



End of line biogas Valorization

VMI Engineering & Contracting

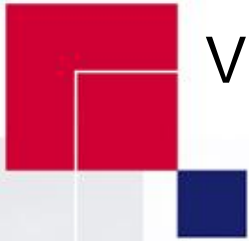
March the 25th
Benjamin De Vis



Introduction

- ° 1994
- Origin: UPS and critical power
- 1st extension of activities: datacenters
- 2nd extension: energy efficiency

- 50 employees
- Active in Western Europe and beyond...
- HQ: Hoegaarden (15 min from Brussels)
- 60 % engineers
- Flemish, French, English, German, ...



It's not just WHAT we do...

POWER QUALITY

UPS Electricity Projects + Datacenters

From global approach
to integration

(mobile UPS units)



ENERGY

Energy Solutions

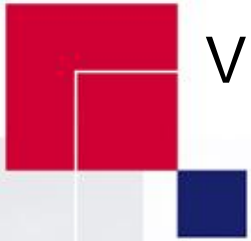
- Optimization
- Industrial boiler rooms
- Decentral production
- CHP
- Gas turbines
- Steam turbines
- Engines



Energy + Renewables

- Bio gaz
- Bio mass
- Incineration
- Pyrolysis
- Legislation and govern. support
- Financial support
- Network





... it's the **WAY** we do it !

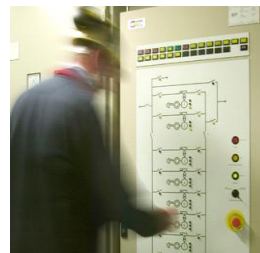
ENGINEERING

Audits, feasibility
Design & specifications
Economic analysis
Site monitoring
Delivery



CONTRACTING

Installation Design
Project realisation from
A to Z
Independant!!



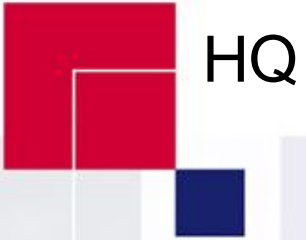
SERVICE LEVEL AGREEMENTS

Optimal performance of
your installation
According to client's
needs and
expectations



INVESTMENTS

Knowledge of market and legislation
Business plan
Search for partners

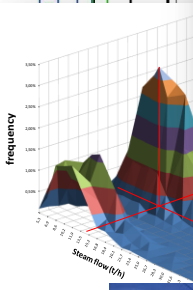
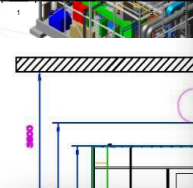
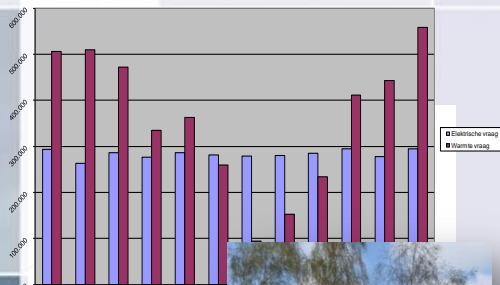


HQ





VMI Engineering & Contracting





Outline



- Anaerobic digestion vs. Fermentation
- Biogas CHP
- Case study
- Dual fuel



Anaerobic water treatment





Purification vs fermentation

Fermentation

- **Goal: green energy**
- Control of input → high gas quality
- Internal buffering
- Internal desulfurization



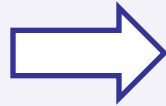
Water purification

- **Goal: standards**
- Very large variation of gas quality and flow
- External buffering
- External scrubbing
- Integration into existing plant
- Variation in heat consumption

