Case Linköping Biogas - challenges and solutions

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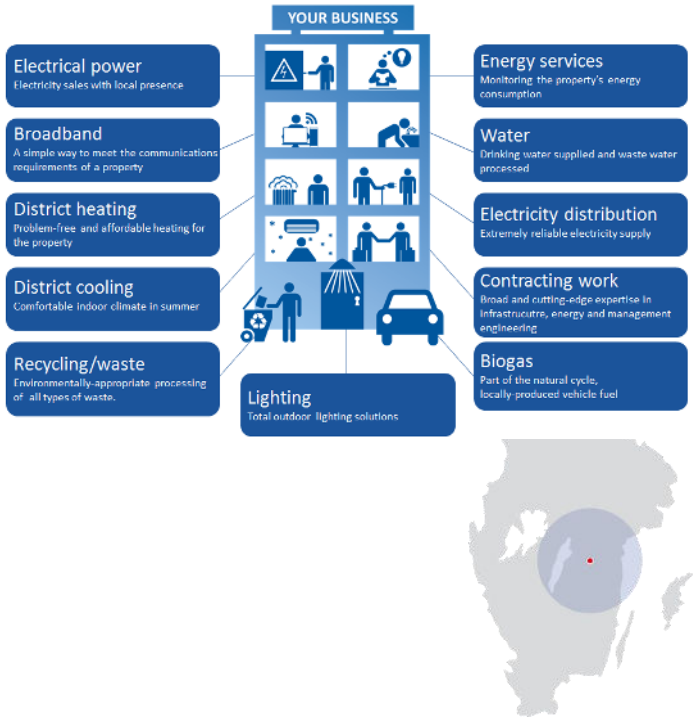
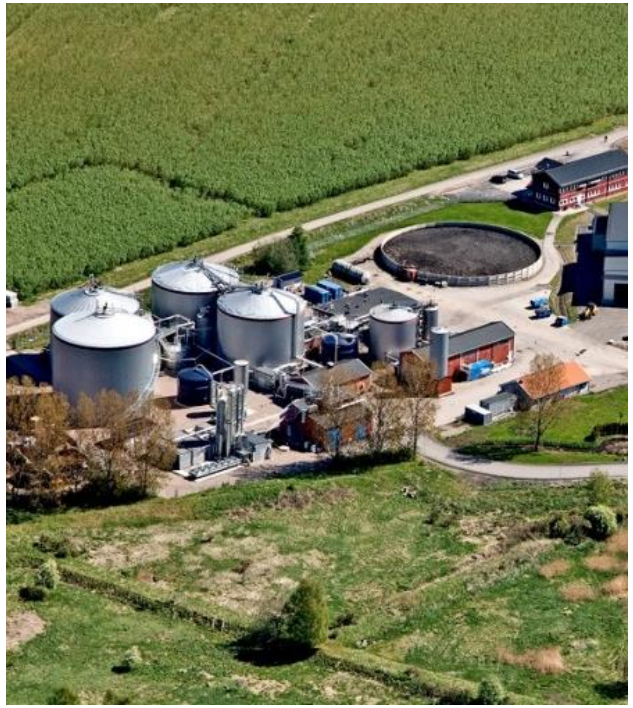


Tekniska verken is owned by the municipality of Linköping

Financial key figures 2019

- Clients: ≈ 260 000
- Employees: 958
- Sales: M € 550
- Profit*: M € 72
- Net investments: M € 140

* after financial items



Linköping biogas plant started in 1997

Year: 1996

Why biogas in Linköping?

- Problems with soot particles in the air and noise in the city centre
- Complex management of organic waste from one of Sweden´s biggest slaughterhouses in Linköping
- The municipal transport company needed a focus area to strengthen their competitiveness

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Challenges

1. Non-existing biogas market
2. Foaming, process problems and bad odour
3. Introduction of organic fraction of municipal solid waste (food waste)
4. Expansion to new markets

