

# DiBiCoo Biogas Webinar

## Safety Regulations for Biogas in South Africa

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# Content

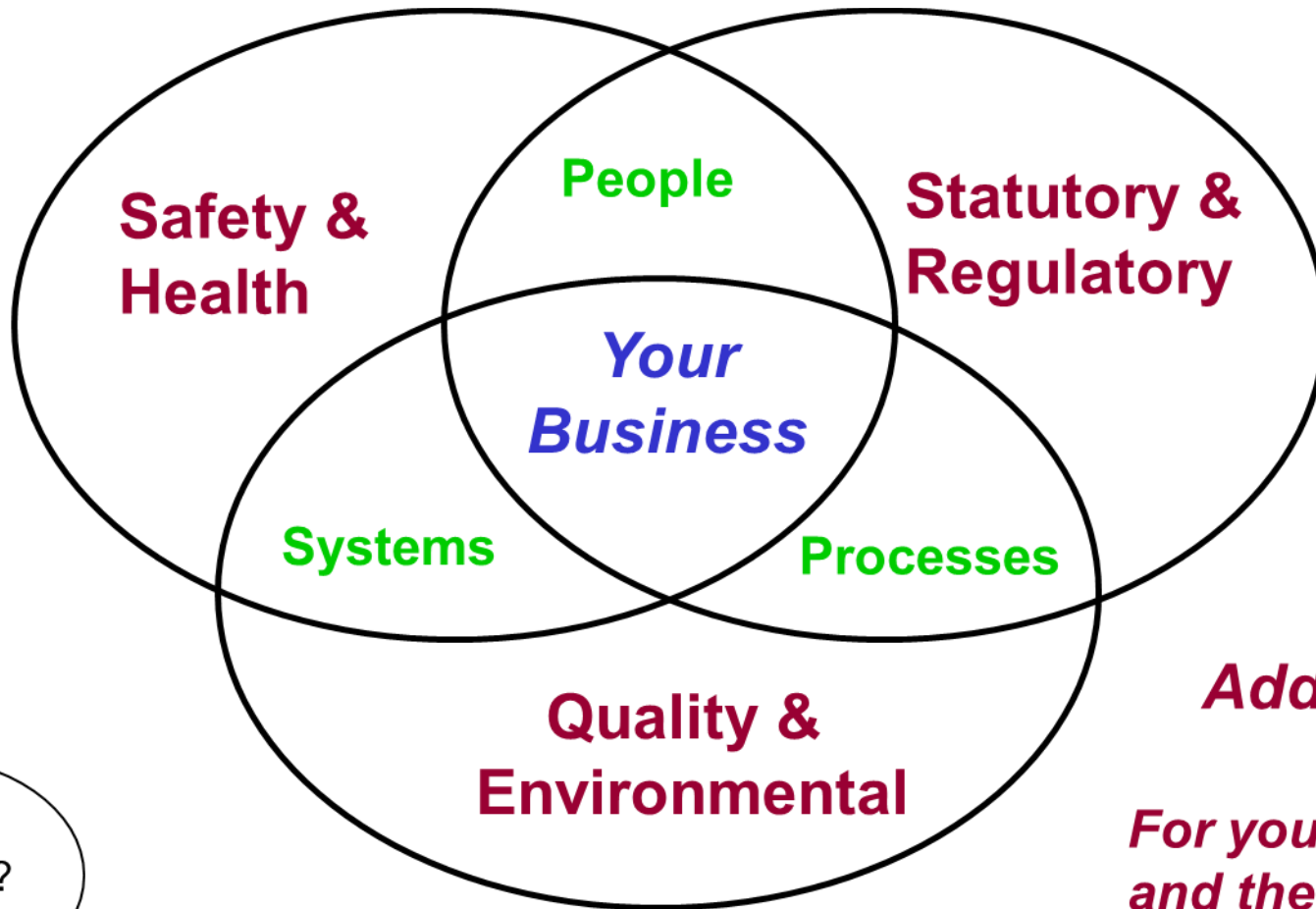
- ▶ SABIA
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# SABIA

