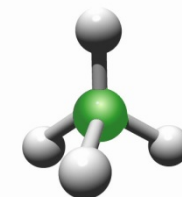


# Country report: Sweden



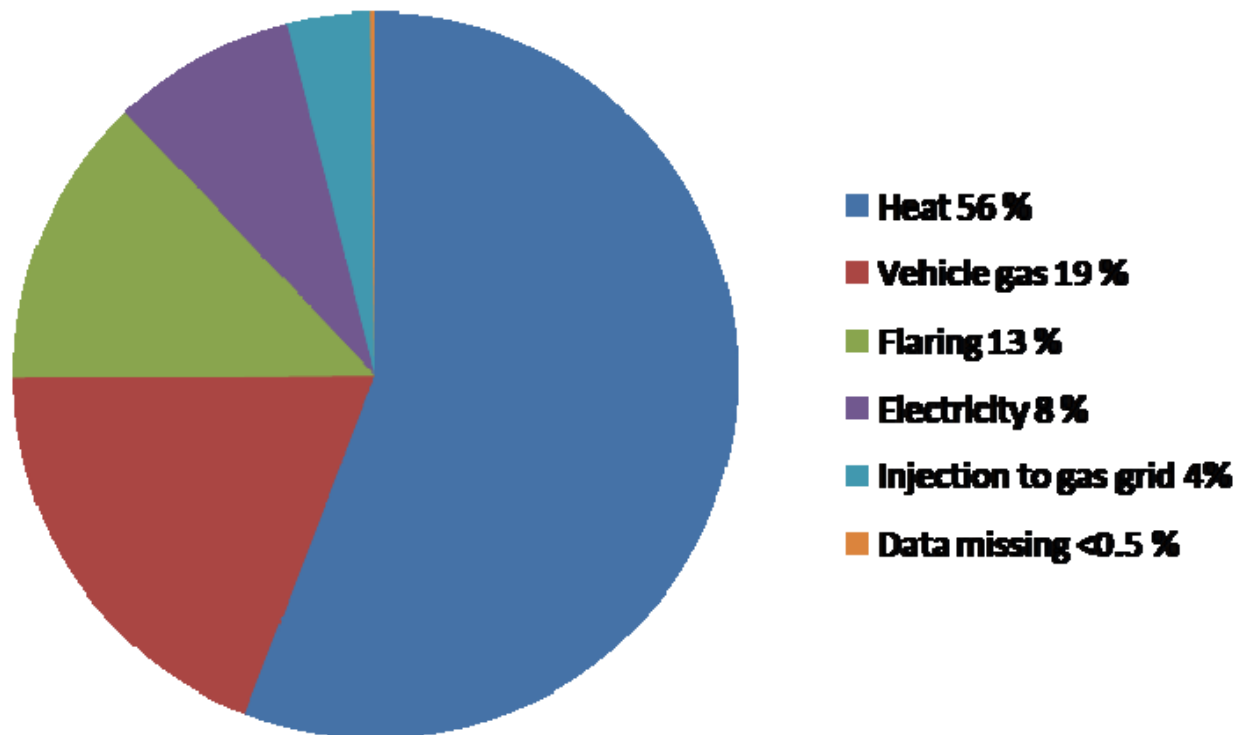
Anneli Petersson, PhD.  
Swedish Gas Centre  
Sweden



- 1.2 TWh produced per year
- 223 plants
  - 138 municipal sewage treatment plants
  - 60 landfills
  - 3 Industrial wastewater treatment plants
  - 14 Co-digestion plants
  - 8 Farm plants

