



Methane Emission from Swedish Biogas Plants

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BACKGROUND



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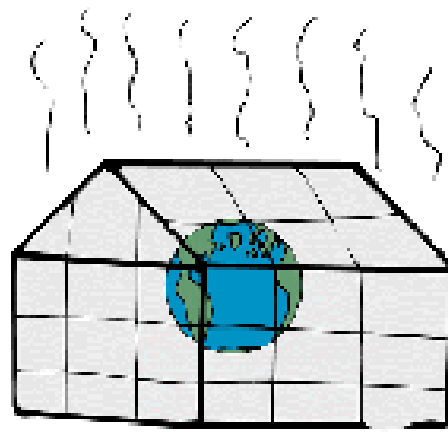
BIOGAS IN SWEDEN



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4 STRONG REASONS

Environment



Economy

Safety

Goodwill

- show that the sector acts responsibly
- to be pro-active



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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)



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AVFALL SVERIGE

The Swedish Waste Management Association



DESCRIPTION OF VOLUNTARY AGREEMENT



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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



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WHAT THE SYSTEM IS NOT

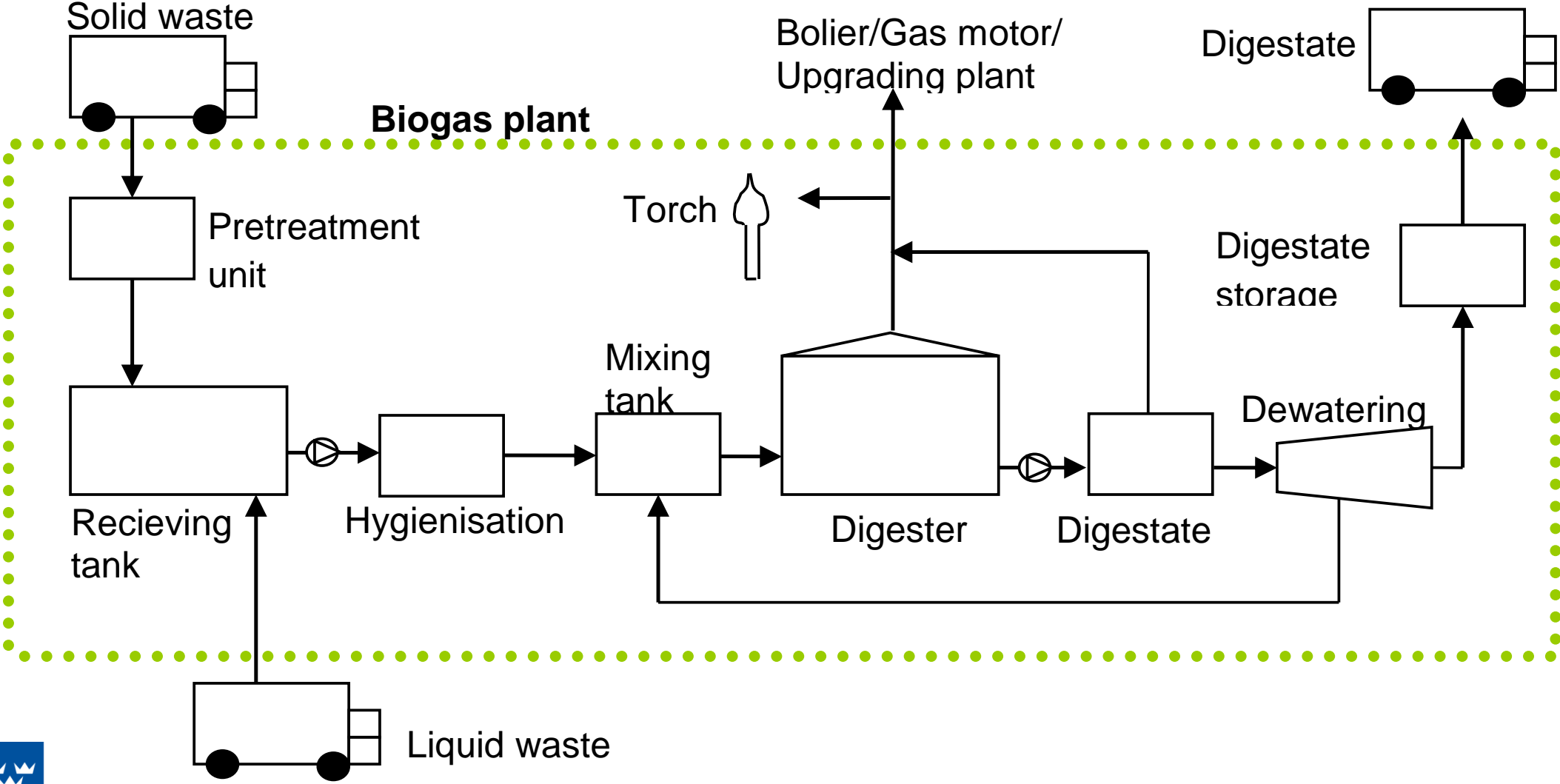
It is voluntary

There are no limit values

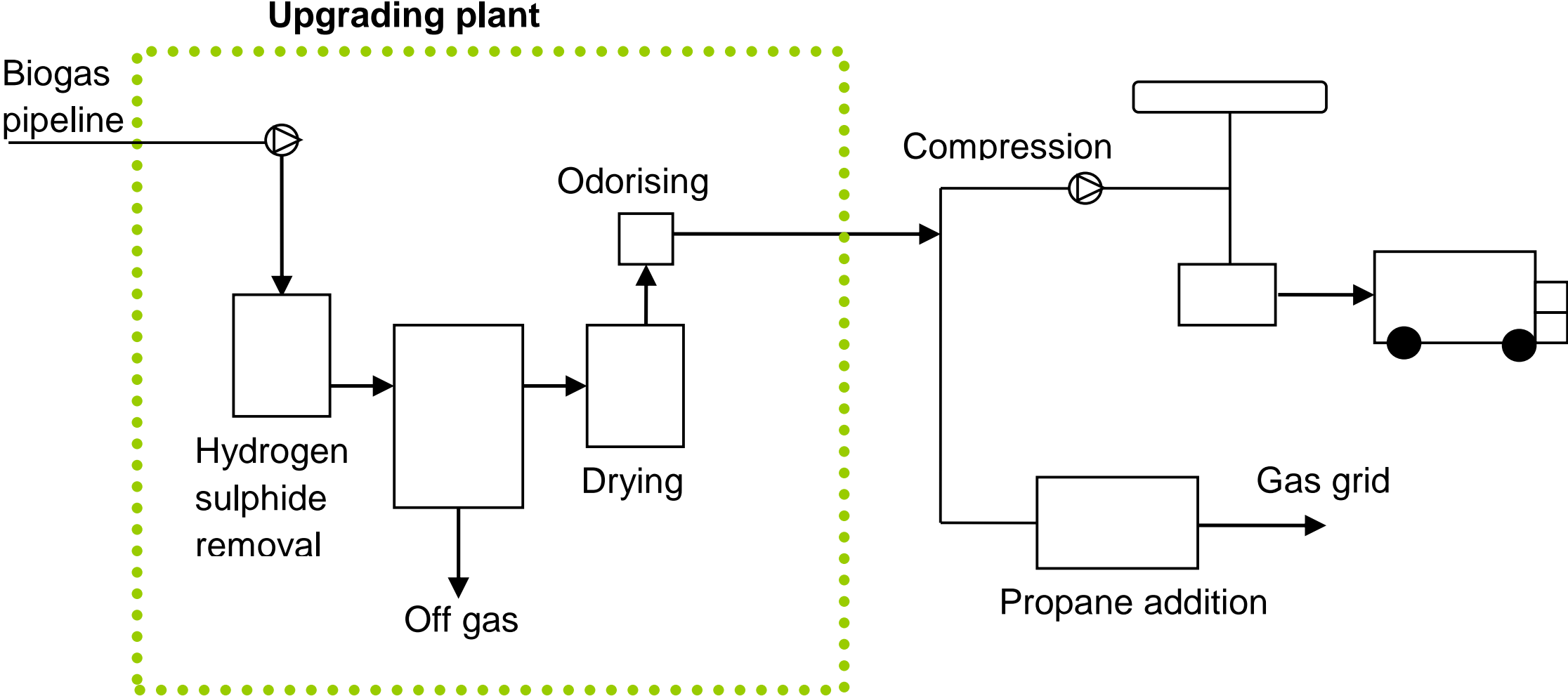
There are no sanctions