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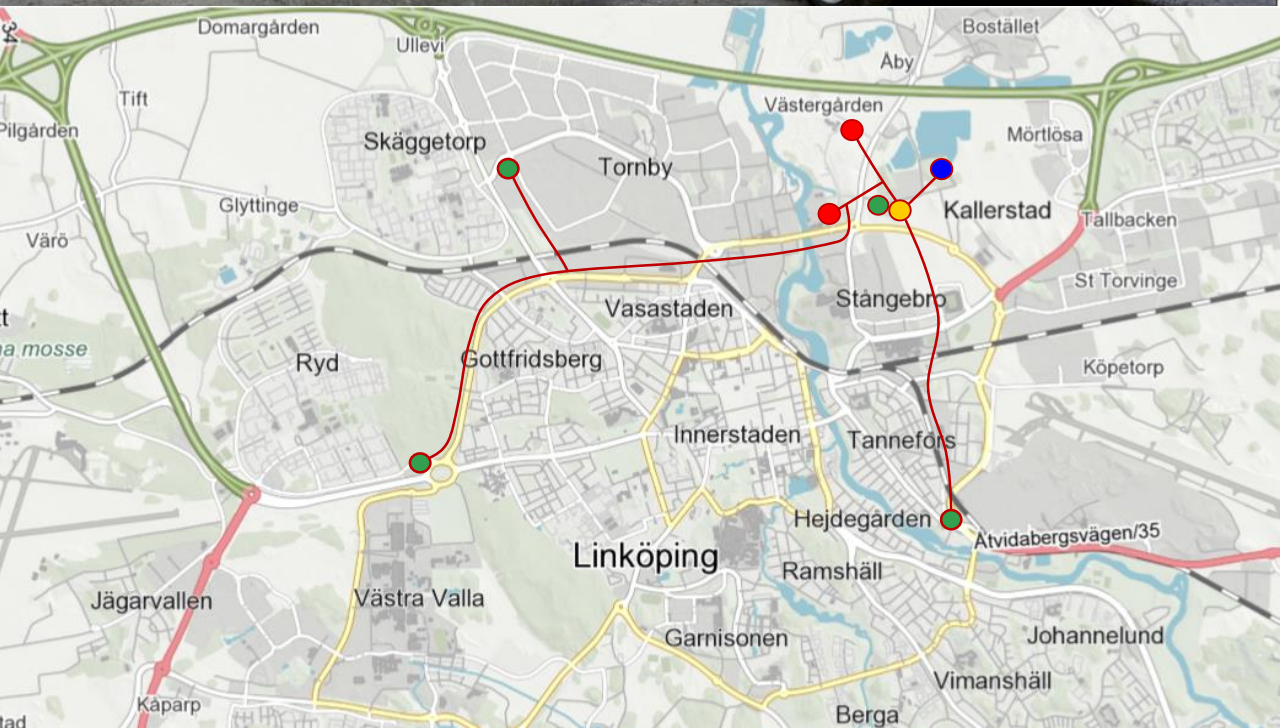

Year: 2001

1. Non-existing biogas market

TV decided to create a market

- Workshop converting petrol cars
- Local gas grid to fuelling stations
- Primarily local busses, garbage trucks

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Year: 2000-2005

2. Foaming, process problems and bad odour

Foaming

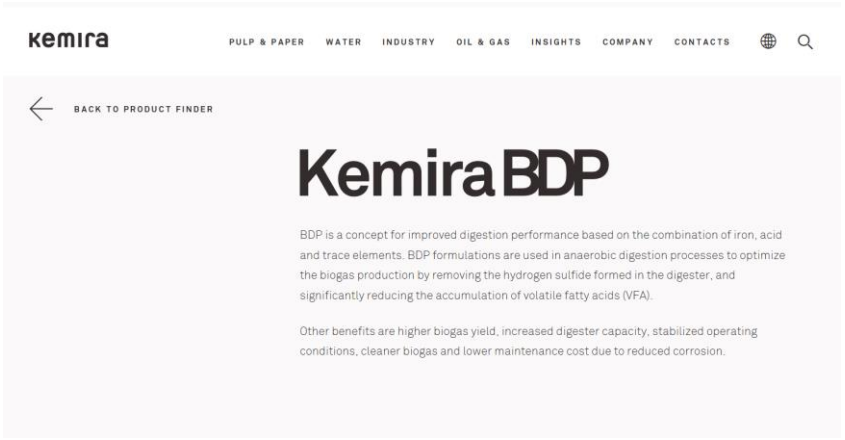
- Reoccurring problems with foaming when treating slaughterhouse waste (rich in fat and proteins)
- Caused by poorly degraded fat and accumulated LCFA