Source: Swedish Energy Agency, ER 2008:02

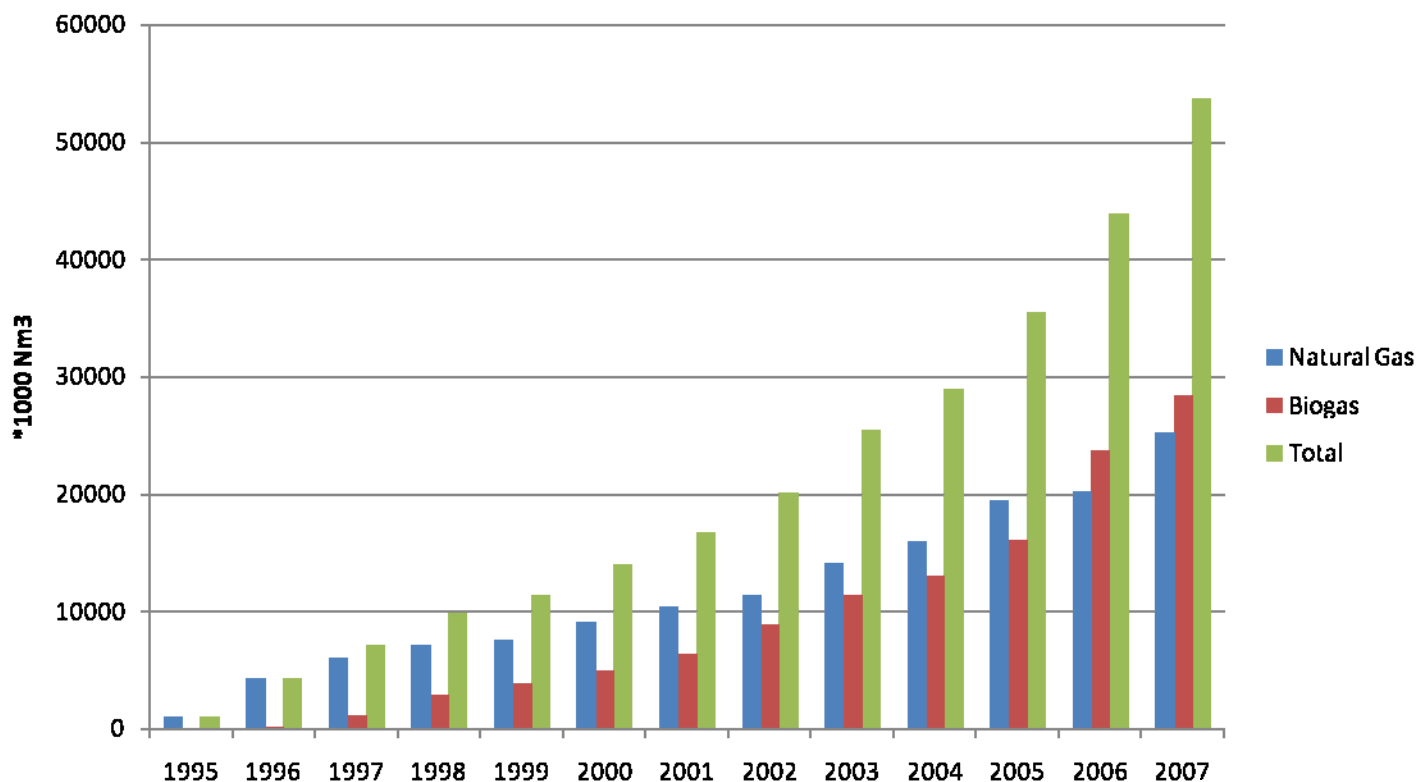
# Utilization of biogas in Sweden (2006)