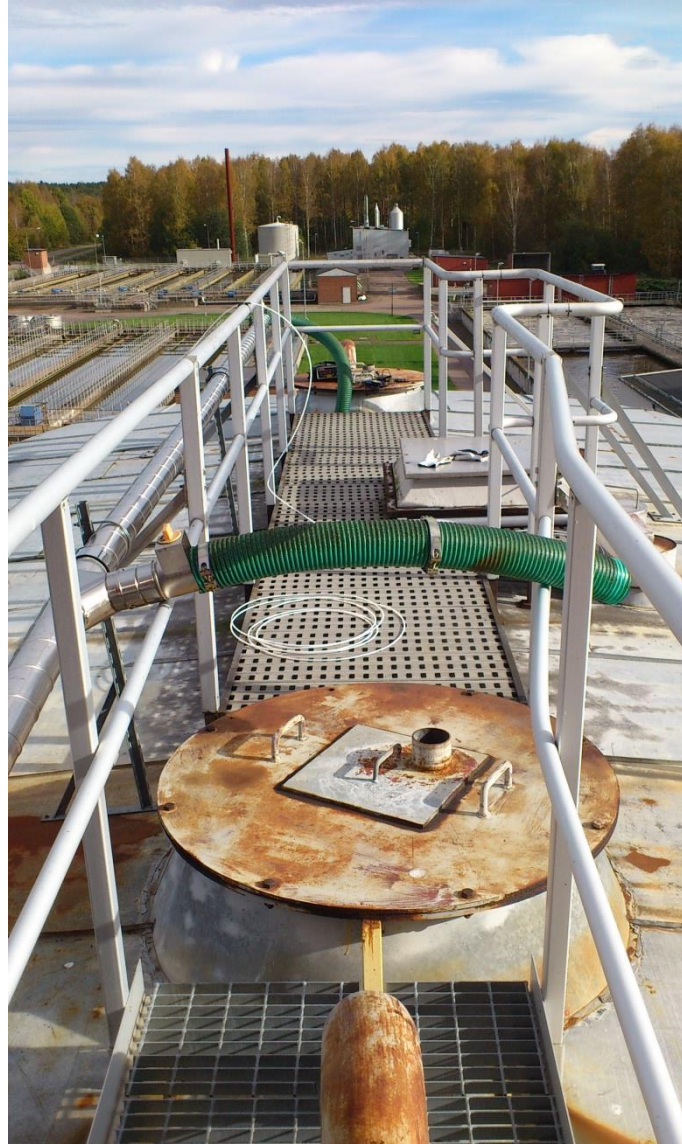


System boundaries, gas production plant



System boundaries, gas upgrading plant





PERFORMED QUANTIFICATIONS

2007-2009

18 gas production plants

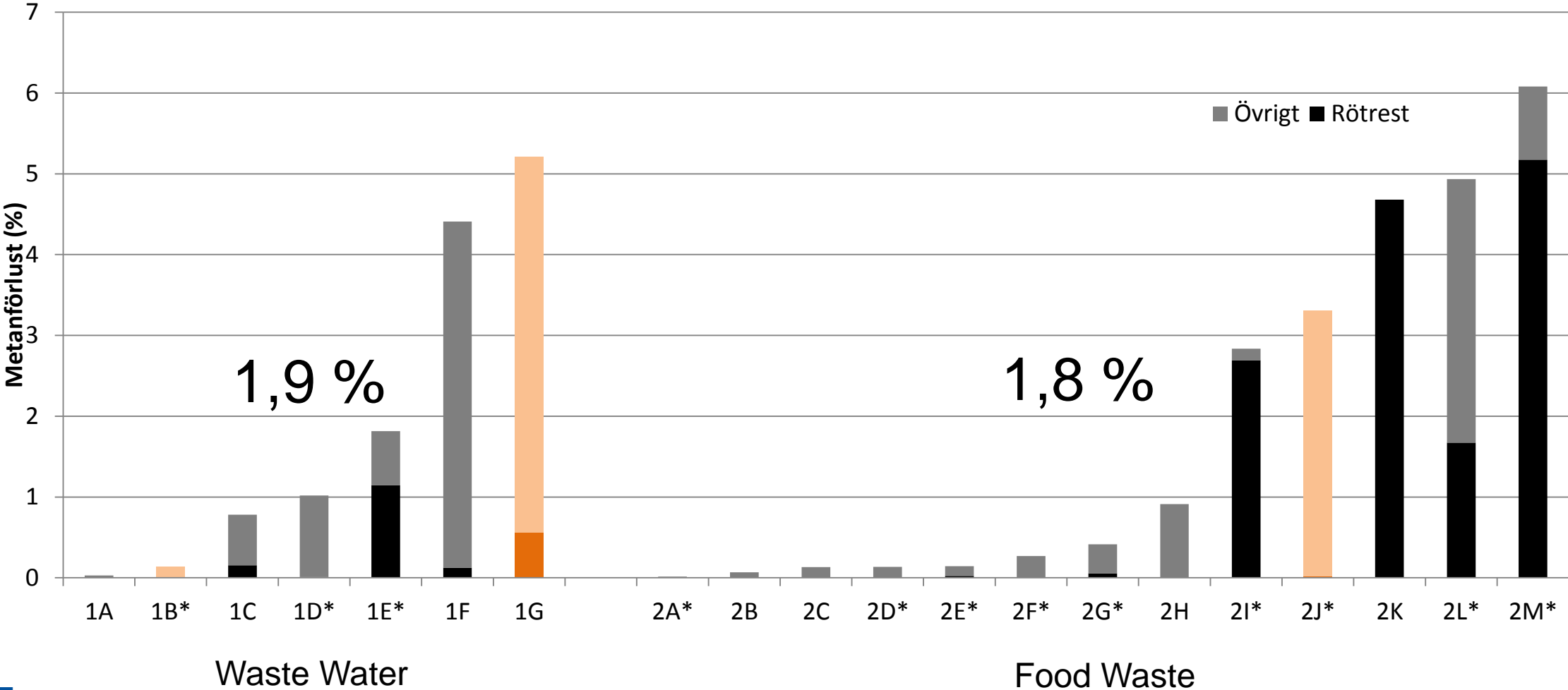
20 gas upgrading plants

2010-2012

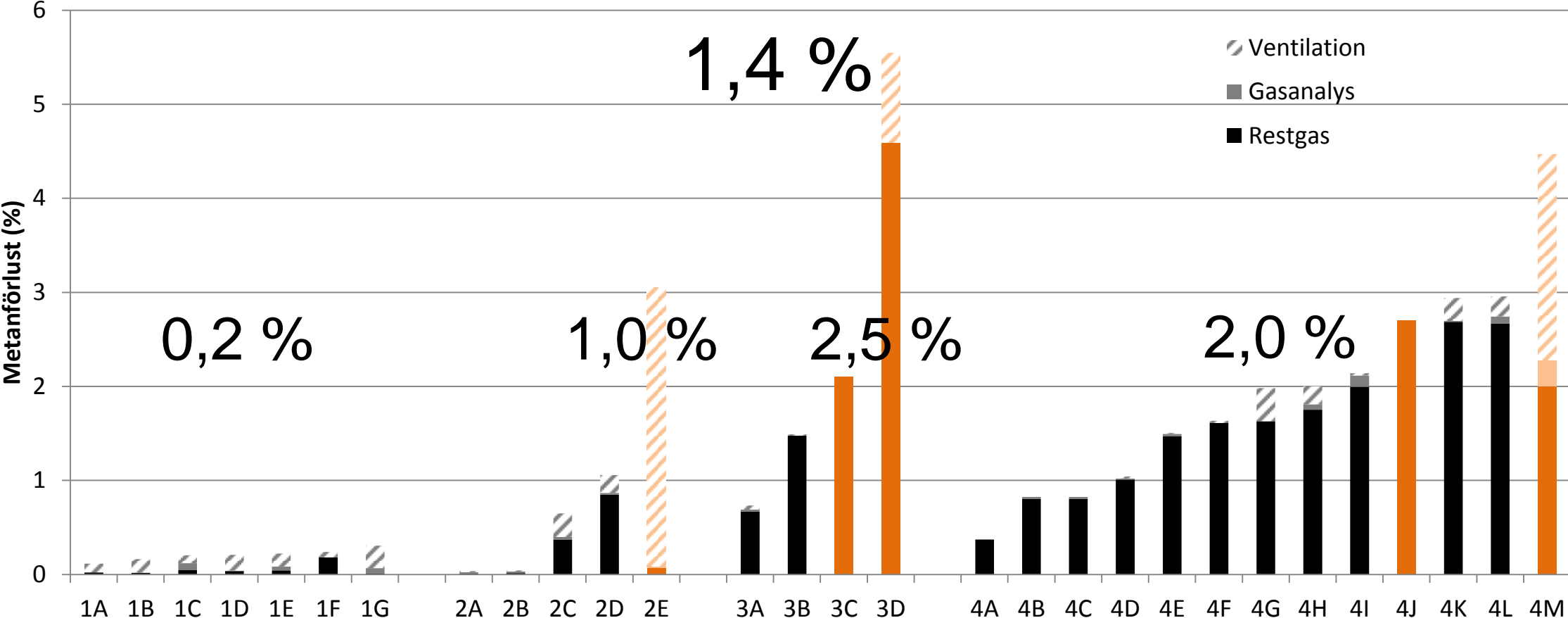
19 gas production plants

26 gas upgrading plants

Results 2007-2012, Gas production plants



Results 2007-2012, Gas upgrading plants



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



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)



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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



