



# FROM WASTE TO ENERGY: BIOGAS IN GHANA

alternative utility model with resource recovery

Integrated Waste Management Sectoral Meeting

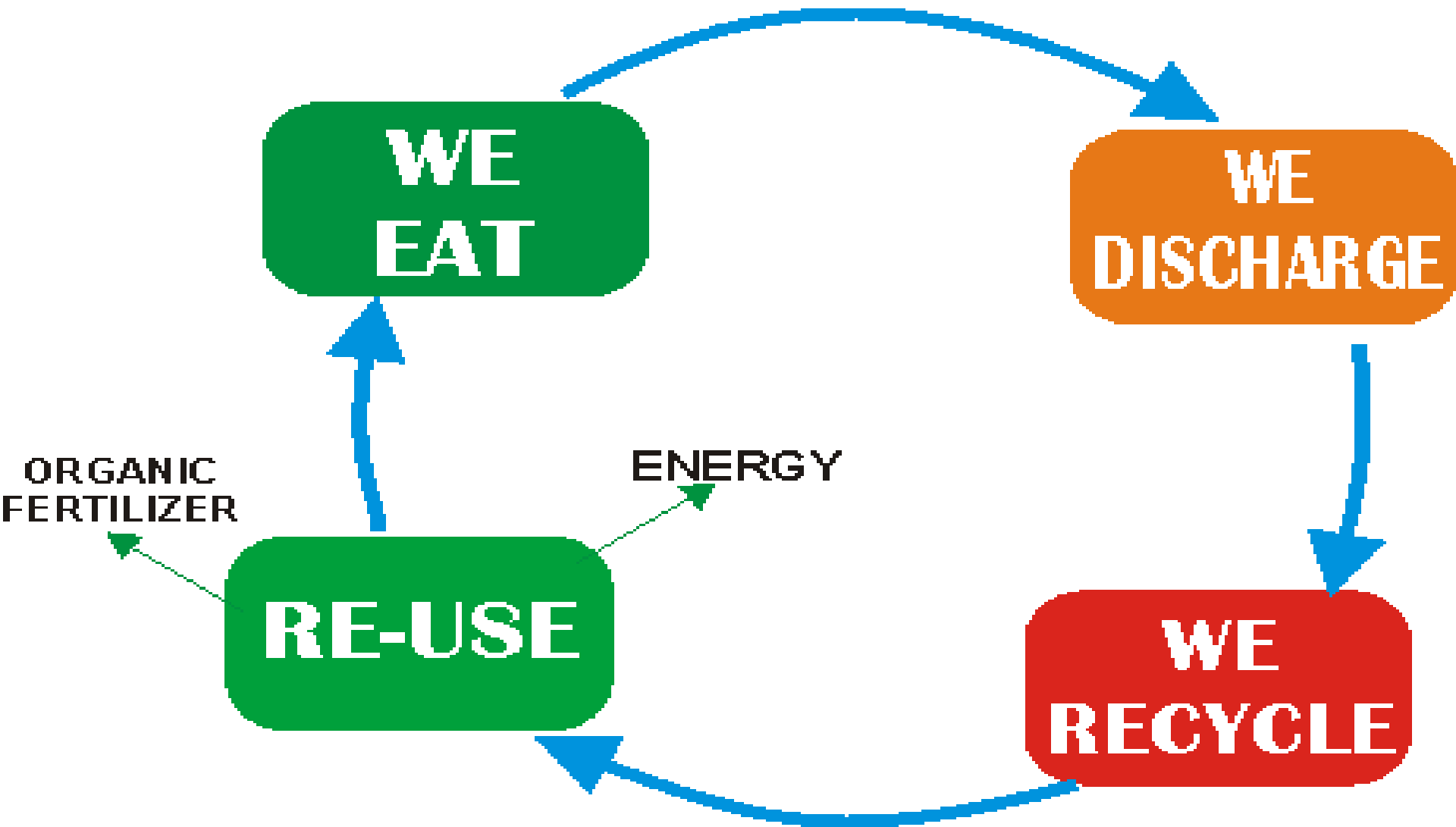
Accra, Ghana

11/06/2019

**Raymond Okrofu**



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the reality



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80% of waste water globally  
ends up in eco system  
without treatment or re-use