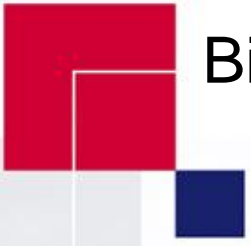




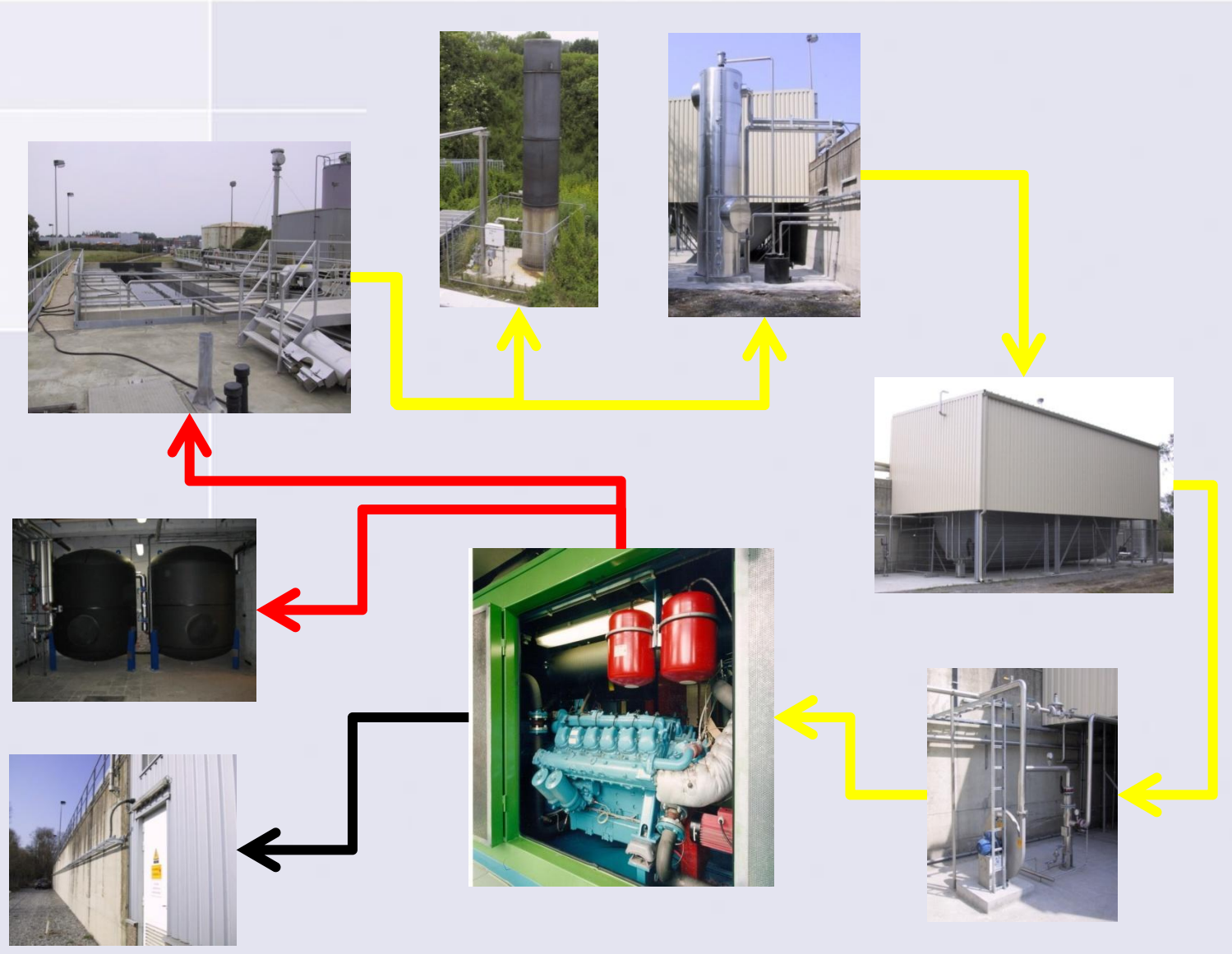
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Biogas cogeneration





Technology status



On citera ainsi Inbev à Hoegaarden (165 kW_e) et Leuven (944 kW_e), Unifrost à Ardoois (291 kW_e), Alpro à Wevelgem (220 kW_e), Westro à Staden (291 kW_e), Ordegem Papier à Dendermonde (540 kW_e) et la raffinerie Tirlémontoise à Tirléfont (593 kW_e).

- 7 installations in BE at least 2 not mentioned
 - 6 owned by VMI
 - 2 under construction by VMI
- ➔ VMI = most important player



Businessplan

Turn key investment	€ 475.000
<u>Incomes</u>	
Electricity	95.500 €/y
Heat	32.000 €/y
GSC	96.000 €/y
WKC	57.500 €/y
<u>Costs</u>	
OPEX	30.500 €/y
Net income	250.500 €/y
Payback	1,9 y

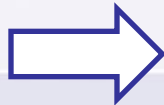
Design parameters:

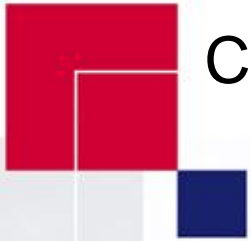
65 Nm³/h, 70 % CH₄, 165 kW_e, 6000 h/y



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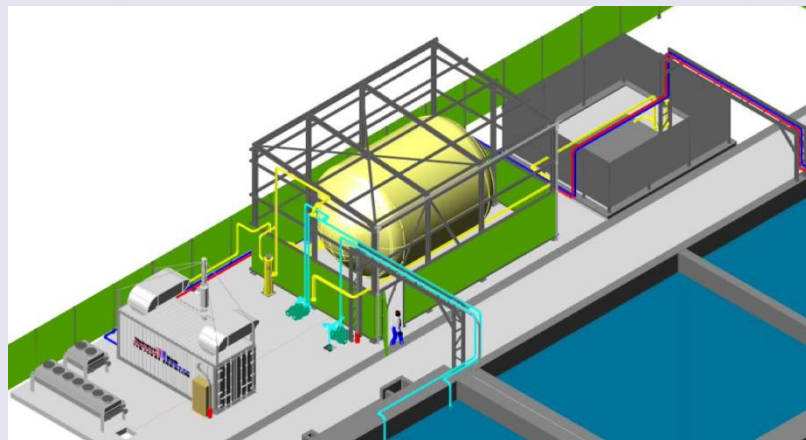


