



**AD at abattoir - Feasible?**

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# Content of interaction

- AD as solution for waste management at abattoir
- ibert Cavalier abattoir biogas system
- Feasibility?
- What are the pitfalls/ most critical issue ?
- Back door
- Reference plants – ibert Cavalier, etc.
- Conclusion



# Anaerobic Digestion?

“Product” of natural process of decomposing of organic material in the absence of  $O^2$

Biological process that converts carbohydrates, fats and proteins into methane  $CH_4$  and  $CO^2$



# Golden rule of AD

To Act immediately and consistently

BUT

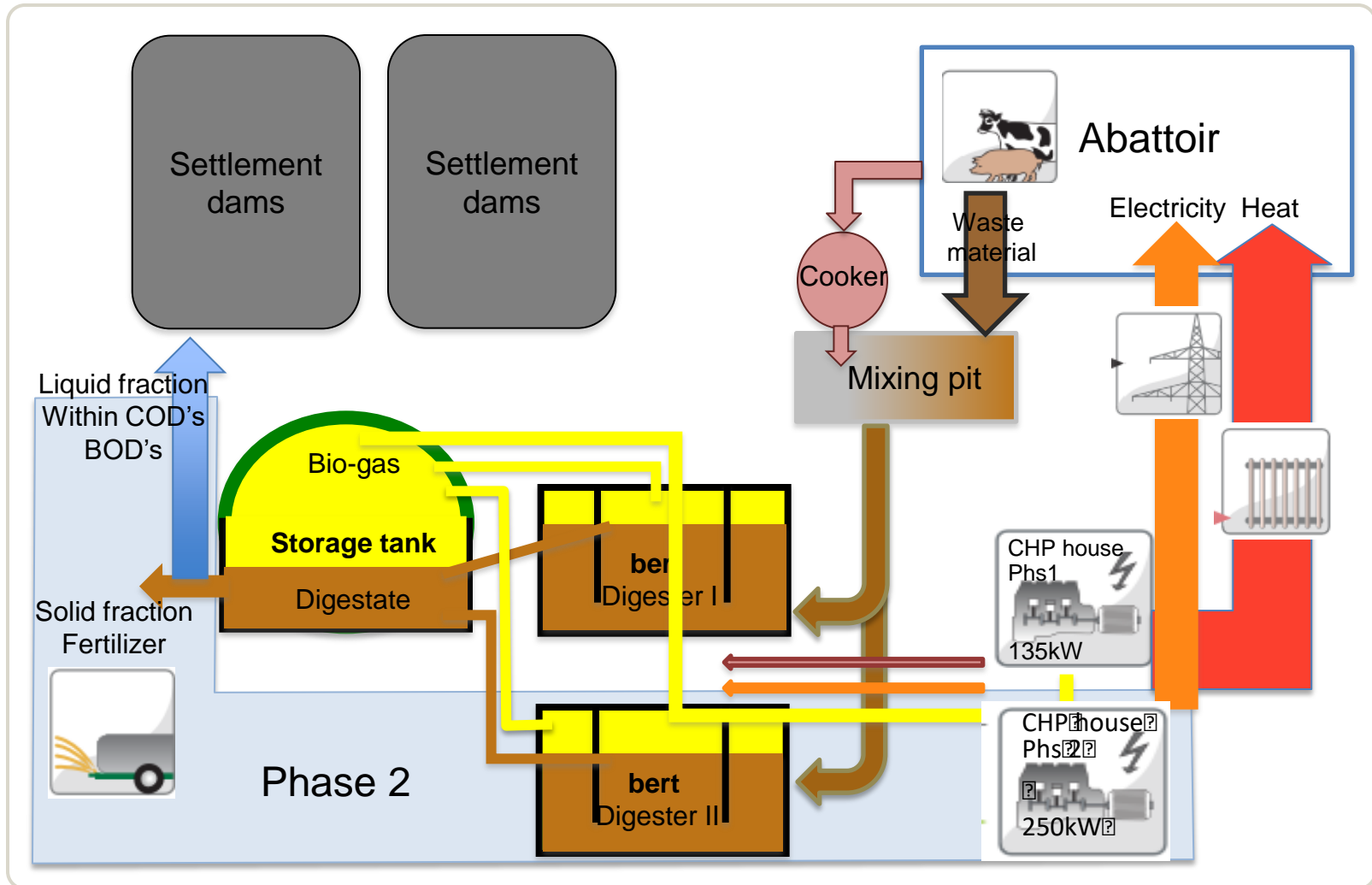
with patience

this will

achieve results



# ibertCavalier Biogas process/ system



# Feasibility game changers

- **Price** of service & energy is critical - **MUST** move away from cheaper than Eskom - why?
- **Waste processing cost** - gate fee - laws must be enforced - please
- Green - **Carbon tax** - must be realized
- **Tri-generation**
  - Electricity sales - reality
  - Heat - 80C - reality
  - Cold - 9-12C via adsorption cooling - chiller plant
  - **Organic compost** - not reality YET !! must become a sought after product
- **Funding period** must be long term 10y +

# Most critical operational aspect

## Material = fuel

- Consistency – seasonality
- Availability - 365day/y
- Quality - directly linked to gas production
- Stock-pile ? JIT

## Reality

- It's all variables !!!!
- animal size varies, seasonality, peaks & valleys, strikes, draughts

## Contracting

- Critical thinking/ planning of all eventualities

## Funding

- Ensure funders understand time-lines & flexibility
- Include 1<sup>st</sup> year operation & maintenance cost !!!

# Critical technology issues - effects

- Type & quantity of material – Fuel begin and end
- Operation – skills, back-up NOW not tomorrow
- Workforce – 24/7 – weekends, holidays/ strikes – infrastructure, transport, accommodation, safety, theft, etc. bacteria does not know when its Christmas
- Complexity of technology – Africanize
- Maintenance & break-downs – simple
- End-use - can not only be electricity - tri-gen