...and 20%



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high in CAPEX and OPEX



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...lack of ownership and  
low maintenance





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... or lack of good solutions for  
non-sewered areas





the need for a different approach



# Biogas Plants

	Location	Source of Feed	Use of NH3 Gas
1	Jubilee House	Toilets + Food waste	Cooking
2	Ashaiman SHS	Boys' Dormitory	Cooking
6	Lambert's House	House + Kraal	Cooking/Lighting
3	MUDOR	Various	Bottling Biogas for sale
4	Safi Sana	Market	Electricity
5	Maritime Hospital	-	Electricity
6	St. John's SHS	Girls' Dormitory	Electricity





## Negative impact

- On people's health
- On the eco system
- On th

Result:

**HIGH ECONOMIC COST,  
DIRECT OR HIDDEN**



## Client's position in next steps

The (local) government in most cases is aware but:

- Lack of expertise to develop and run the system
- Lack of capacity or interest to operate
- No need for a one-off intervention
- Lack of financial means to maintain the system
- And / or ....



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# Market opportunities that push innovation

growing demand for nutrients & energy due to urbanisation



the Safi Sana approach



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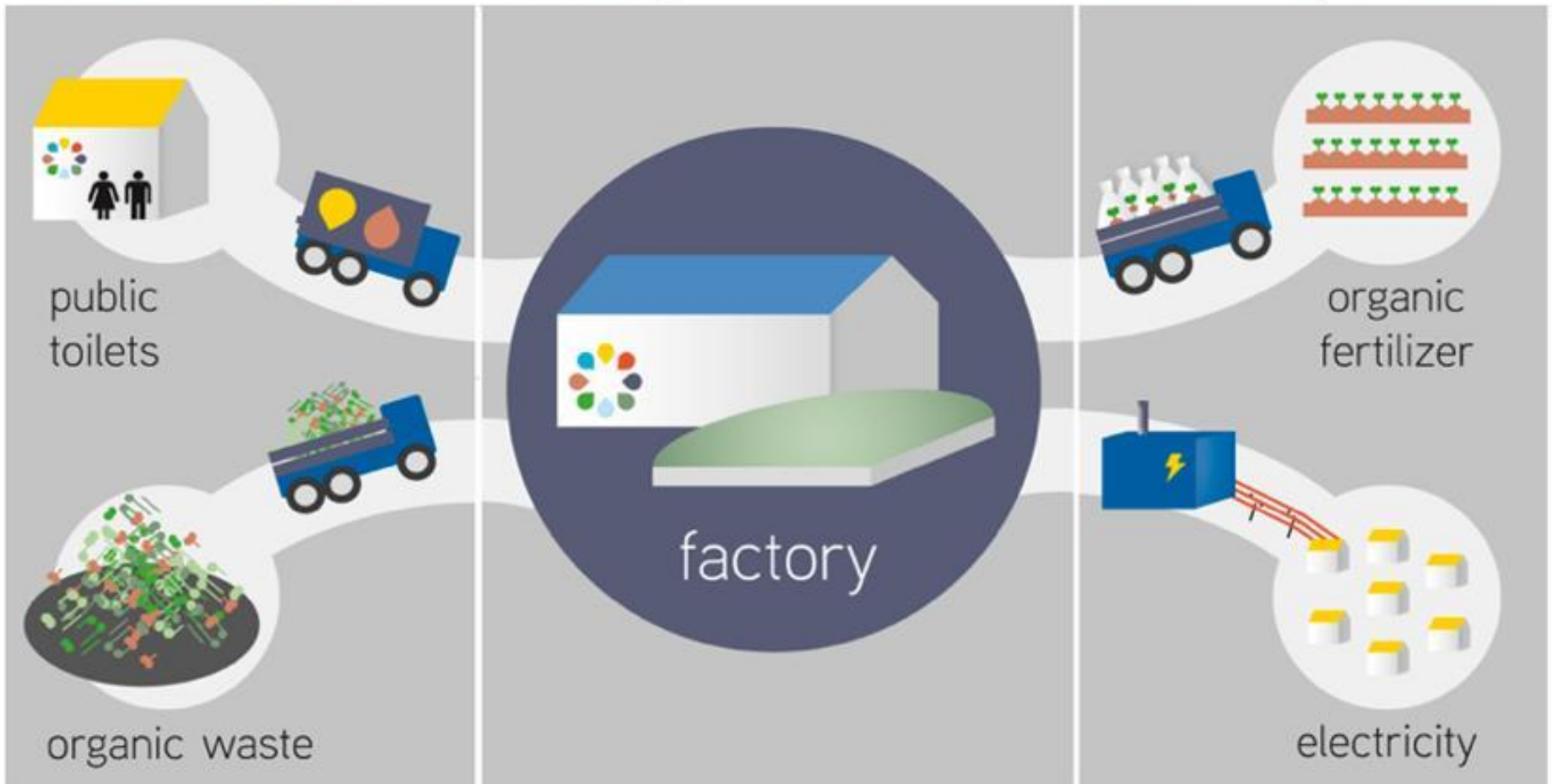
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# Value chain in a PPP