Case Study: Brewery

Biogas Cogeneration

250 kW_e

- V8 MAN
- Heat → anaerobic dig. or emergency coolers
- 200 m³ buffer → 2h on full load
- Low noise levels





Case Study: Brewery

Biogas Cogeneration

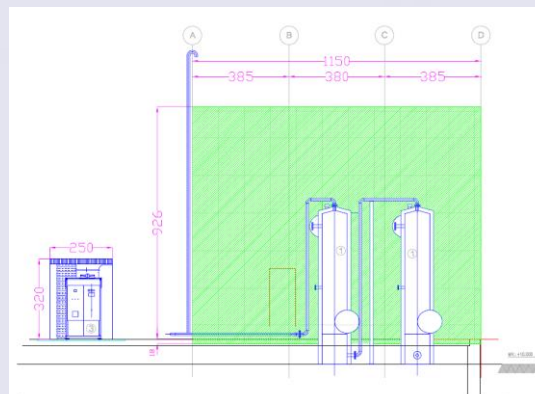
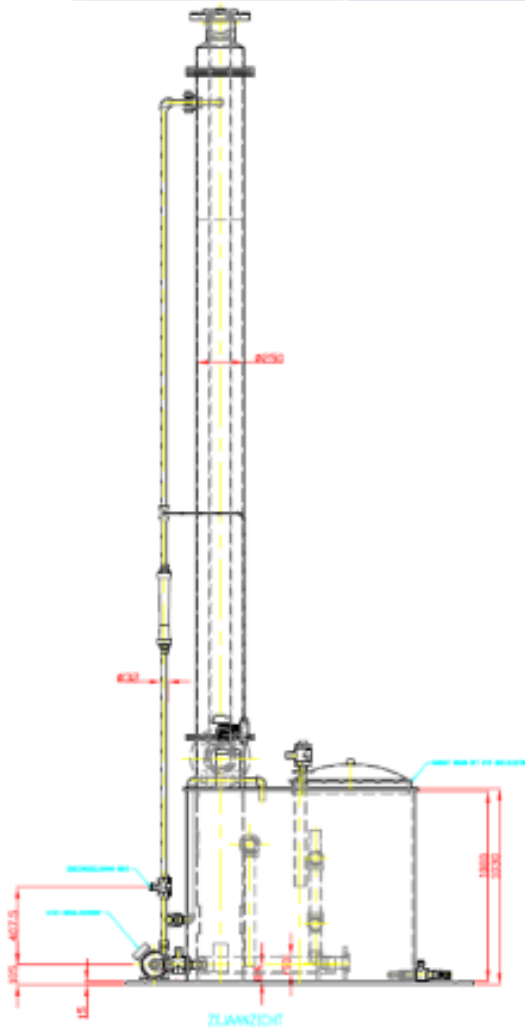
250 kW_e

- IEM
- High quality materials (stainless steel, fouling resistant heat exchanger, coatings,...)
- Customized design of critical components
- Emergency Cooling:
 - Serpentine problem
 - GSC
- Control of [CH₄] & [H₂S]
- Serviceability
- Superior Techniques



Biogas Cogeneration 250 kW_e

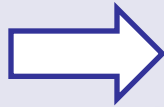
- Continues gas analysis (CH₄, H₂S)
- [H₂S]_{motor} < 200 ppm
- [H₂S]_{anaerobic} > 5000 ppm
- Gas scrubbing → aerobic sludge
- Scrubbers dimensioning on [H₂S]_{max}
- Automatic gas stop → torch





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Dual fuel

- Biogas + natural gas
- Design based on heat demand
 - Bigger engine possible
 - Better efficiency
 - Example: 140 kWe → 35,4 % and 250 kWe → 38 %
 - More profits
- Hot start of engine
- Stop on natural gas





Dual fuel

- Fluctuating gas quality:
 - Less start/stops
 - Less risk
- CHP for process heat → cont.
- Higher gas production
- More green electricity production even with same amount of gas

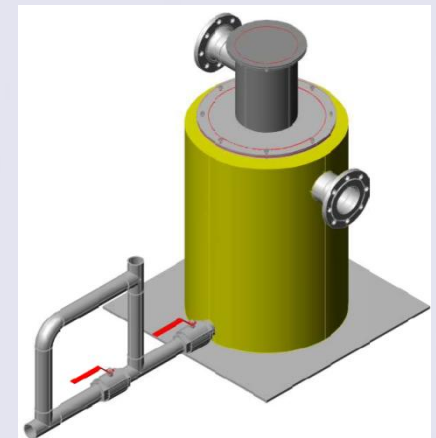


Dual fuel

- CHP certificates
- No need for gas buffer → cont. buffering
- Higher availability
- Preheating of reactor
 - Improved functioning of reactor
 - Improved biogas quality

Disadvantages :

- Bigger CAPEX
- Natural gas purchase
- Experience needed for fine tuning





Conclusions

- End of line biogas valorization
- Anaerobic water treatment \neq good quality biogas
- Green energy production = difficult especially during maintenance
- When techniques under control = very beautiful business plan



Informatie

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