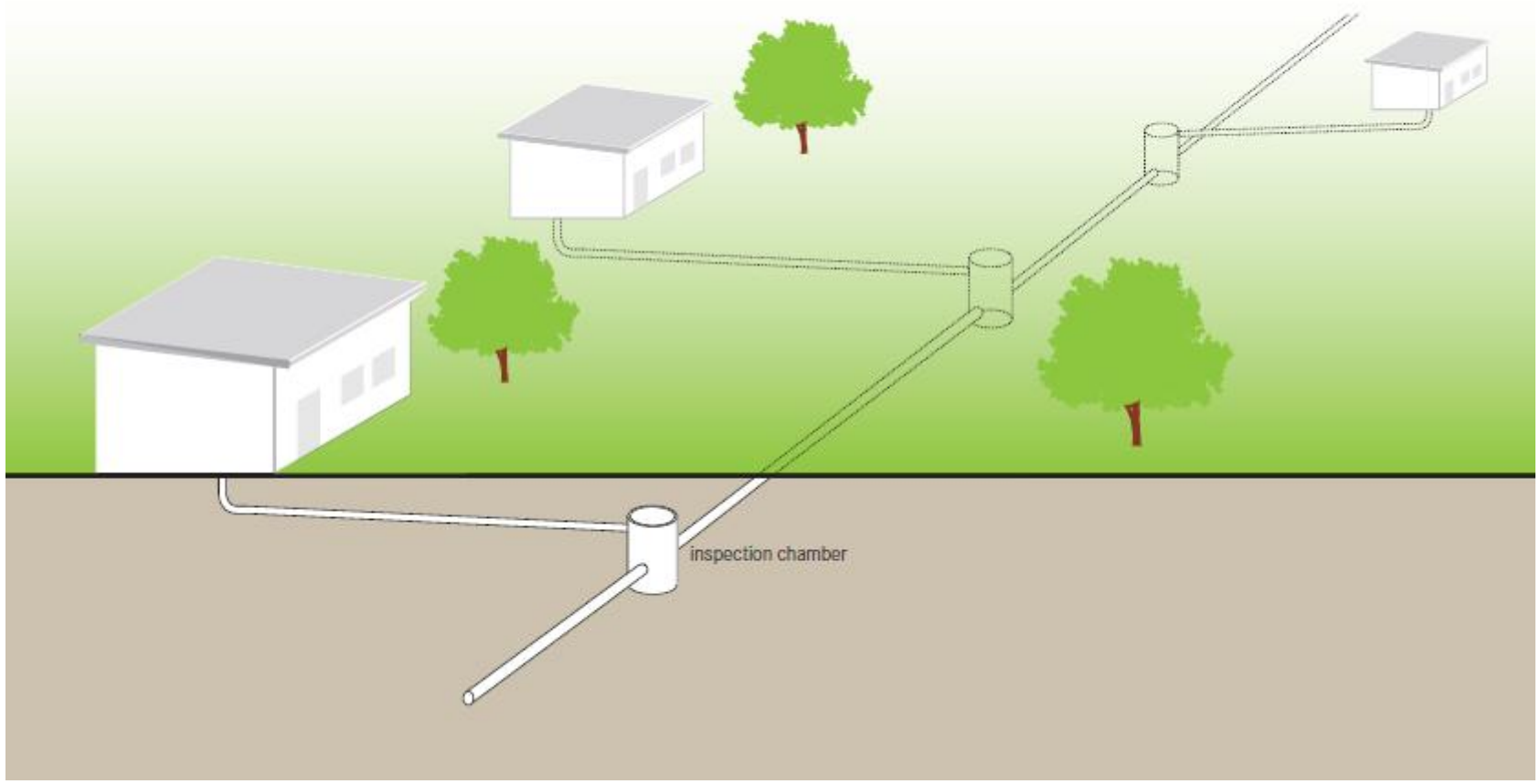
- As the technology is simple to use, the farmer capability and capacity can easily be developed:
  - Capacity building programmes
  - Engagement of CSOs
  - Farmer organisation to enable formation of clusters and cooperatives
  - Enforcing environment regulations would accelerate adoption
  - Continuous stakeholder engagement

Biodigetster – converting dung into cooking energy




Cooking
Lighting
Inlet
Gas tank
Manure
+ Fertilizer
Gobar
Soil
Soil
Out let
Scum
Compost tank


Biogas
Organic
household waste
Farm yard
waste
High-quality
fertilizer


inspection chamber

Baler- Animal feed production from wastes

Animal feed

Pellets & briquettes

Building materials

Benefits

Economic

- Job and wealth creation
- Income optimisation
- Emergence new ventures
- Reduce rural urban migration
- Contribution to GDP

Environmental

- Mitigation against climate change impacts
- Improved access to clean energy
- Energy security
- Reduced carbon footprint
- Cleaner & safer environment

Way Forward

- Build capacity and awareness
- Cooperation & synergies
- Enforcing environmental laws
- Support acquisition of waste management facilities for agric
- Business management skills
- Engage CSO s in pilot test & moblisation
- Levies, extended producer responsibility & individual producer responsibility
- Ban food & agri-waste to land fill
- Involvement of microfinance

Thank you