*is “To promote safety through the compliance with the relevant Acts, Standards and accompanying Regulations and all future amendments to the Acts as they may change;”*

*“Creating a single voice to promote the multiple benefits of biogas in Southern Africa”*

# FUNCTIONAL INTERRELATIONSHIP:



*Added value*

*For your business  
and the customers*

# Basic Development Steps

- ▶ Develop or adopt standards for biogas
- ▶ Lobbying of government departments
- ▶ Educate the stakeholders
- ▶ Studying local regulations and policies
- ▶ Understanding environmental and waste regulations
- ▶ Renewable energy policy
- ▶ Local Occupational and Safety Regulations

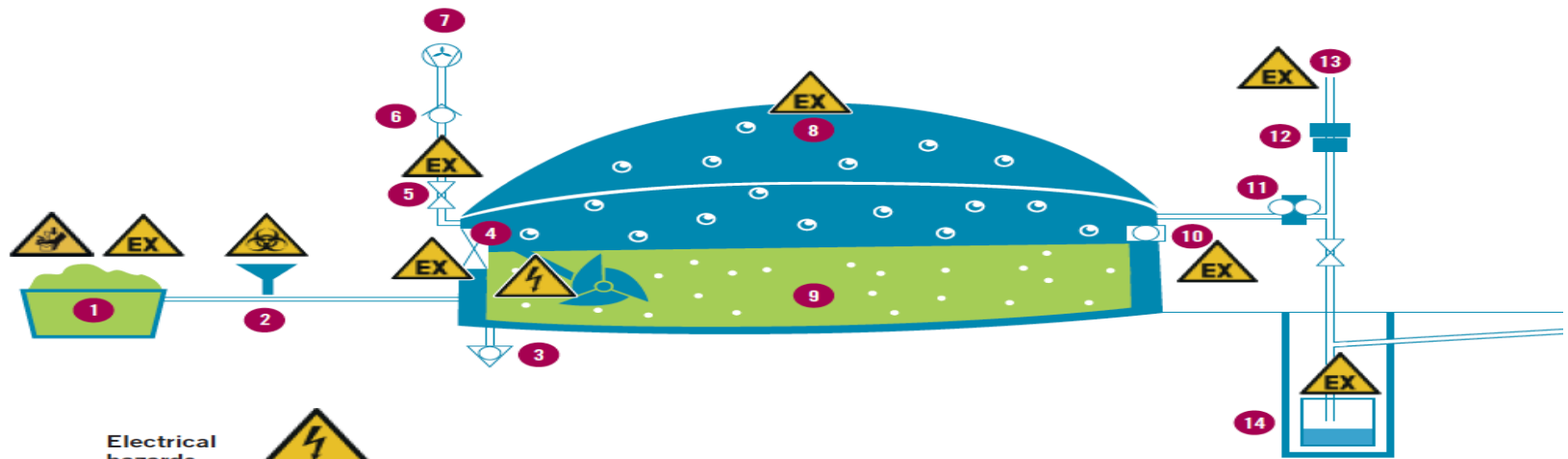
# Biogas Safety Basics and Principles

- ▶ All the following risks are easily mitigated if health & safety are taken into account at all phases of a biogas project development. The risks include, for example:
  1. Fire and explosion
  2. Confined space hazards and working at heights
  3. Risk of Asphyxiation
  4. Risk of gas poisoning ( $H_2S$ ,  $CO_2$  and  $NH_3$ ) and chemical hazards
  5. Risk of high-pressure gas or liquid leaks
  6. Risks associated with rotating mechanical equipment
  7. Risks associated with pathogens (diseases)
  8. Risks of hydraulic and construction failure

# Local Approvals and Requirements

- ▶ Building regulations
- ▶ Engineering and design
- ▶ Site and zoning approvals
- ▶ Fire and safety approvals
- ▶ Electrical and ATEX approvals
- ▶ Environmental and waste approvals
- ▶ Installation and commissioning approvals
- ▶ Operational and trading approvals
- ▶ Recertification and periodic inspections