Source: Swedish Energy Agency, ER 2008:02

# Utilization of biogas as vehicle gas

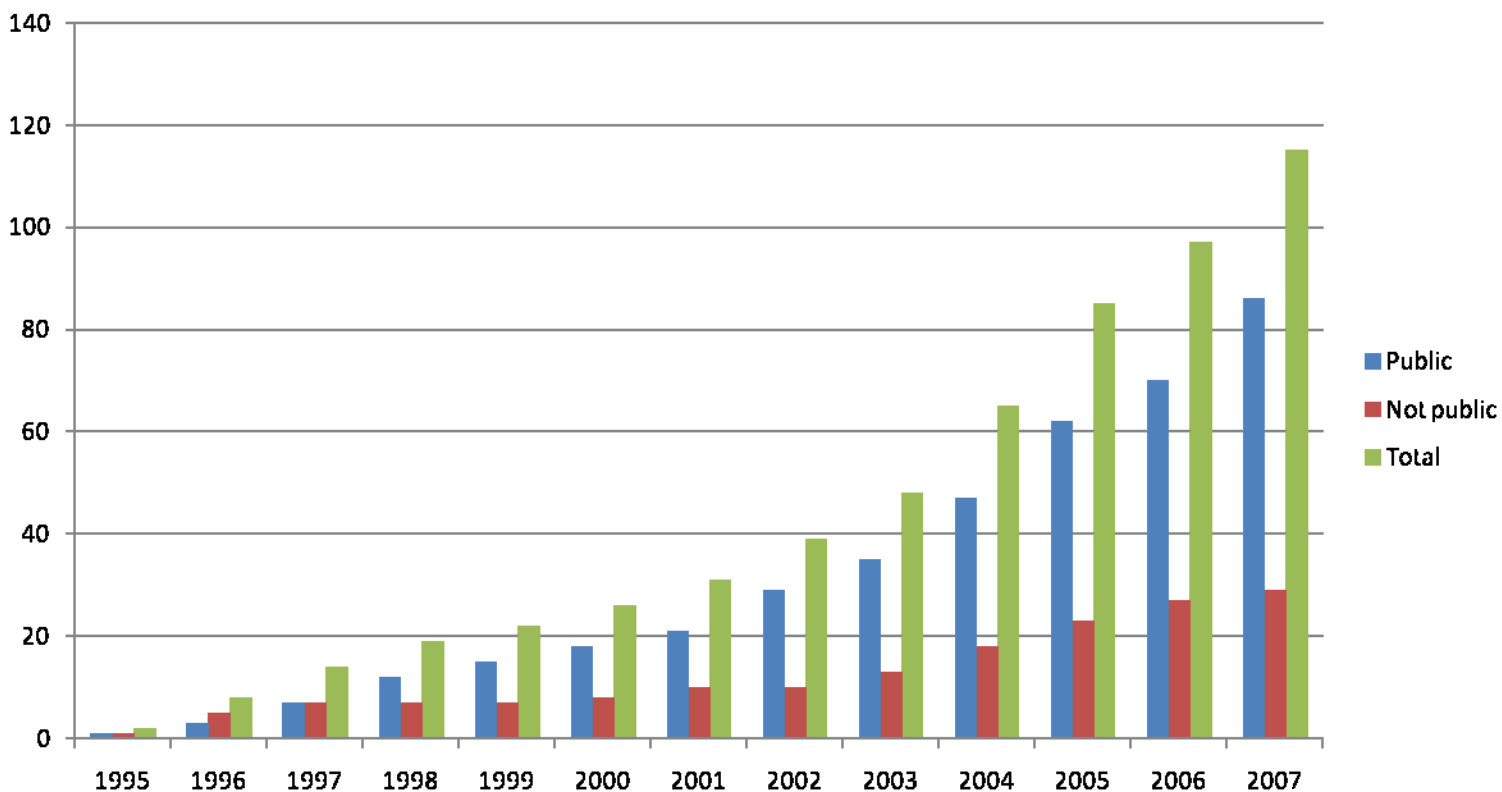
Sold amounts of Vehicle Gas



Source: Swedish Gas Association

# Utilization of biogas as vehicle gas

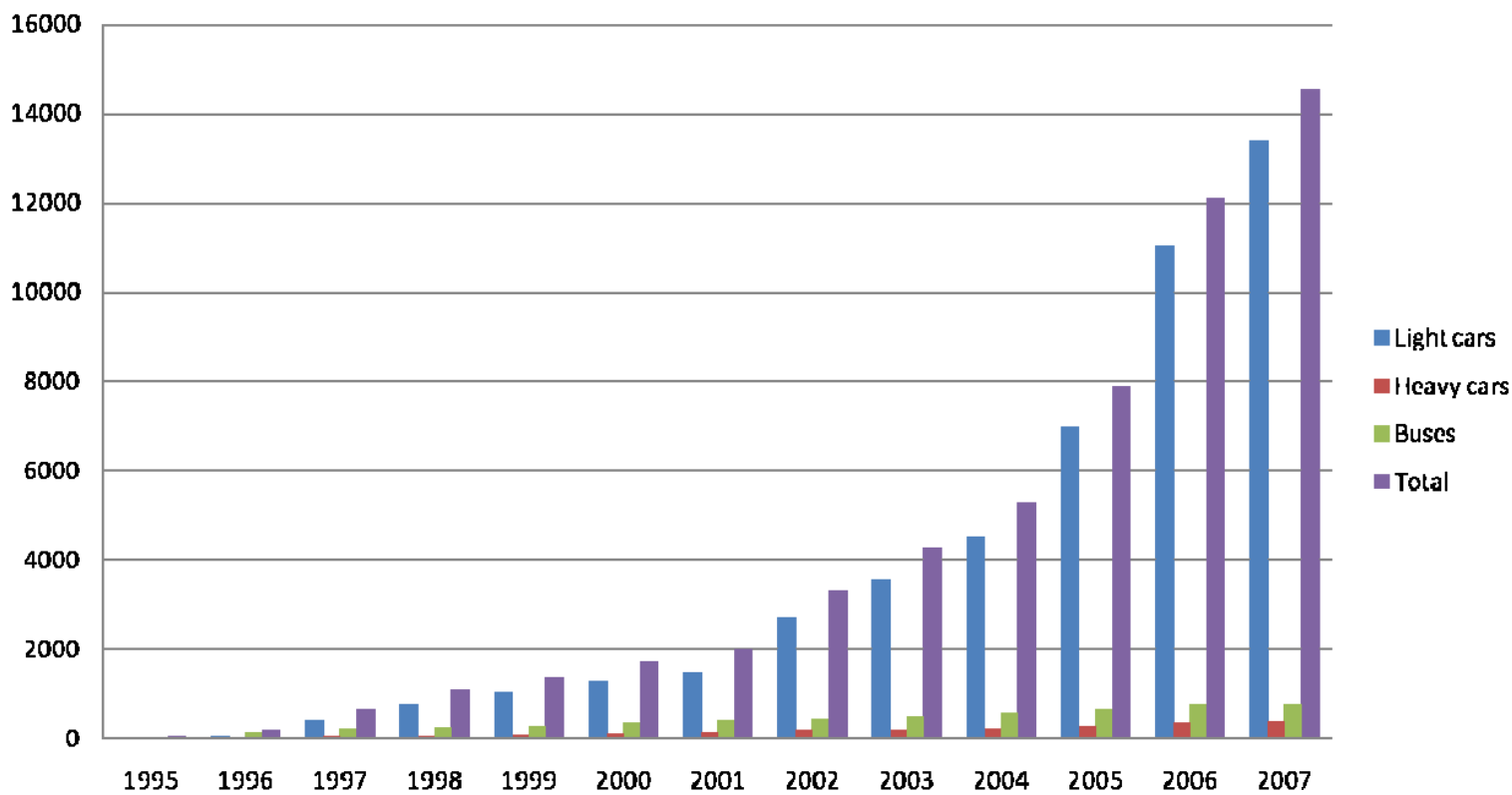
Filling stations



Source: Swedish Gas Association

# Utilization of biogas as vehicle gas

Number of vehicles



Source: Swedish Gas Association

# Voluntary system for control of emissions of methane



Photo: Magnus Holmberg, Vattenfall Power Consultants

# Reasons to implement the system

- Environmental
  - Methane is a strong GHG
  - Odour
- Economical
  - Reduced leaks and emissions = higher yield
- Safety
- Goodwill
  - To show that the biogas sector acts responsibly
  - To be pro-active on this issue (relation to authorities)