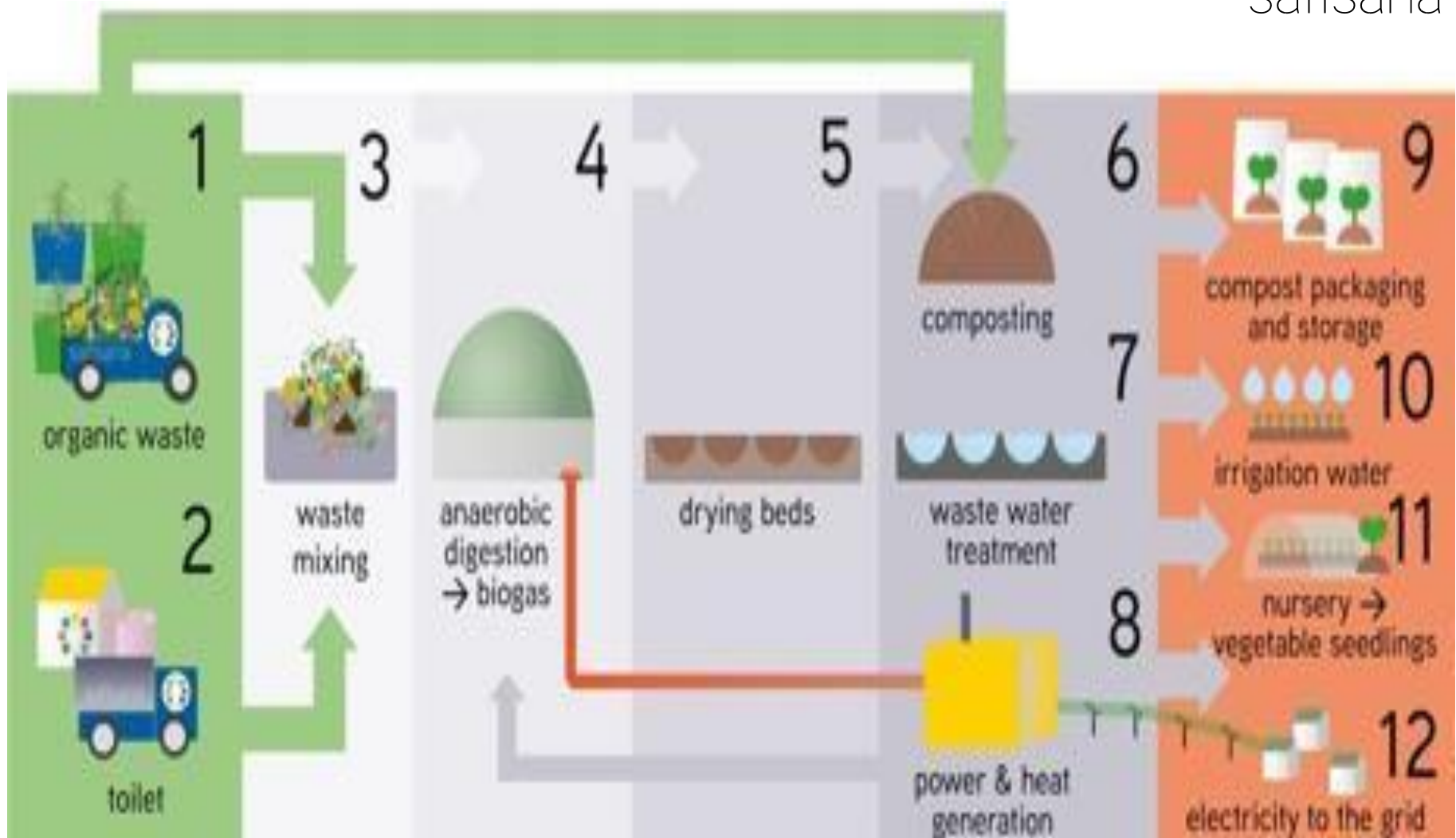
## 1. waste collection

## 2. factory

## 3. sale end products



# The process







## The Client's benefits

- A solution for non-sewered areas
- Income generator to lower product life cycle cost (and competitive to doing nothing!)
- Operational responsibility out-sourced
- End-to-end solution to boost local ownership and acceptance
- Positive impact on the Government goals for sanitation and hygiene goals, agriculture and renewable energy
