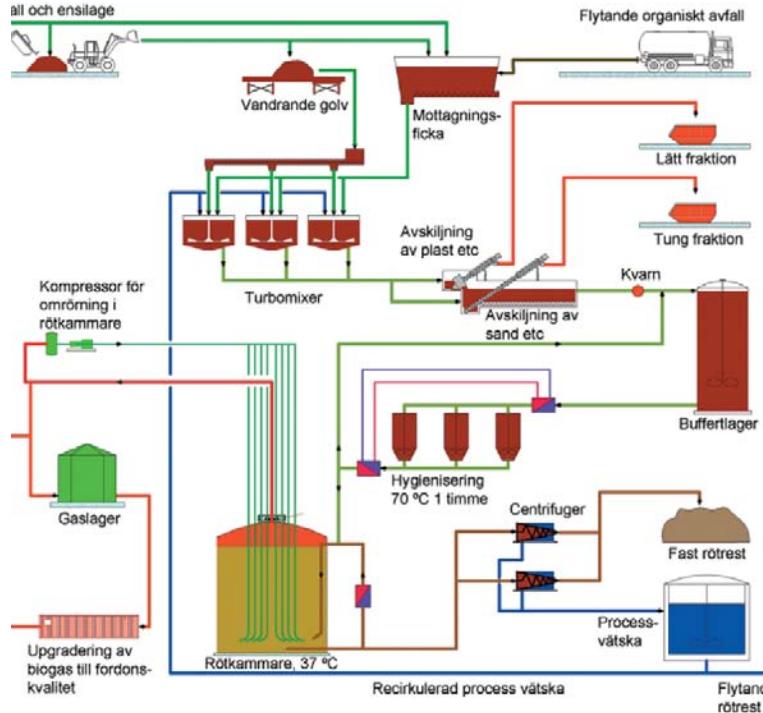
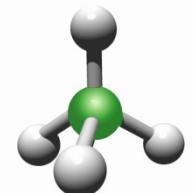


# Co-digestion in Västerås and Kristianstad



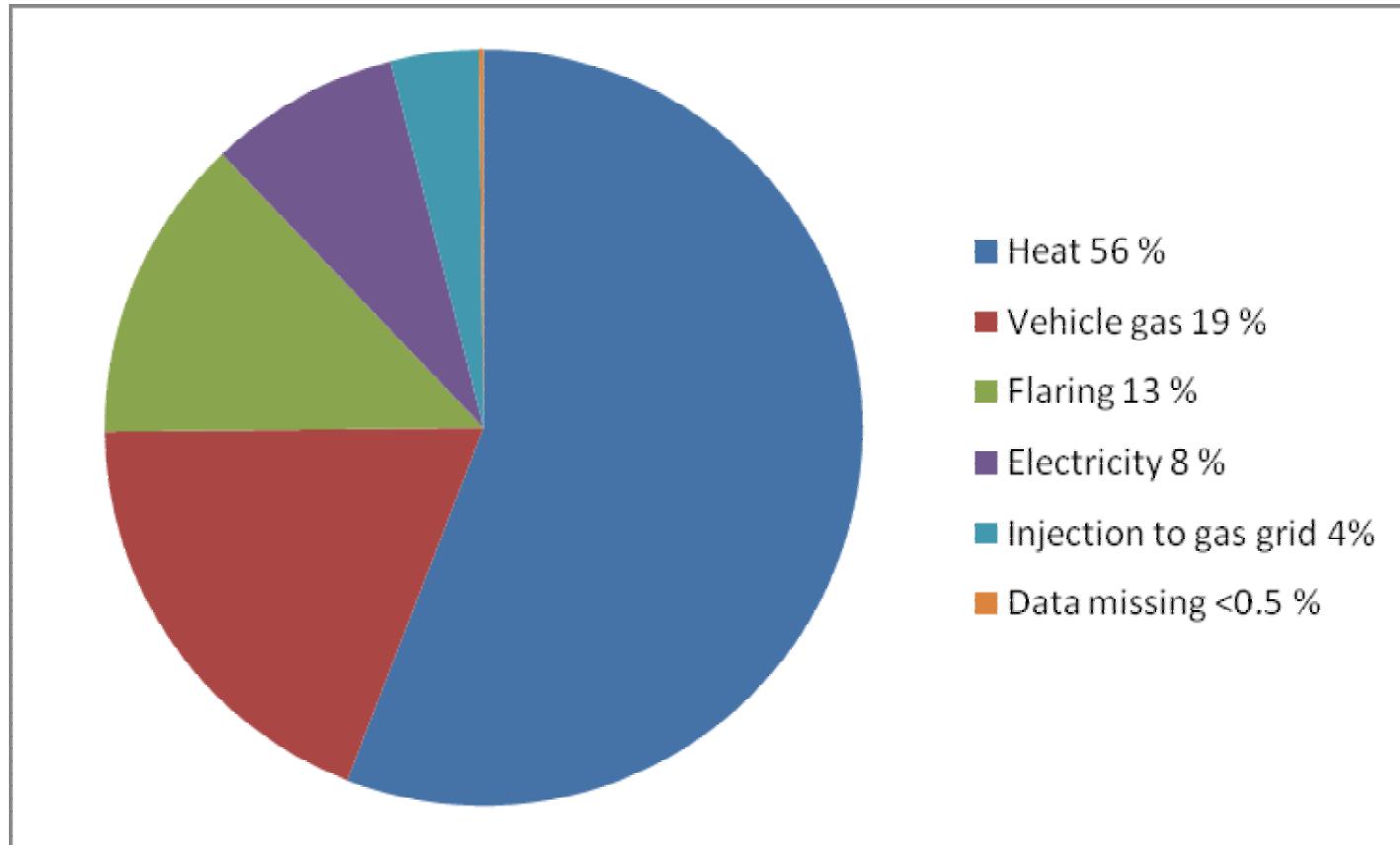
Anneli Petersson, PhD.  
Swedish Gas Centre  
Sweden



