MOMENT
modern water management

NEWS

NEWSLETTER # 6. DECEMBER 2011

FEASIBILITY STUDY:

BIOGAS PRODUCTION USING SLUDGE FROM SMALL SCALE SEWAGE PLANTS IN THE MUNICIPALITY OF RONNEBY

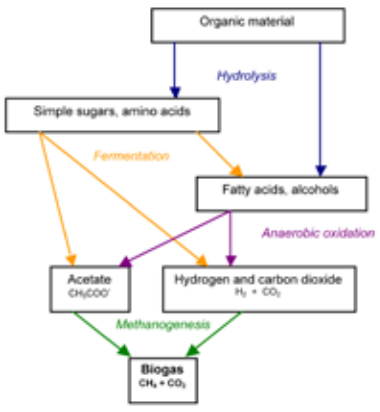
Introduction

This feasibility study is part of Ronneby municipality's participation in the project MOMENT. The study is moreover partially funded by LOVA, support from the Regional County Administration of Blekinge for local water management projects.

The objectives are to establish the status of private small scale sewage plants and carry out a feasibility study on the potential biogas production with sludge from these sewage plants. The study area is situated along the coast in the southwest part of Ronneby municipality. The study is conducted as a combined sewer inventory and literature study on biogas.

How does it work?

Biogas is produced by anaerobic (oxygen free) digestion of organic material. The process involves several steps and ends with methanogenesis where methane CH_4 and carbon dioxide CO_2 is formed. There are two main techniques for biogas production, wet digestion for pumpable substrates with <12 % TS (total solids) and dry digestion for stackable substrate with 20-35 % TS (total solids). How well the process works is partly due to the relationship between carbon and nitrogen (C/N-ratio) in the material that is digested. Too low ratio leads to toxic conditions for the micro organisms and too high ratio leads to less growth. Optimal ratio should be around 20. C/N-ratio of sludge in small scale sewage plants is often low so straw as source for carbon can be added to improve the process. After dewatering and possibly purification, the produced gas can be used in boilers for gaseous fuels, for cogeneration (CHP) or for production of vehicle gas.



To achieve a recycling of nutrients, they need to be returned to agriculture. Above all, it is the limited resource phosphorus that needs to be recycled. Spreading of the digested sewage sludge is regulated by a long list of legislations and restrictions, and despite an existing certification, REVAQ, there is a lot of resistance within the Swedish food industry for spreading on agricultural land.

In cooperation between seven regions in four countries around the South Baltic Sea area the project MOMENT aims at reducing the outflow of nutrients and hazardous substances by modern water management. This includes the establishment of Water User Partnerships allowing a "bottom up" approach starting at a local level and working within river basins letting the water set its own independent boarders. The project is co-financed by the South Baltic cross-border programme 2007-2013 and runs from September 2009 until August 2012.

South Baltic PROGRAMME

Investing in your future

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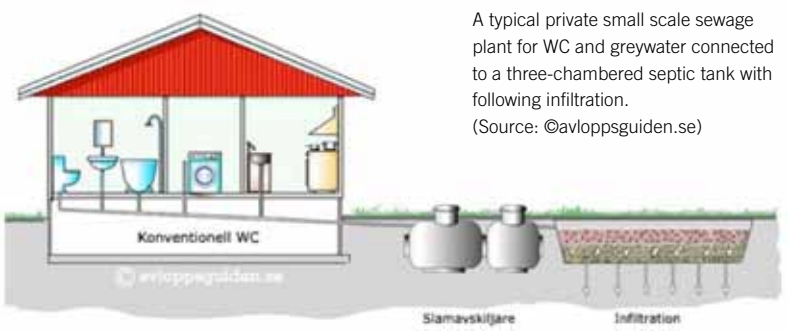
SMALL SCALE SEWER PLANT INVENTORY

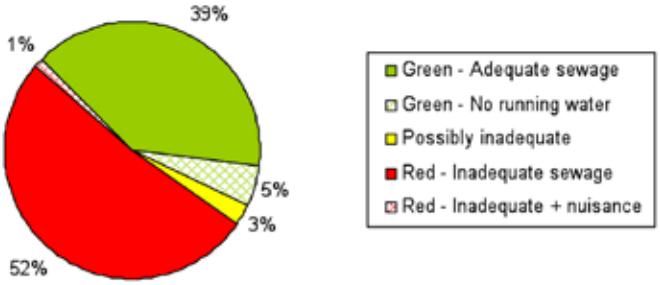


A typical private small scale sewage plant for WC and greywater connected to a three-chambered septic tank with following infiltration.
(Source: ©avloppsguiden.se)

The result of the sewer inventory shows that 44 % of the homes in the study area have an adequate sewage treatment and 53 % have an inadequate sewage treatment. The remaining 3 % have a sewage plant of dubious function.

Potential production capacity
Produced estimates are based on a biogas plant with wet digestion and a digestion chamber with the size of 700 m^3. The substrate used is 10 000 m^3 sewage sludge from septic tanks in the entire municipality and 56 tons of chopped straw. Estimated production is 178 000 Nm^3 biogas per year, or 20 Nm^3 biogas per hour. The compared alternatives are cogeneration (CHP) and upgrading to vehicle gas. The calculations show a deficit of about 2 800 Euro for cogeneration (CHP) and a profit of nearly 13 800 Euro for vehicle gas production.

Status of sewages in the area



CONCLUSIONS

The feasibility study recommends an investment in biogas production with subsequent upgrading to vehicle gas. The gas should then be used primarily for municipal waste collection vehicles.

The municipality of Ronneby adopted in 2007 a vision of a fossil fuel free municipality, where one of the goals is the reduction of carbon dioxide from transports. By switching to biogas-powered waste collection vehicles, the goal is one step closer.

TIPS AND LINKS

- **The complete study can be downloaded from the MOMENT project website www.momentproject.eu**
- **Anaerobic digestion potential of urban organic waste: a case study in Malmö. Waste Management & Research**

INTERVIEW WITH THE AUTHOR CATARINA WELIN

What is your opinion on the future of small scale biogas production?
I think small scale biogas production has a bright future. The problem is to get the right amount of input substrate and produced biogas to be able to get full effect of a small scale upgrading facility. As long as the gas net is poorly developed we need locally produced biogas to minimize transporting costs.

Do you think the advantages of locally produced biogas in smaller facilities outweigh the disadvantages?
There is a great advantage in locally produced biogas as it hardly generates any transport of substrates or digestate. The disadvantage is upgrading and distribution cost for produced vehicle fuel. This could be solved with locally situated small scale biogas production units and large centralized upgrading facilities. The greatest advantage of biogas that overrules all disadvantages is that:
- Biogas can be produced from all kinds of organic wastes.
- It is one of the most climate friendly alternatives for vehicle fuel production existing today.
- It is very urgent to change from fossil fuels to renewable fuels for our vehicles.

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