# Plants that have joined

## 17 Biogas production plants

- Bjuv
- Boden
- Borås
- Eskilstuna (WWT)
- Falköping
- Helsingborg
- Jönköping (mainly WWT)
- Kalmar
- Kristianstad
- Laholm
- Linköping
- Linköping (WWT)
- Norrköping
- Skellefteå
- Uppsala
- Vänersborg
- Västerås

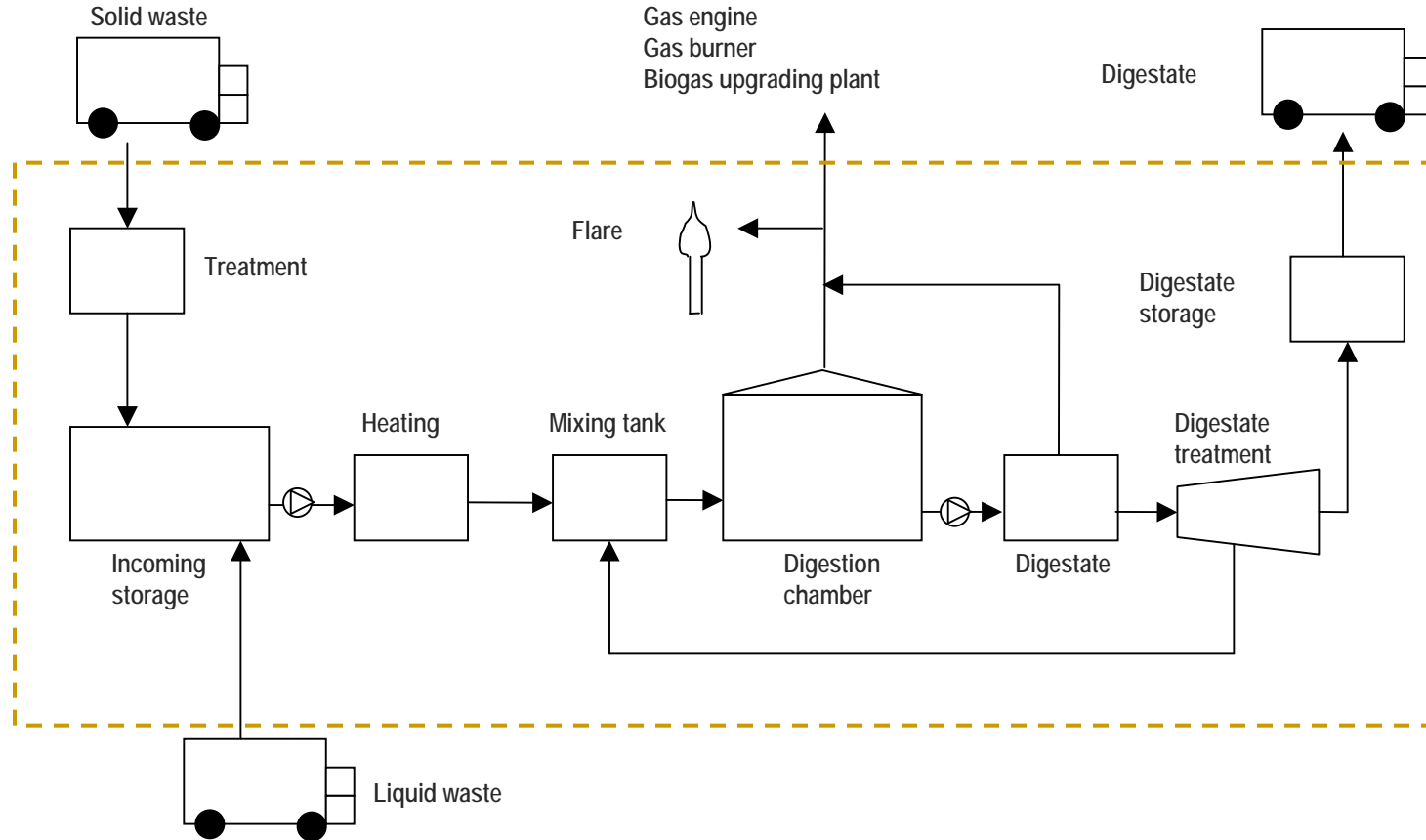
## 16 Biogas upgrading plants

- Bjuv
- Boden
- Borås
- Bromma (WWT)
- Eskilstuna (WWT)
- Göteborg (WWT)
- Helsingborg
- Jönköping (mainly WWT)
- Kalmar
- Laholm
- Linköping
- Norrköping
- Norrköping (WWT)
- Skellefteå
- Uppsala
- Västerås