# Biogas production in Sweden

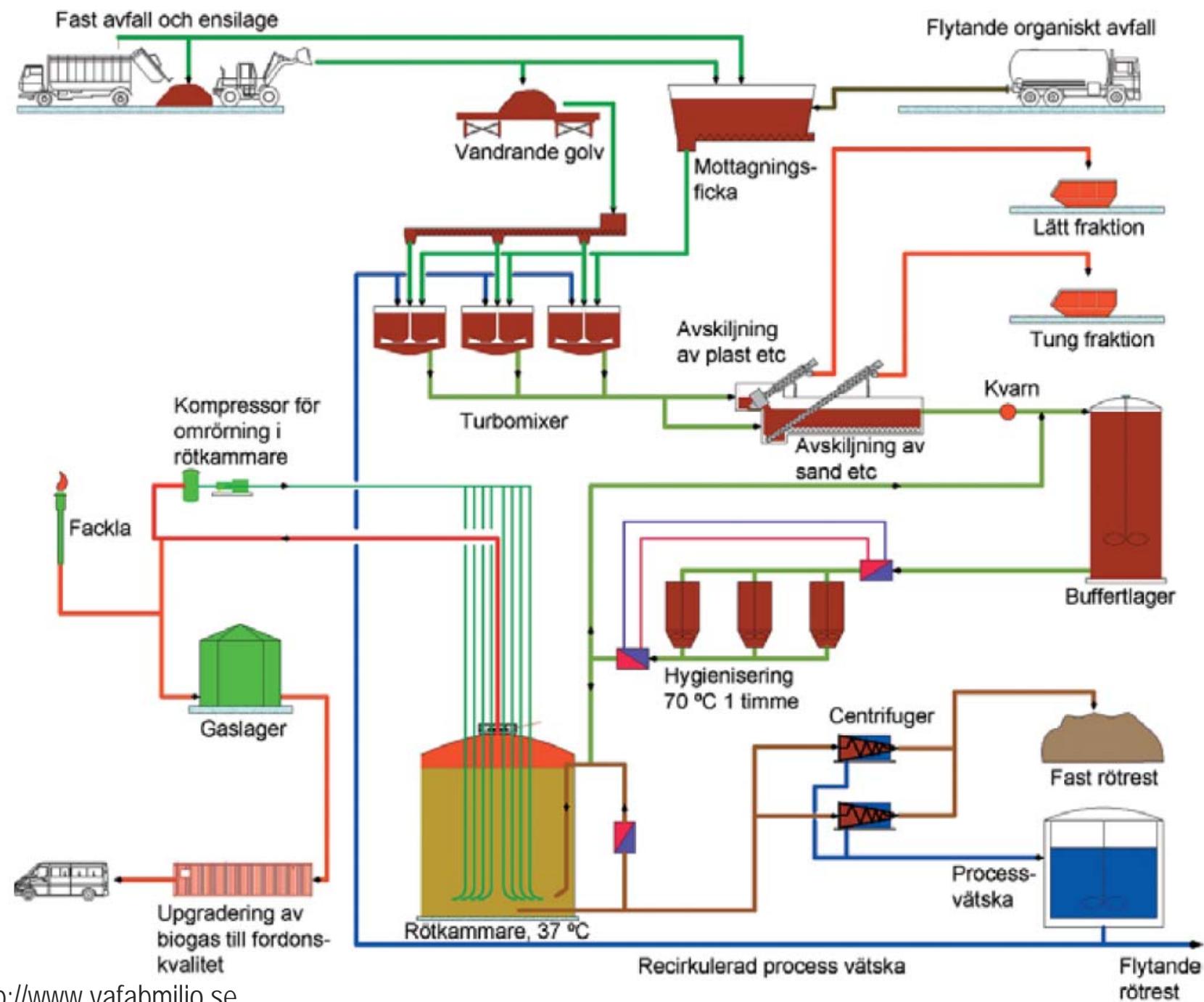
<b>Biogas plants</b>	<b>Number of plants</b>		<b>GWh produced</b>	
	<b>2006</b>	<b>(2005)</b>	<b>2006</b>	<b>(2005)</b>
Municipal sewage treatment plants	138	(139)	581.8	(559.0)
Landfills	60	(60)	342.37	(410.0)
Co-digestion plants	14	(13)	183.9	(163.0)
Industrial waste water treatment plants	3	(3)	91.2	(94,5)
Farm plants	8	(7)	13.9	(12.4)
<b>Sum</b>	<b>223</b>	<b>(223)</b>	<b>1213.2</b>	<b>(1238.9)</b>