- Being innovative generates big exposure...

## Our services

1. Feasibility study (pre-project) – go / no go / how
2. PPP contract:
  - Design, Build and Operations (DBO-T)
  - Setting up supply and sales channel
  - Community engagement and capacity building
  - Remote monitoring and help desk

# Challenges



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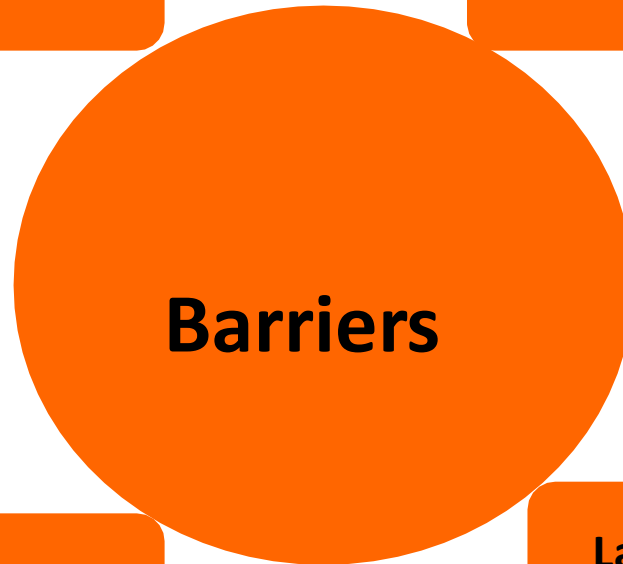
## QUALITY OF WASTE