# Basic Biogas Plant Hazards



Electrical hazards



Hazardous substances



Explosion hazards



Fire hazards



Mechanical hazards



- 1 Feeder
- 2 Dosing station for processing aids
- 3 Potential equalisation
- 4 Access opening
- 5 Shut off valve
- 6 Return valve
- 7 Air injection for the biological desulphurization

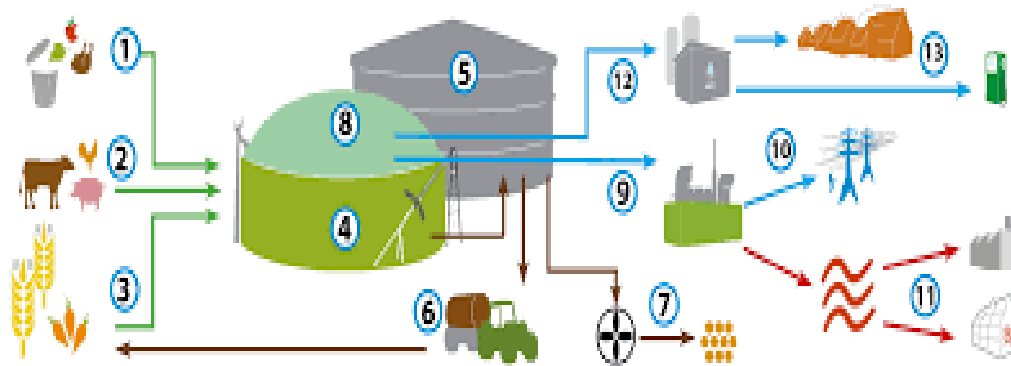
- 8 Gas storage
- 9 Digester
- 10 Observation window
- 11 Low pressure monitor
- 12 Over- and underpressure protection
- 13 Blow off pipe
- 14 Condensate trap

Source :World Biogas



# General Sites and Operational Safety

- ▶ Equipment should be designed not to let biogas in or out
- ▶ Electrical installations must comply with standards and regulations (ATEX approval)
- ▶ Make sure to plan the project rigorously
- ▶ Hire an onsite expert to insure the workers apply the health and safety measures that are established



Source:biopower.com

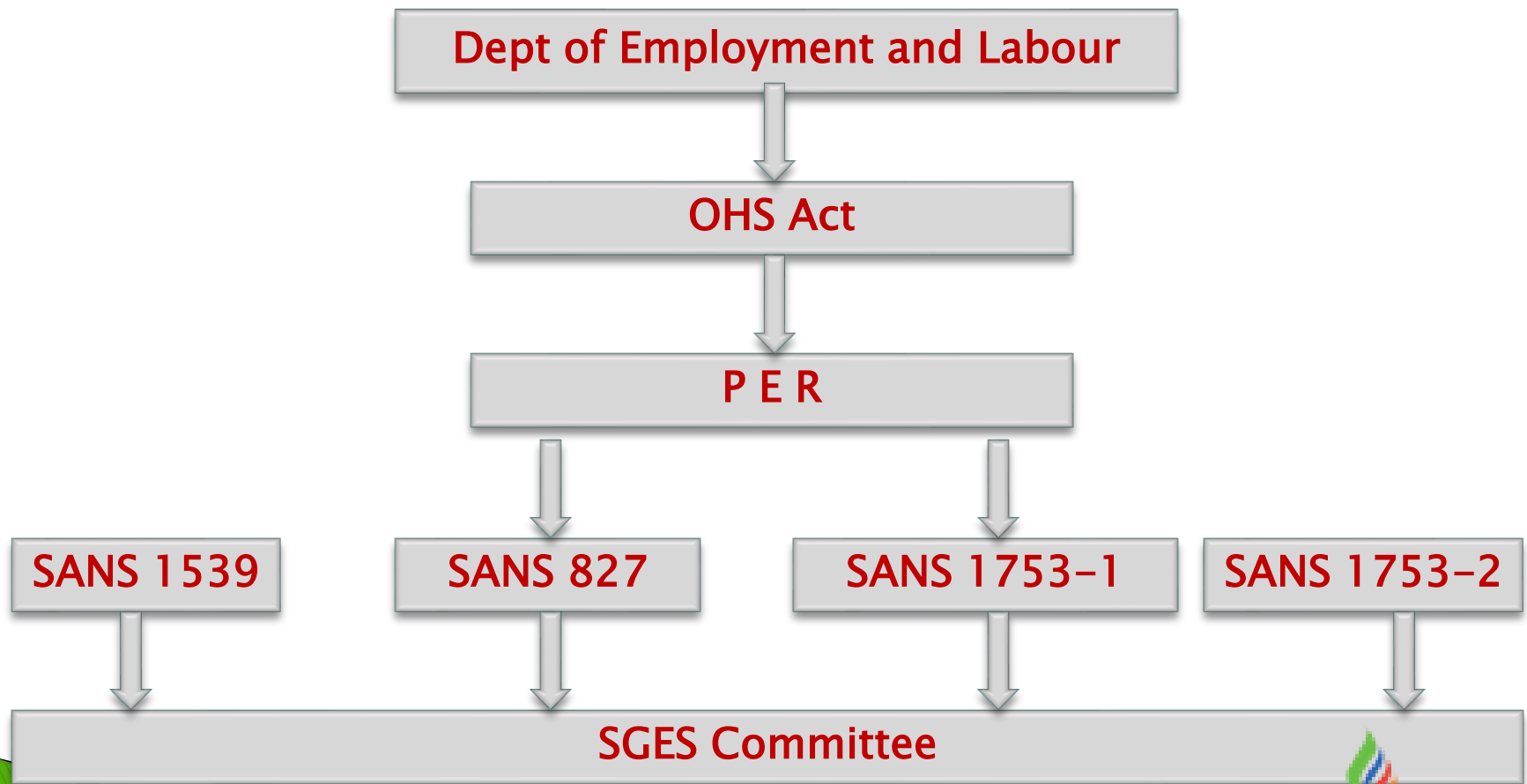
# Installation or Construction Safety Considerations