# Biogas utilization in Sweden 2006



# Co-digestion in Västerås





# Substrates

- Source separated household waste

14 000 tonnes, DM 30%

- Ley crops from 300 hectares

5000 tonnes, DM 35% (preserved as silage)

- Liquid waste (grease trap removal sludge)

4 000 tonnes, DM 4%



# Household waste

- 144 000 households in the region
- 90 % participates in source separation
- 7 % do home composting
- 3 % produce a mixed household waste



# Pretreatment



Anneli Petersson, Co-digestion in Västerås and Kristianstad, 2008-04-17

# Hygenisation

- Temperatur: 70 °C
- Retention time: 1 hour



# Biogas production

Temperature: 37 °C

HRT: 20 days

Volume: 4000 m<sup>3</sup>

Biogas: 15 000 MWh

Digestate:

- 6500 tonnes solid part  
(DM 25-30 %)
- 15 000 tonnes liquid part  
(DM 2-3 %)



# Separation in solid digestate



# ...and liquid digestate



# Biogas upgrading – Water scrubber

- 15 000 MWh from biogas plant
- 8 000 MWh from sewage treatment plant

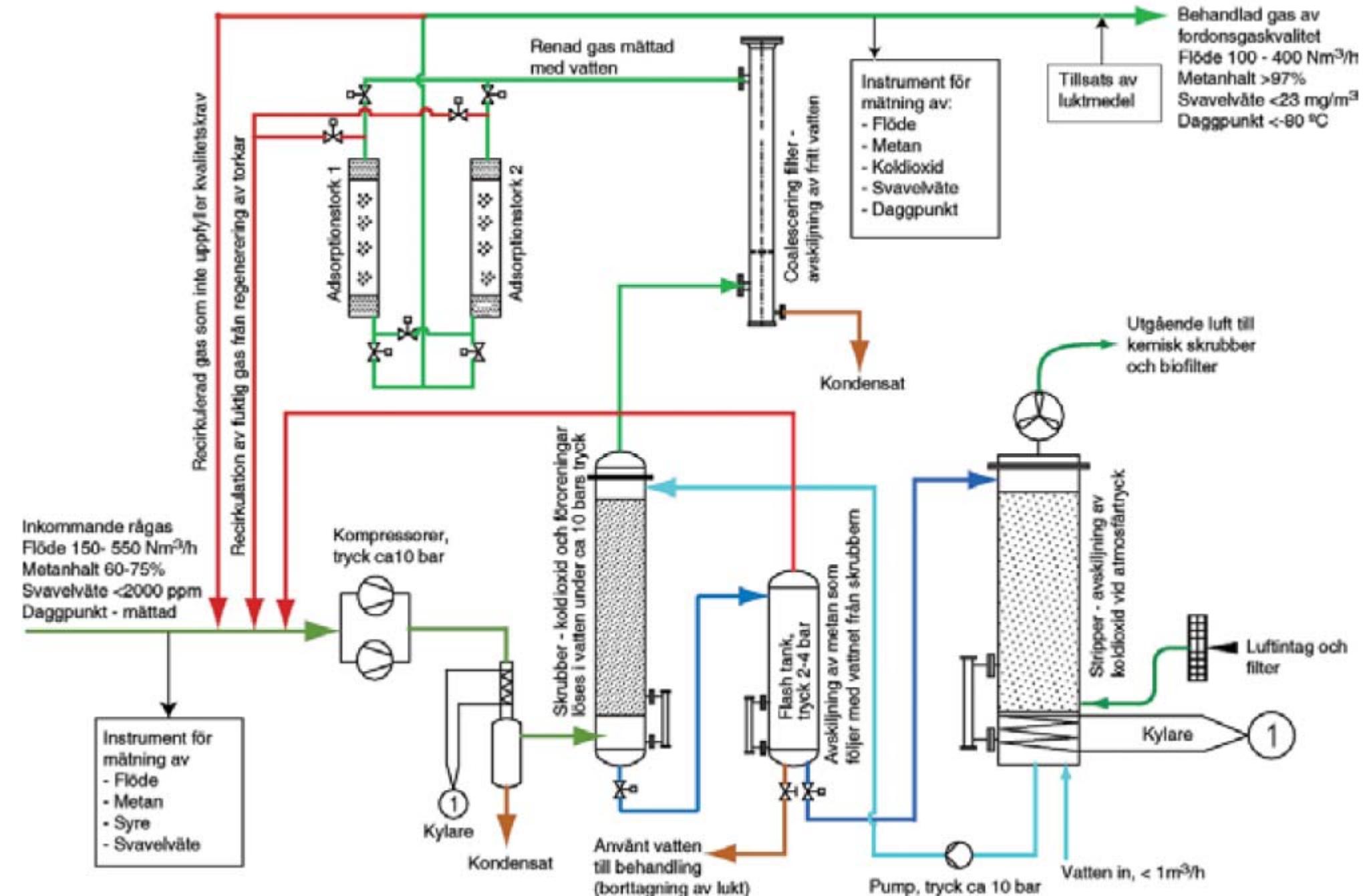


Before treatment:

- 150-550 Nm<sup>3</sup>
- 60-75% methane
- Hydrogen sulphide <2000 ppm
- Water saturated

After treatment:

- 100-400 Nm<sup>3</sup>
- 97% methane
- Hydrogen sulphide <23 mg/m<sup>3</sup>
- Dew point <-80°C



# Biogas utilization in Västerås

23 000 MWh vehicle gas =  
2.3 milion litres of petrol, which  
is sufficient for:

- 40 city-buses
- 10 refuse-collection vehicles
- and 600 cars



Co-digestion at Karpalund

69 000 tonnes substrate:

- 35 % manure
- 60 % waste from food industry
- 5 % household waste

Hygenisation:

70 °C, 1 hour

Biogas production: 38 °C,  
20-24 days HRT



# Biogas production in Kristianstad. II

Production at Karpalund:

- 53 GWh biogas
- 63 000 tonnes digestate

Gas from Karpalund and sewage treatment plant upgraded with water scrubber technique fuels:

- 240 gas vehicles
- 22 city buses
- 18 trucks
- 210 light vehicles

(=1.3 milion litres of petrol equivalent)

Anneli Petersson, Co-digestion in Västerås and Kristianstad, 2008-04-17



# Thank you for your attention!