Process problems

- VFA-accumulation, risk for low pH
- High NH_4-N due to high protein content

Bad odour

- Protein degradation leads to the release of H_2S
- Substrate



Year: 2000-2005

2. Foaming, process problems and bad odour

Foaming

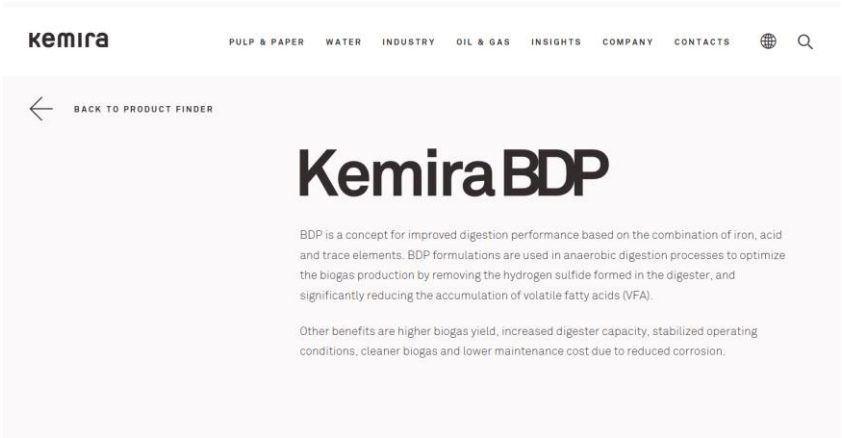
- ~~Reoccurring problems with foaming when treating slaughterhouse waste (rich in fat and proteins)~~
- ~~Caused by poorly degraded fat and accumulated LCFA~~

Process problems

- ~~VFA-accumulation, risk for low pH~~
- ~~High NH_4-N due to high protein content~~