- ▶ Commissioning of a biogas plant can be the most dangerous step of a project



Source: PEETS UJ and Versobio

# Mandate / Authority of the Safe Gas Equipment Scheme (SGES)



# Safety During Commissioning

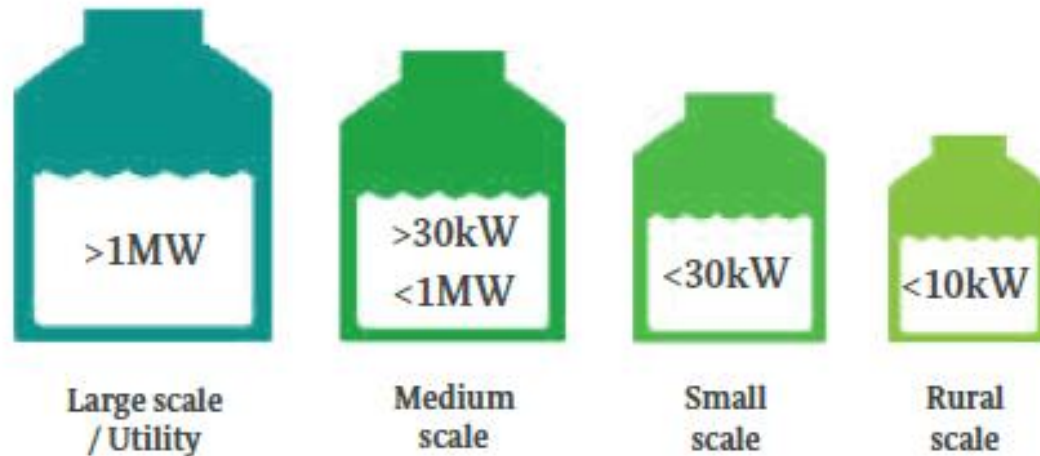
- ▶ Commissioning of a biogas plant can be the most dangerous step of a project
- ▶ Accidents that can happen include:
  - Structural failure rarely happens when the tank is being filled or the high-pressure pipes are being tested
  - Accidental hydraulic discharge during the pre-operation test of the pumps and valves
  - Lack of calibration of the health and safety equipment
- ▶ Higher risks of explosion when the air inlets are opened and the air reacts with biogas to form flammable mixture.