Photo by Patricia Santos/Agência Brasil - 12.07.2007

*Garbage piled up on the bank of the Pinheiros River in São Paulo, due to rain.*

new sanitation | organic  
farming | renewable energy



- **High Initial Cost (breakeven is still over 5 years!)**

- **Effective channels for subsidizing**

- **Turn around for securing permits and licences**

- **Lack of workable examples**



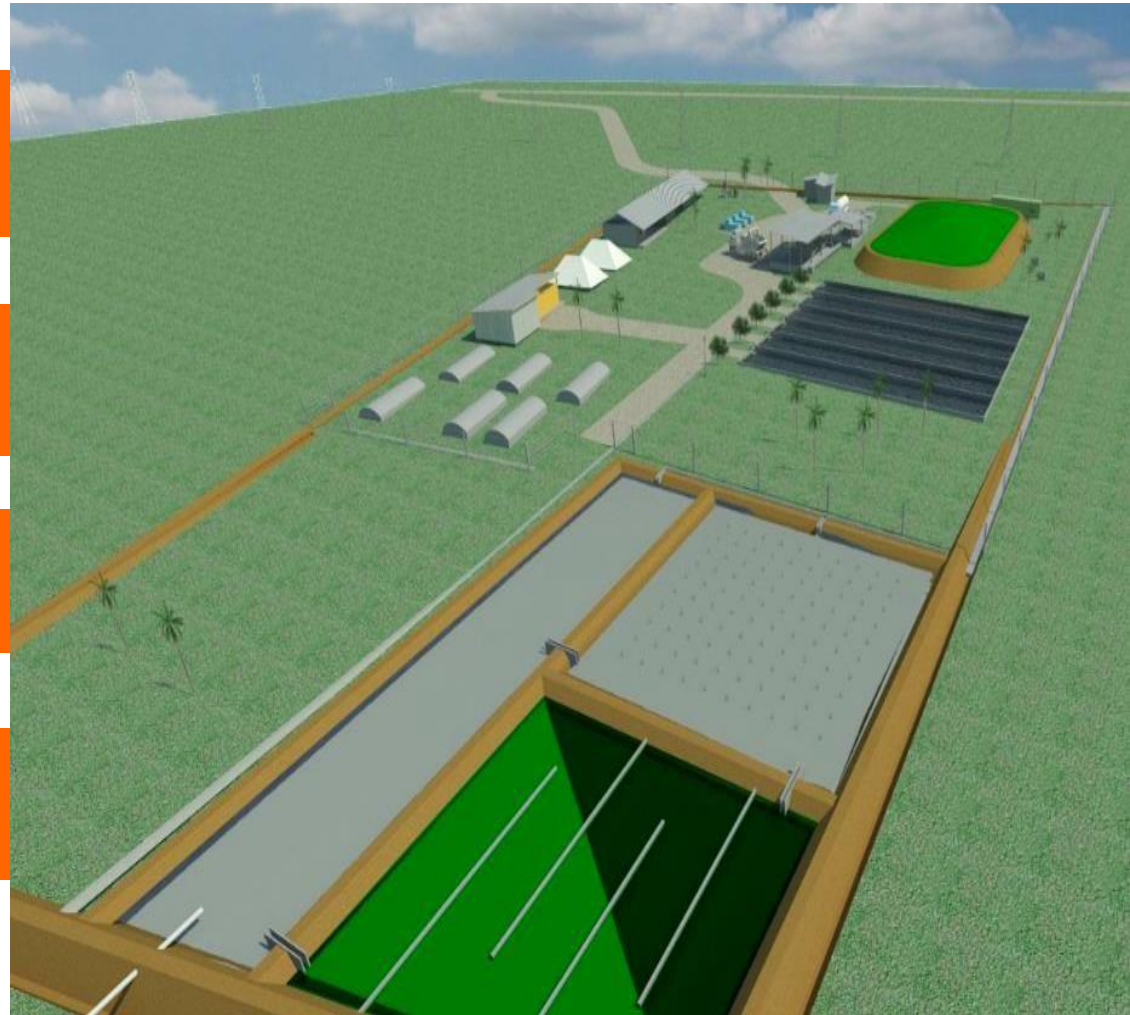
# Prospects

- Policy for public participation

- Feed in Tariff Regime

- High Demand for End produce

- Availability of feedstock





# Lessons Learnt so far

- A huge in-balance between demand and supply
- Obstacles to scaling up
- Very limited funding options for municipalities
- Need for tangible political commitment
- Increased community engagement is key
- Management of people's expectations.