# Current setup of the system

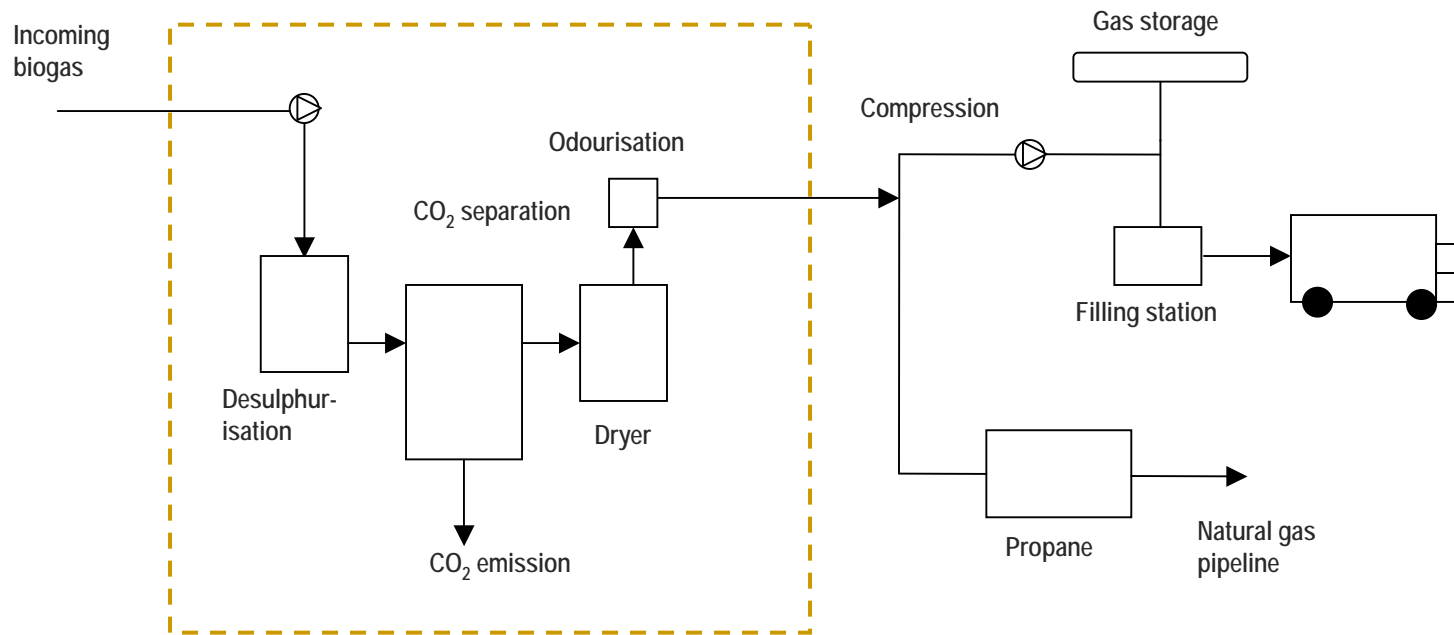
- Plant personnel identifies sources of emission
- Inventory of whole plant – Systematic leak detection
  - If possible, leaks are dealt with at once
- Quantification
  - Measurements or estimations of methane and flow
  - Calculations of mass emission and percentage loss
- Targets and measures
  - Plants report results, set targets and plan measures to reach the targets

# System boundaries – biogas plant



Source: Magnus Holmberg, Vattenfall Power Consultants

# System boundaries – biogas upgrading plant



Source: Magnus Holmberg, Vattenfall Power Consultants

# Leak detection

## Biogas plants

- In general, a few larger leaks
  - Relief valves
  - Digestion residue (digestate)