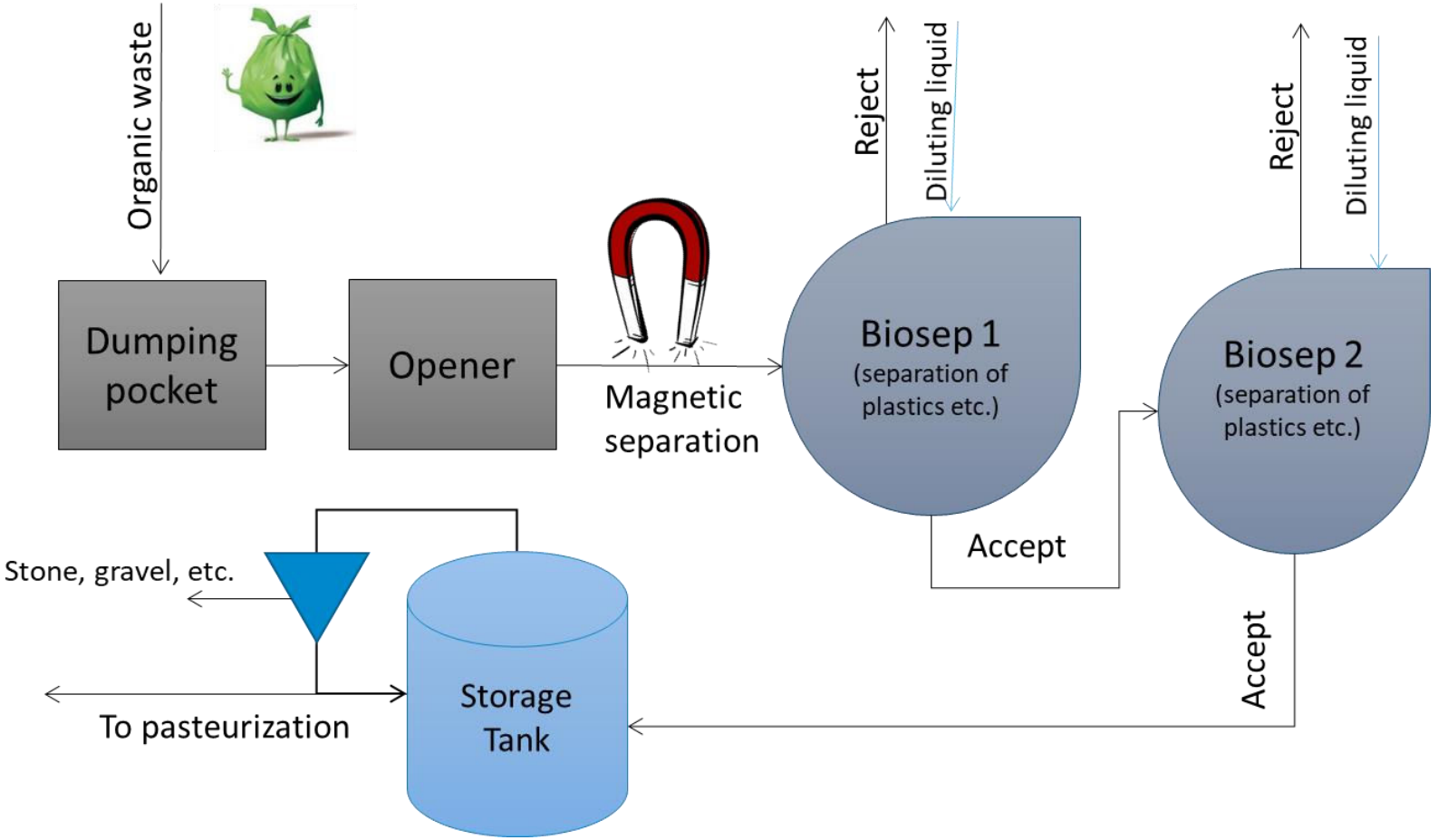
Bad odour

- ~~Protein degradation leads to the release of H_2S~~
- Substrate ← Closed substrate treatment, only pumpable fractions



