

# Country Report Sweden

*Tobias Persson, SGC Sweden*



# Biogas Plant Inventory

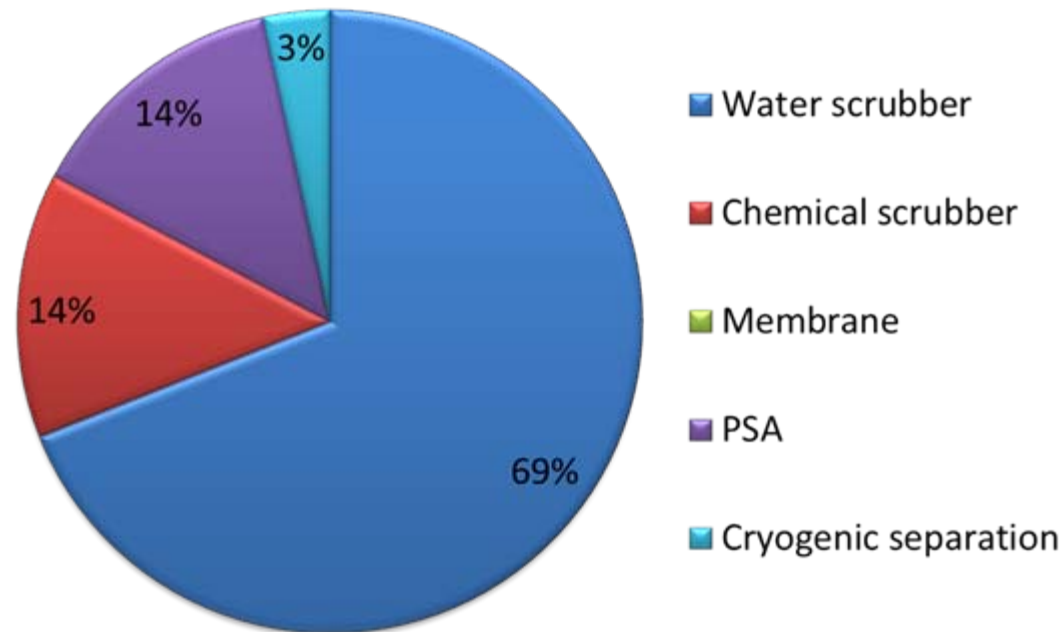
## Anaerobic digestion plants (2011)

Anaerobic digestion plants	Number	Production (GWh/year)
Sewage sludge	135	638
Municipal (biowaste)	19	416
Agriculture	19	20
Industrial	5	129
Landfills	55	270
<b>Sum</b>	<b>233</b>	<b>1 473</b>

# Biogas Plant Inventory

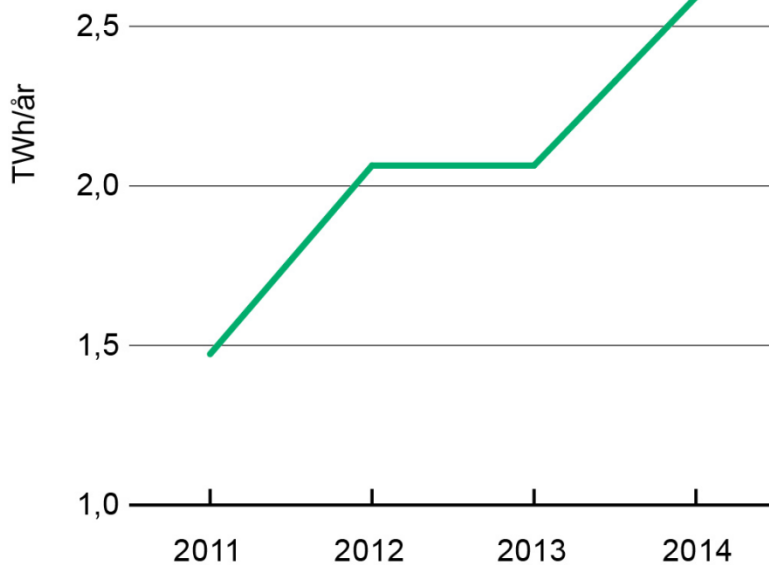
## Upgrading plants (2012)