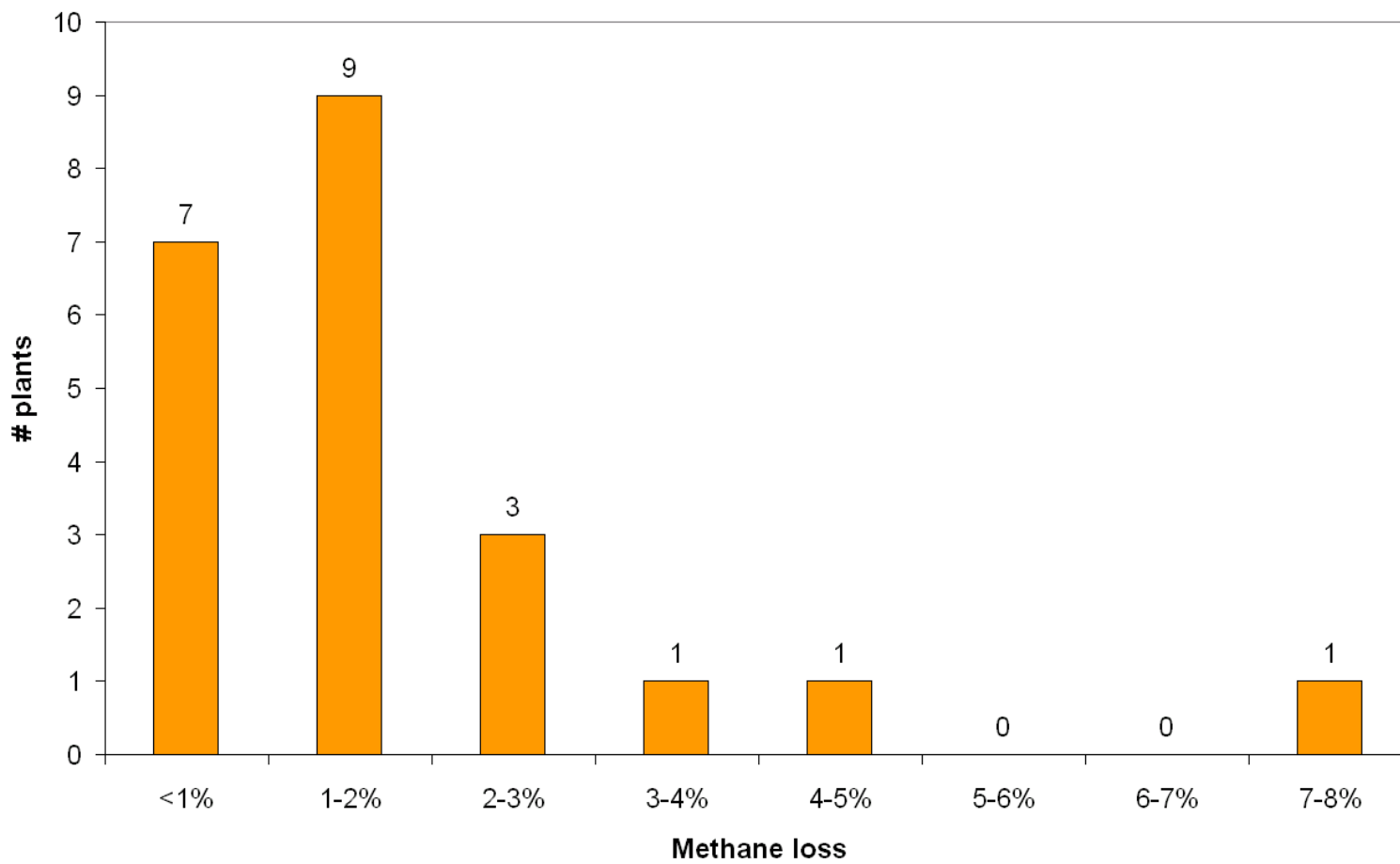


## Biogas upgrading plants

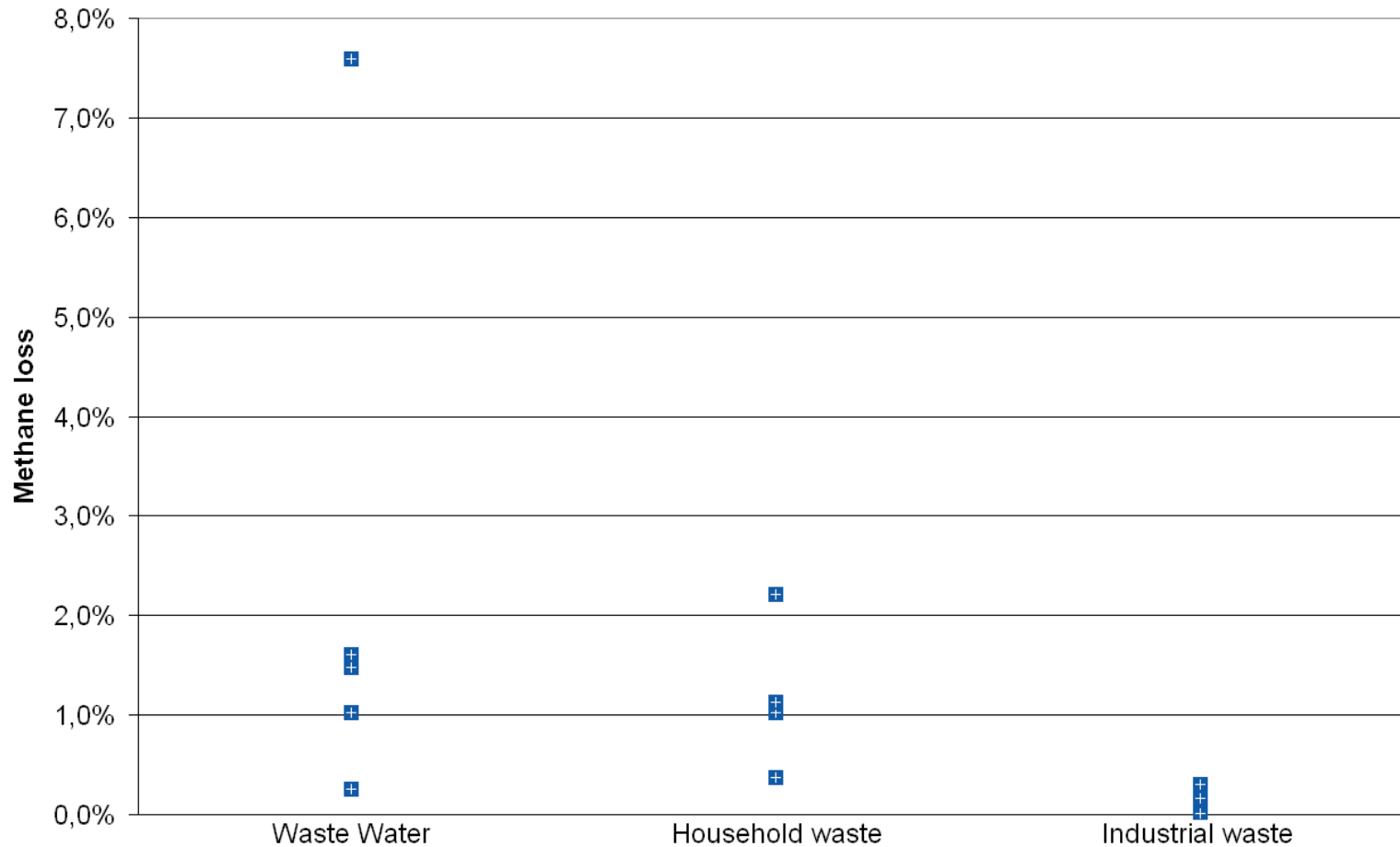
- In general, many smaller leaks
  - Various gas equipment parts
  - Compressors



