Methane Emission from Swedish Biogas Plants
Magnus Andreas Holmgren, magnus.andreas.holmgren@sp.se, 2014-09-04
BACKGROUND
BIOGAS IN SWEDEN
4 STRONG REASONS

Environment

Economy

Safety

Goodwill
- show that the sector acts responsibly
- to be pro-active
THE "VOLUNTARY AGREEMENT" SYSTEM

Launched 2007

Methane only

Focus on Municipal Waste Treatment plants (food waste)

Almost all Avfall Sverige plants have joined
+ a few other plants (waste water treatment)
DESCRIPTION OF VOLUNTARY AGREEMENT
SYSTEM SET-UP

Systematic leak detection

Quantification of emission sources (every 3 years)

Plant sets target for emission
Plant takes measures to reach the target
Plant reports to Avfall Sverige

Avfall Sverige presents statistics

WHAT THE SYSTEM IS NOT

It is voluntary

There are no limit values

There are no sanctions
System boundaries, gas upgrading plant

Upgrading plant

Biogas pipeline

Hydrogen sulphide removal

Off gas

Drying

Odorising

Compression

Gas grid

Propane addition
PERFORMED QUANTIFICATIONS

2007-2009
18 gas production plants
20 gas upgrading plants

2010-2012
19 gas production plants
26 gas upgrading plants
Results 2007-2012, Gas production plants

- **Waste Water**: 1.9%
- **Food Waste**: 1.8%
Results 2007-2012, Gas upgrading plants

1. Chemical scrubber
2. End-of-pipe
3. PSA
4. Water scrubber

Metanförlust (%)

- Ventilation
- Gasanalys
- Restgas

- 1A
- 1B
- 1C
- 1D
- 1E
- 1F
- 2A
- 2B
- 2C
- 2D
- 2E
- 3A
- 3B
- 3C
- 3D
- 4A
- 4B
- 4C
- 4D
- 4E
- 4F
- 4G
- 4H
- 4I
- 4J
- 4K
- 4L
- 4M
SUSTAINABILITY CRITERIA

EU RED Directive
Biogas used as *vehicle fuel* is covered

The production chain needs to fulfil set sustainability criterias

GHG emission savings (LCA):
All plants from April 2013: 35 %
All plants from January 2017: 50 %
New plants from 2018: 60 %
(% better than the fossil reference case)

CALCULATION TOOL

Default values for methane loss (when measurements have not been done)

Upper quartile of results 2007-2012:
2,5 % gas production plant
2,1 % gas upgrading plant

These default values give the result ca 56 % emission savings
MEASUREMENT METHODS
MEASUREMENT METHODS

EN/ISO standards
- CH₄ with FID/Cutter or GC
- Gas flow

Measurements Handbook

Open Area Sources

Covered (not gastight) storages
**METHANE CONCENTRATION**

Cutter is not used on upgrading plants

Leak detector is OK to use on small emissions

**FLOW**

Fan data can be used

Default values in Handbook
PSA

Metanhalt (ppm)

Restgasflöde (Nm³/h)

Metanhalt: blue line
Restgasflöde: red line

14:35 14:45 14:55

SP Technical Research Institute of Sweden
WATER SCRUBBER (water release)
COVERED (not gastight) STORAGES
THE "VOLUNTARY AGREEMENT" SYSTEM

Waste water treatment plants
- How can we get more WWT plants to join?
- Data available from ca 10 of 130 biogas plants

Farm plants
- A “methane reduction state aid” has been suggested
- Demand for some type of leak detection/measurement?
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