Number of biogas upgrading plants: 57

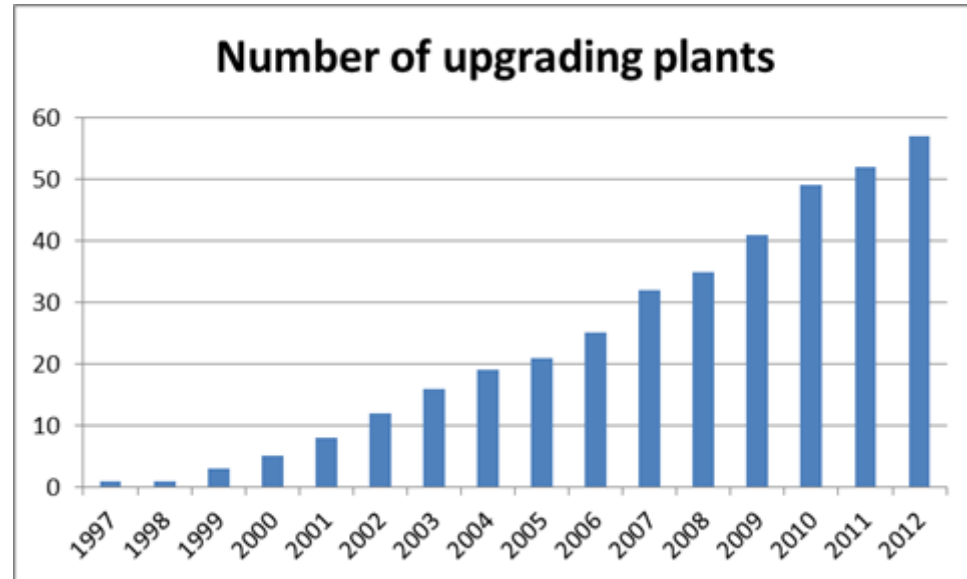


# Biogas Plant Inventory Trends

Expected development of biogas production in Sweden including gasification

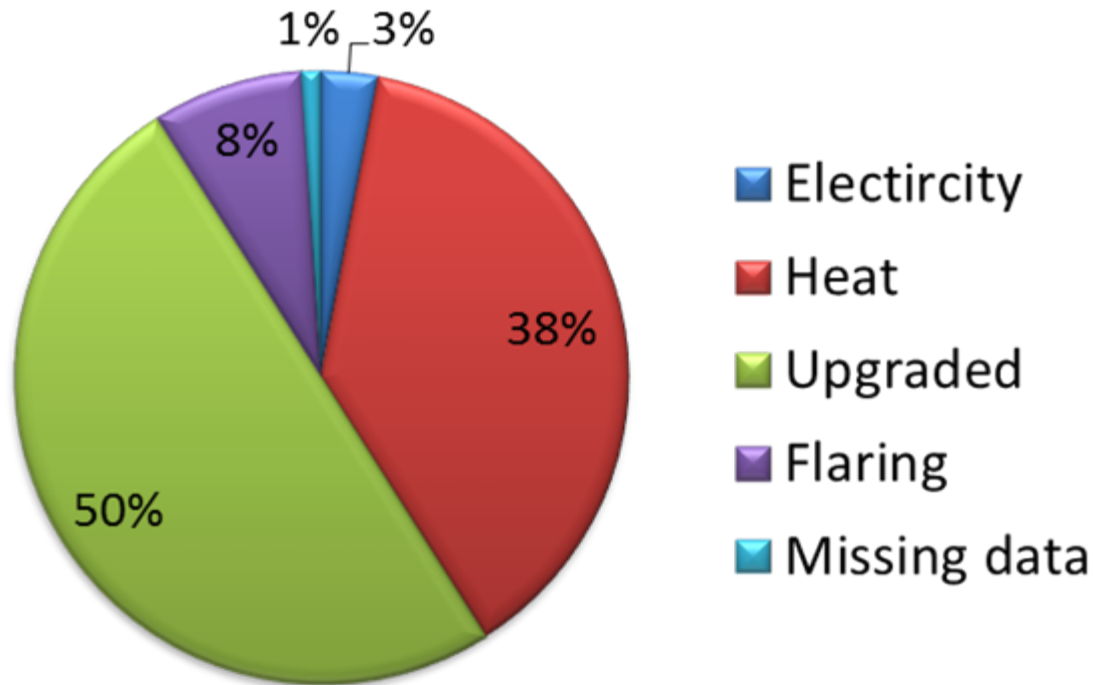


Källa: Energigas Sverige



# Biogas Plant Inventory

## Utilisation of the annual production of 1.5 TWh



# The first Swedish LBG plant in operation

## **Processed amount substrates:**

60,000 metric tonnes/year (biowaste)