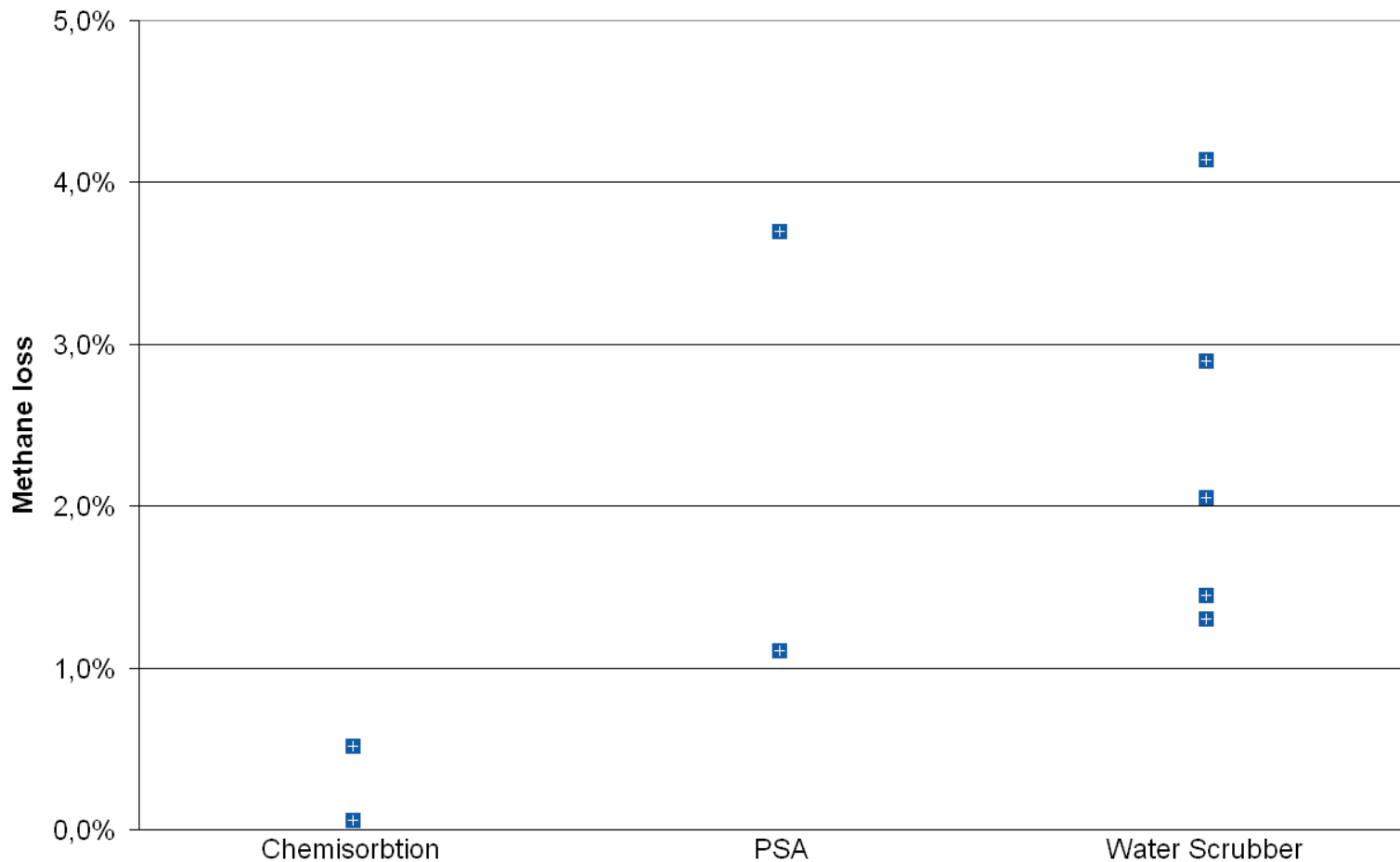
# Quantification – all plants



# Quantification – biogas plants

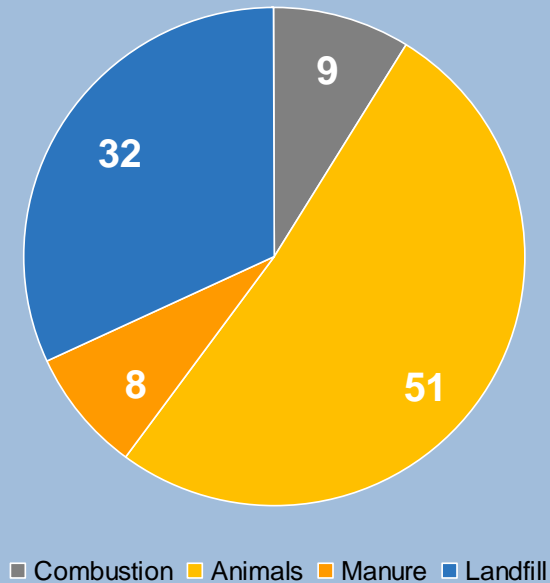


# Quantification – upgrading plants



# GHG emissions in Sweden

## Swedish methane emissions 2003



Swedish NIR 2006

## Put things in perspective

- Emissions from one biogas plant producing 3 million Nm<sup>3</sup>/year with a methane loss of 2 %, is only 0,03 % compared to total emissions from animals.
- Only 8 % of Swedish GHG emissions is methane.
- Emissions of methane from biogas plants are not significant to Swedish emissions of GHG

