

Biomethane from sewage sludge as a successful business model in Minworth, UK

SUCCESS STORY



Picture: Malmberg

Operator
Malmberg Water AB

Location of the project



Minworth, United Kingdom

Contact details
Customer: Imtech/Severn Trent Water

Project results

Physical

- Gas upgrading

Socio-environmental:

- Renewable electricity or heat supply
- Waste reduction
- Reduced pollution
- Raised public awareness/acceptance on biogas and renewable energies

Project outline

To increase the renewable energy production, the UK government introduced a Renewable Heat Incentive scheme in 2011. This scheme replaced the Low Carbon Building programme that was ceased in 2010. The new scheme provides improved incentive for biomethane production compared to power generation using CHP units.

Severn Trent is UK's largest producer of electricity from sewage gas. Over the years, the company undertook number of process development and improvement steps that led to an increased biogas production. As the site continued to generate electricity and heat through CHP, a part of the biogas was foreseen to be upgraded into biomethane.



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Technical data

Year of plant construction:

2013 - 2014

Year of performed service:

2013 - 2014

Plant size: 3,400 Nm³/h of raw biogas (up to 1,500 Nm³/h of that biogas production upgraded to biomethane); 56 GWh_{el} produced in 2012

Digester volume:

16 digesters, in total 80,000 m³/day

Type of raw material:

Sewage sludge (4,000 m³/h)

Utilisation of biogas:

Grid injection

Total investment costs:

€8,150,000

Subsidy:

0.75 €ct/kWh_{th} RHI incentives

Performed actions

The actions that were performed had the aim to answer two main challenges identified earlier. Although the plant reached an increased production of biogas, irregular demand for power in the electricity grid limited the plant to continuously export the power produced, what was an obstacle for a plant producing biogas continuously, 24/7. The second challenge was energy efficiency as Severn Trent Water identified 40% losses of the gas energy in heat losses. The solution was installing the new Malmberg COMPACT® GR14XL unit at the Minworth site. The unit uses absorption, which provides a high pressure water scrubbing process to clean and biogas and increase the methane concentration. Throughout the process the biogas is dried, cleaned, scrubbed, cleaned and compressed. Process engineers dimensioned the flows to around 600 Nm³/h of 97%-98% biomethane. Before shipping the installation to the site, the provider undertook quality checks such as pressure testing and x-ray testing. The upgrading installation was installed upon arrival to the site. For this delivery, Malmberg also supplied RTO (Regenerative Thermal Oxidation to treat the exhaust air), lightning protection, piping and emergency flare.

Results of performed service

The introduction of the RHI scheme in the UK market gave Severn Trent Water the opportunity to make better use of the energy available within their biogas. Once its upgraded to biomethane and in this case supported by RHI, an alternative opportunity shows up in form of biomethane injection into existing high pressure grids, eliminating the obstacles caused by irregular demand for electricity. Such a practice maintains the continuous production of biogas, eliminates the issues of storing electrical power, as in case of other renewable energies and its flexibility allows to meet the demand where it is needed. As an overall result for the Minworth plant, RHI enabled them to develop a sustainable commercial model for biomethane production. The RHI now represents more than ¾ of the plant's revenue.