# Operational Safety Considerations

- ▶ During this step, a lot of accidents and incidents happen. To avoid them, the operator must:
  - Train every operator of the plant for the work in confined space, portable gas detection, process and equipment use
  - Apply strict procedures for equipment locking
  - Regularly verify health and safety equipment to make sure they are calibrated and offer precise measurements
  - Do a visual screening of all equipment to detect leaks and verify the state of equipment
  - Make sure all workers apply health measures to avoid pathogen diseases
  - Train all plant workers for basic firefighting skills and CPR

# SCENARIOS

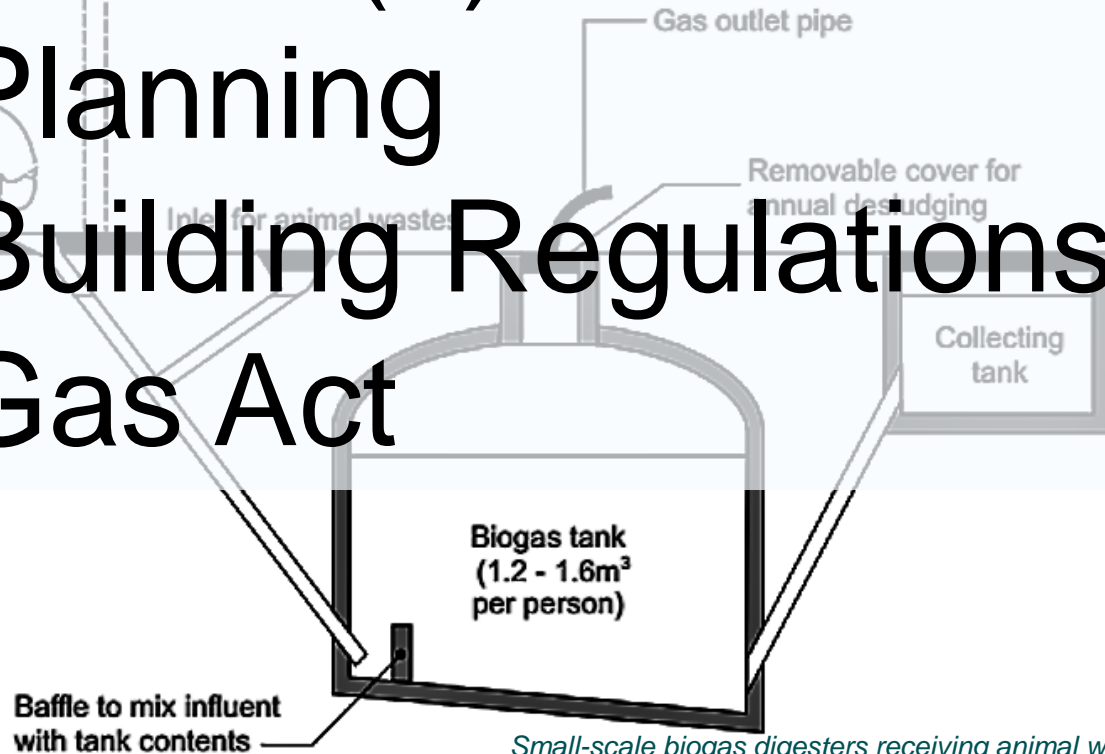
1. Small biogas for own use (cooking & light)
2. Medium plant using on site feedstock and own use electricity
3. Large plant using regional feedstock and wheeling electricity



Source: GIZ 2016

# SCENARIO 1

- NEMA (?)
- Planning
- Building Regulations
- Gas Act



*Small-scale biogas digesters receiving animal waste show higher biogas production rates than bioreactors using only human wastewater as substrate. Source: WELL (n.y.)*

# SCENARIO 3

- *NEMA + SEMAs (3)*
- *Forestry*
- *Heritage*
- *Agriculture (3)*
- *Water*
- *CAA*
- *Gas Act*
- *Safety Standards*
- *NERSA*
- *Building Regulations*

Source: SABIA



# THANK YOU

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