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MEASUREMENT METHODS

EN/ISO standards

- CH₄ with FID/Cutter or GC

- Gas flow

Measurements Handbook

Open Area Sources

Covered (not gastight) storages

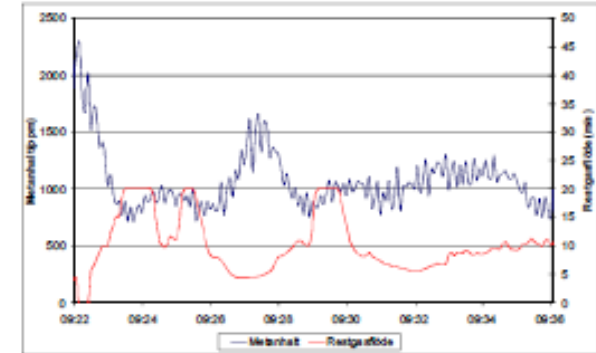


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Rapport SGC 227

Handbok metanmätningar



Magnus Andreas Holmgren, SP

Februari 2011

Rapport SGC 227 • 1102-7371 • ISRN SGC-R-227-SE

CSvenskt Gastekniskt Center





METHANE CONCENTRATION

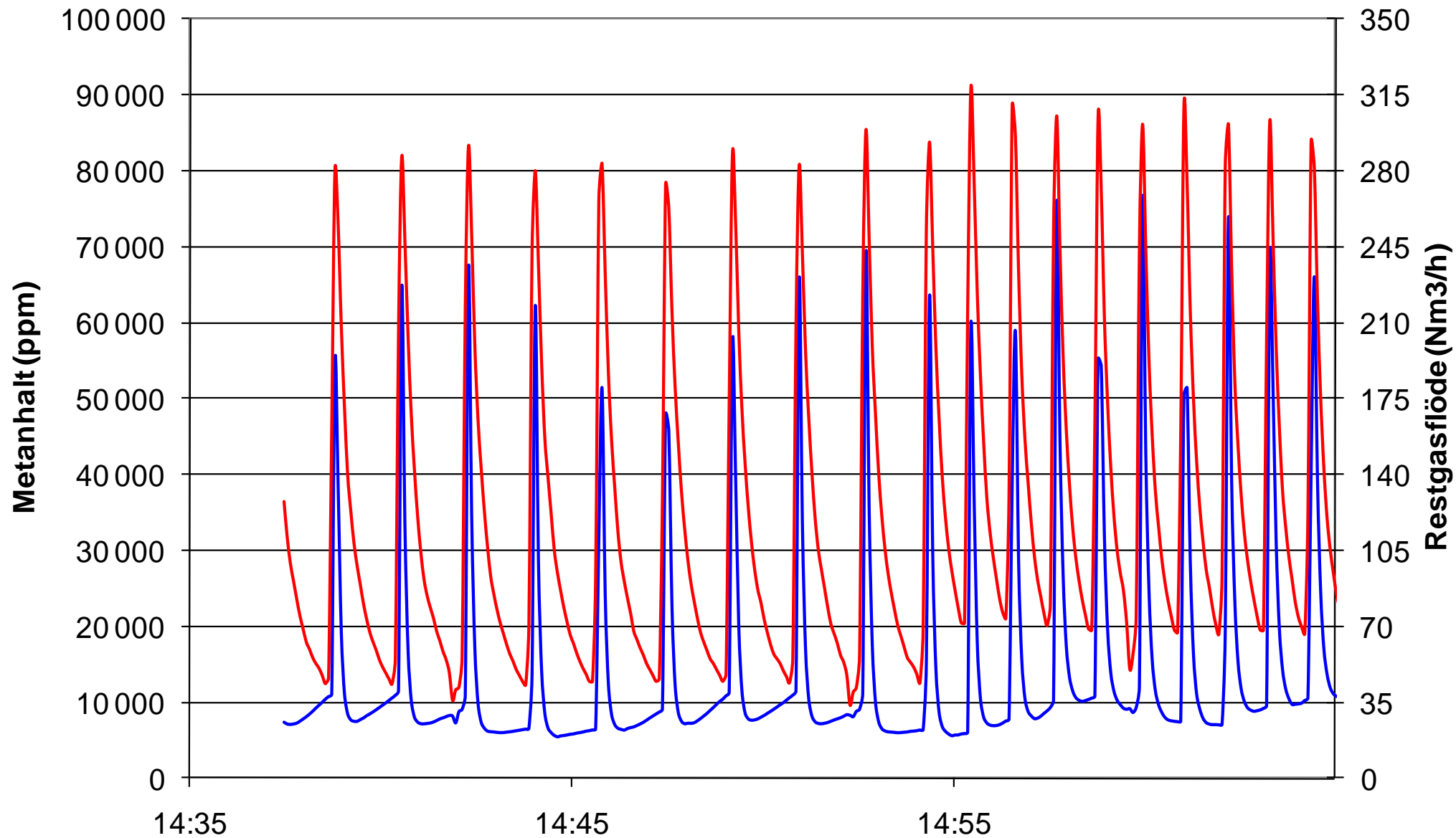