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GREEN



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collection from toilets





collection from markets





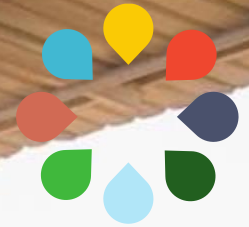
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# supply at Safi Sana factory





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## supply at Safi Sana factory





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processing





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processing



fertilizer production



# fertilizer sales



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# fertilizer sales



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electricity sales



community engagement / training



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# remote monitoring and help desk



Total weight delivered

228,02K

Average temperature

58

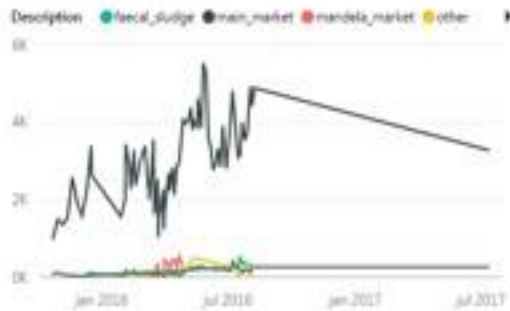
Average people working

2,56

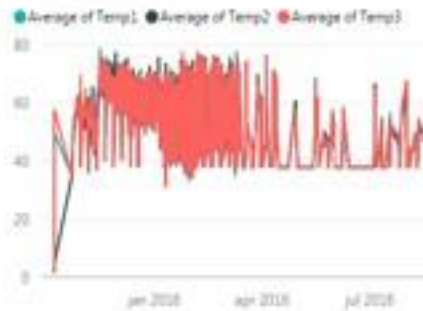
Total Weight by source



Total weight by date and source



Composting Temperature



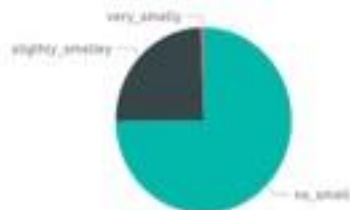
Latest batches with smell

BatchNumber	RegistrationDate	Odour
66	dinsdag 28 jun 2016	slightly_smelly
62	dinsdag 5 jun 2016	slightly_smelly
60	woensdag 29 jun 2016	slightly_smelly
58	vrydag 24 jun 2016	slightly_smelly
58	dinsdag 21 jun 2016	slightly_smelly
57	vrydag 17 jun 2016	slightly_smelly
52	dinsdag 21 mei 2016	slightly_smelly
51	vrydag 27 mei 2016	slightly_smelly
50	dinsdag 24 mei 2016	slightly_smelly

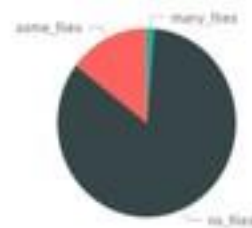
BatchNumber

- Select All
- (Blank)
- 4
- 5
- 6
- 7

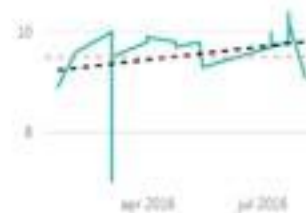
Overall Odour



Overall Flies



Average of PH



the way forward

# Uptake & Upscaling

Waste-to-Energy is a reality, an economic reality and a reality for SDG 3

Let us pursue it in Ghana and in Africa because our conditions for biogas generation is better than any other continent. Don't let our "wasteful resource" kill us.

1. The Public Sector through the relevant government ministries and regulatory agencies Integrate into our subnational local governance system and compel every district assembly to at least run Safi Sana or the Mudor models and feed into the national grid or standalone community energy systems.
2. Activate the provisions of the gazette Building Code of Ghana in respect of biogas plants replacing septic tanks effectively to promote and upscale Biogas Technology
3. The Switch African Green Project which's main focus is the Development of Green Business came as a blessing to the Private Sector's Commercialization efforts of the Biogas Technology in Ghana and the Private Sector players/the Biogas Association of Ghana must live to its mandate
4. Mainstream this into the technical/vocational, TVET and engineering training courses



[www.safisana.org](http://www.safisana.org)