## **Produced amount biomethane:**

6 million Nm<sup>3</sup>/year (60 GWh)

## **Produced amount biofertilizer:**

50,000 m<sup>3</sup>/year

## **Investment 20 M€**

10 M€ digestion and upgrading, 10 M€ for liquefaction.

<http://www.swedishbiogas.com/us/reference-plants/sweden/lidkoeping>

[http://www.swedishbiogas.com/images/bilder/pdf/lidkoping\\_biogas\\_in\\_english\\_111013.pdf](http://www.swedishbiogas.com/images/bilder/pdf/lidkoping_biogas_in_english_111013.pdf)

# Financial support systems

- ***Electricity certificates***

Producers get one certificate for every MWh electricity produced from renewable resources and electricity consumers must buy certificates in relation to their total use. Average price 2012 around 17-22€/MWh

- ***No carbon dioxide or energy tax on biogas until 2014***

This corresponds to a value of 68 €/ MWh compared to petrol and 52 €/ MWh compared to diesel of which 26 €/ MWh is from the carbon dioxide relief and the remaining part is from the energy tax relief.

- ***Investment grants for marketing of new technologies and new solutions for biogas***

*340 MSEK (~38 M€) during 2013-2016, Maximum 45% or 25 MSEK (~3 M€) of investment cost*

# **UNIVERSITIES RESEARCHING THE BIOGAS AREA IN SWEDEN:**

**Luleå Technology Univ., Luleå**

**Landfill biogas production & use.  
Abatement of emissions**

**Swedish Univ. of Agricultural Sciences,  
Uppsala and Alnarp  
System Studies**

**Microbiology, Ammonia, Substrate  
utilisation and production, Biofertilisers,  
Agriculture basis**

**Högskolan i Gävle**

**System studies**

**Royal Institute of Technology,  
Stockholm**

**Sewage treatment AD. Access to pilot scale  
reactor park.**

**Mälardalen Univ., Västerås**

**Largely coupled to issues of the local biogas  
plant digesting ley silage and household  
wastes. Mixing, Algae, Biofertilisation**



# **UNIVERSITIES RESERACHING THE BIOGAS AREA IN SWEDEN:**

**Karlstad Univ, Karsltad**

**AD in pulp and paper industry**

**Linköping Univ., Linköping**

**Microbiology, Substrates, Nutrition – trace elements, Rheology, Reactor configuration, Enzymes, Gas upgrading, System studies**

**Borås Technology Institute, Borås**

**Biogas from various ligno-cellulose fractions, Pretreatment methodology**

**Högskolan i Halmstad, Halmstad**

**Optimising the digestion process**

**Linné Univ., Växjö & Kalmar**

**Maritime substrates: Mussels, Algae, Reed**

**Lund Univ., Lund**

**Substrates, Pretreatment, Agriculture, Microbiology, On-line process control, Sewage AD, Energy systems, Hydrogen, System studies**

# Linköping Univ. Biogas Research Center (BRC)

- Initiated by the Swedish Energy Agency (SEA)
- Co-financed one third by each SEA, LiU, and Industrial/Societal partners
- 10 years, ca. 2.5 Meuro annually
- Kick-off: Beginning of Dec. 2012

# TWO YEARS ESTABLISHING PHASE WITH EXPLORATORY AND DEVELOPMENT PROJECTS

- Substrate inventory by bottom-up modeling based on a technological overview
- Improvement of the biogas process
- Municipalities as system builders in energy systems
- Increased methane production and process stability in biogas reactors
- Enzymatic tool to increase the biogas production
- Effluent biofertiliser values and effective use
- Cooperation for optimisation of energy, economic and environmental capacities
- Synergies by including the biogas production concept in new areas.