Cutter is not used on upgrading plants

Leak detector is OK to use on small emissions

FLOW

Fan data can be used

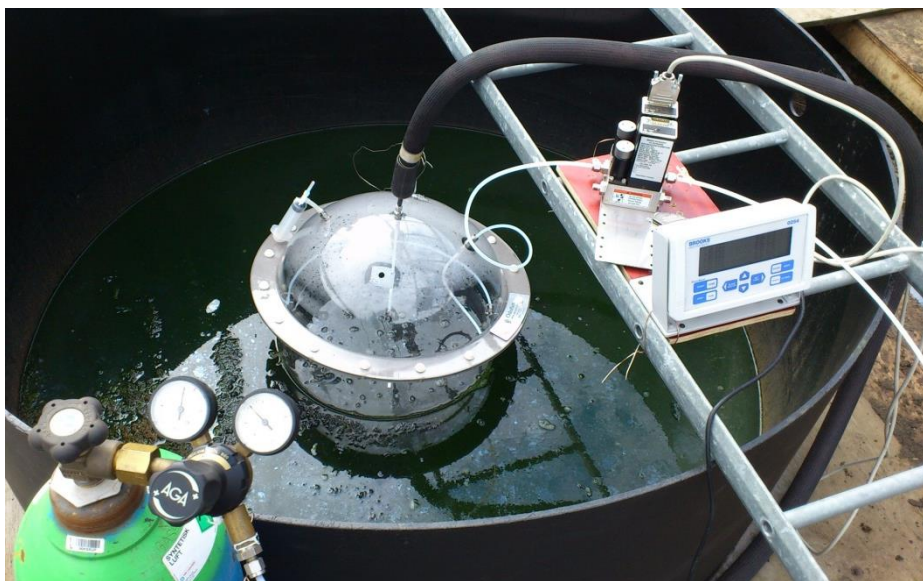
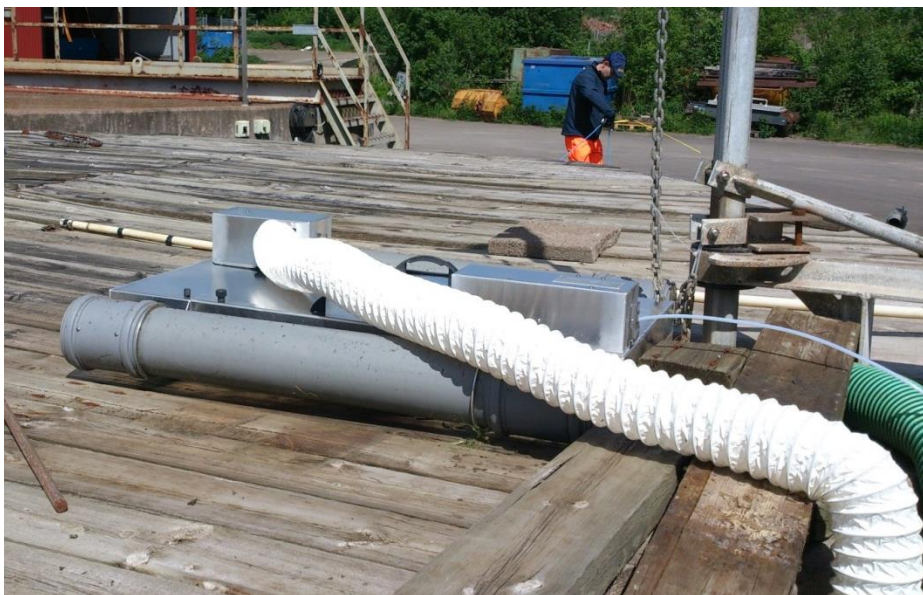
Default values in Handbook



WATER SCRUBBER (water release)



OPEN AREA SOURCES



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COVERED (not gastight) STORAGES



THE FUTURE



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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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