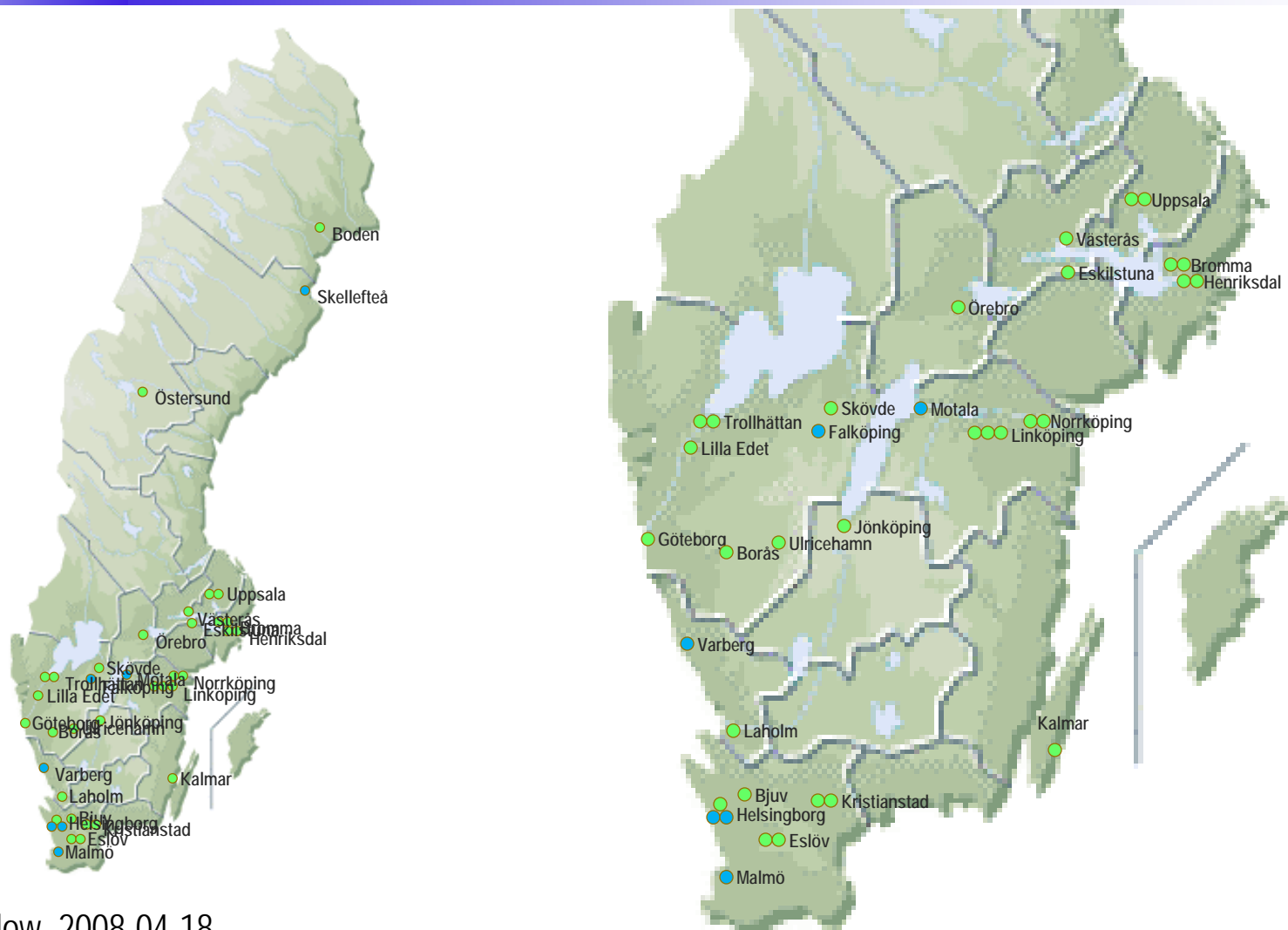


# Upgrading plants in Sweden 2007

| Technique                              | Number of plants |
|--|------------------|
| Water wash, with water regeneration    | 18               |
| Water wash, without water regeneration | 7                |
| PSA                                    | 7                |
| Chemical absorption                    | 2                |
| <b>Sum</b>                             | <b>34</b>        |



# Upgrading plants in Sweden

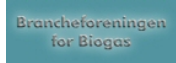




# 2<sup>nd</sup> Nordic Biogas Conference

## 5-7 March 2008, Malmö Sweden

Organizing committee



257 registered delegates...  
 ...from 15 different countries  
 19 exhibitors  
 25 presentations available on  
[www.nordicbiogas.com](http://www.nordicbiogas.com)

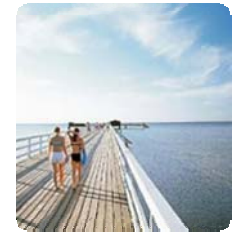
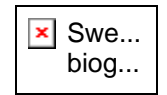
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[anneli.petersson@sgc.se](mailto:anneli.petersson@sgc.se)