# Financial of ibertCavalier

## Plant

- Process plant AD = 1000m<sup>3</sup> process +/- 30t/day
- +/- 170m<sup>3</sup>/hr at full output
- CHP's 135 + 225 kW = 360kW el
- Budget cost phs1 R12,5m actual R16m
- Phase 2 budget R12m actual R12m

**Low operation cost >10c/kWh / self usage >6%**

## Revenue streams

- Gate fee
- Energy sales
- CER - carbon tax possible
- Organic Fertilizer - not realizing

# Back-doors - life line

## Waste supply

- Every bodies potatoes the larges but reality is different
- Must have **alternative feedstock** or **penalties**

## Funders

- keep them close speak to them, make sure they understand what you telling them, the have a **different decoders**

## Take off/ client payments

- Must find workable process must be **win-win**

## Legalities

- Enforce your agreement don't let it slip - it will bite you
- Spend extra week on definitions and clarity before signing agreement **don't rush** - it will save years in long-run



# Reference sites South Africa

## Plant #1 Meat to Market Jan Kempdorp - 2010



600m<sup>3</sup> AD, 135 kW CHP, 15 t/day slaughter waste

# Plant #2 Hessequa Abattoir - Riverdale - 2014



400m<sup>3</sup> AD, 50 kW CHP, 10 t/day slaughter waste

# Plant #4&5 Cavalier Abattoir - Cullinan - 2015/17



2 x 500m<sup>3</sup> AD, 360 kW CHP, 35 t/day abattoir waste

# Plant #3 No2 Piggeries - Peninsula - Queenstown - 2015



600m<sup>3</sup> AD, 190 kW CHP, 35 t/day pig manure

# Plant #6 Zandam Cheese & Piggery (W/Cape) 2016



1 x 400m<sup>3</sup> AD, 75 kW CHP, 30 t/day pig manure



# Plant #7 Thorny hill KZN - energy crop - 2016



200m<sup>3</sup> AD, 16 kW 2,5t/d Napier grass

# Conclusion

- AD at abattoir is feasible waste management option
- Critical to select correct technology and operational process (the devil is in the details)
- All energy must be utilised - tri-gen most feasible
- Must be partnership - can't be one sided
- Funding is critical must have some equity but flexible loan conditions - something WILL GO WRONG - plan for it!

Will I do it again? **YES, BUT** I will spend more time on contracts before I sign !!