Year: 2012

3. Introduction of organic fraction of municipal solid waste (food waste)

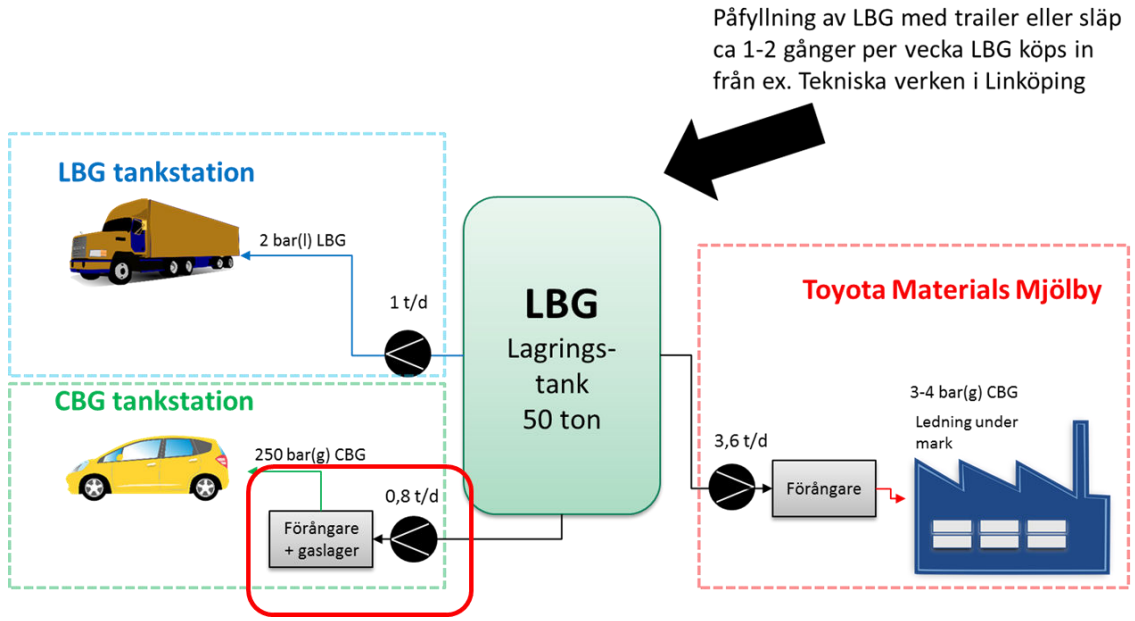


Year: 2012

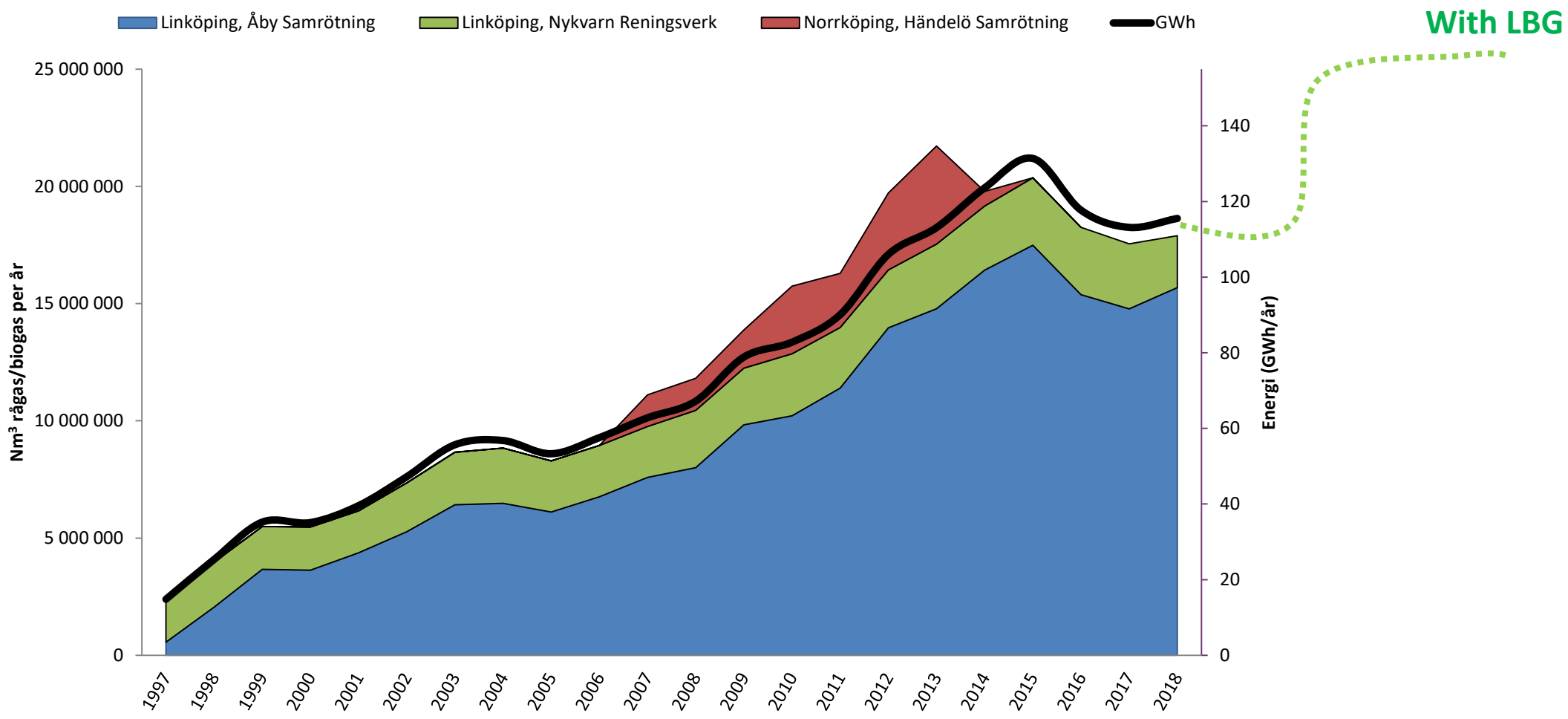
3. Introduction of organic fraction of municipal solid waste (food waste)

Year: 2019

4. Expansion to new markets



4. Expansion to new markets



Year: now

Whats next?

- Negative CO_2-emissions with CCU/CCS
- Power 2 Gas
- Waste2Fish
- Biofertilizer to private persons

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Tack!

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