Bergen biogassanlegg

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Water & Sewerage Works
Experiences

Why biogas plant in Bergen

About the plant

Energy production
Goals for the WWTP

- Recipient oriented and remain at a level that ensures water quality and prevent sludge around the outlet. "Precautionary principle" be based on the choice of strategy.
- Selected treatment level shall be in accordance with all regulations from the authorities
- Recycling of the sludge.
Requirements for secondary treatment

• COD: 75 % reduction (or max. 125 mg/l)

• BOD: 70 % reduction (or max. 25 mg/l)

• Deadline to fulfill the requirements: December 31, 2015

PHOTO: H. SKODVIN
Wastewater sludge

- Kvernevik: 900 ton DS/y
- Ytre Sandviken: 800 ton DS/y
- Holen: 1700 ton DS/y
- Knappenen: 1400 ton DS/y
- Flesland: 2800 ton DS/y
- Bergen Biogass: 10,000 ton DS/y
Bergen biogas plant
3D-model
Capacity

- Sludge 10 000 Ton/Y
- Septic 100 Ton/Y
- Grease + oil 200 Ton/Y
- Food waste 900 Ton/Y
- Glycol
Tanks for pasteurization
The use of Biogas

• Upgrade the bio methane to fuel quality
  • 6,1 mill km/Year - For 80 buses (25 GWh/Y)

• Electricity

• District heating

Photo: EnergiLex
Forecasts

**Year 2020 (90% of 2030)**

<table>
<thead>
<tr>
<th></th>
<th>Nm3/Yr</th>
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<tbody>
<tr>
<td>Produced bio methane</td>
<td>3 484 000</td>
<td></td>
</tr>
<tr>
<td>Upgraded biogas</td>
<td>2 264 600</td>
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**Year 2030**

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Upgraded biogas

• Delivered by Malmberg

• Guaranteed values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Methane content</td>
<td>98 +/- 0,5%</td>
</tr>
<tr>
<td>Max CO₂</td>
<td>2% forutsatt at O₂+N₂ er mindre enn 0,5%</td>
</tr>
<tr>
<td>Total sulfur content</td>
<td>&lt;5 mg/Nm³</td>
</tr>
<tr>
<td>Degrade point</td>
<td>-60°C ved 4 bar</td>
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<tr>
<td>Delivery pressure</td>
<td>250 bar(g)</td>
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CLEAN WATER TO PEOPLE AND FJORDS
The Biorest

- 25% as soil improvement
- 75% as fertilizer on agricultural fields
Odor simulation model
Ongoing Projects:

- **Utilization of Waste from Marine Food Production to Regional Renewable Energy** (RenEnerMar, 2016-2019)


High-value products from Anaerobic Digestion - Norwegian experience
Both projects will aim to increase use of organic resources for the production of valuable products:

- clean energy in form of biogas
- plant available nutrients
- intermediate products of anaerobic digestion
- fertilizer byproducts

Specific goals:
- Increase clean energy production through co-digestion processes at biogas existing plants;
- Produce VFAs and up-concentrate them, as platform chemicals for conversion into different bio-products;
- Produce valuable digestate fractions with enriched nutrient content (N:P:K)
High-value products from Anaerobic Digestion - Norwegian experience
Utilization of Waste from Marine Food Production to Regional Renewable Energy (RenEnerMar, 2016-2019)

Main goal

Optimize utilization of organic resources from fish waste available in Western Norway to create public sector values by increasing production of renewable energy at municipal biogas plants.

Secondary objectives

Determine the optimal sampling ratios for fish waste, sewage sludge and food waste;
Determine the potential for increasing methane production using fish waste;
Improve quality and nutrient content in the residual product (P and N);
Build up local R&D expertise and establish cooperation between public users and suppliers of fish waste.
Summary:

- The biogas plant is a good investment that has a positive effect on the environment and use of resources.
- Use of biogas is in accordance with the national cross-sectorial biogas strategy which states «Biogas should be a part of the ongoing long term effort to change Norway to a low-emission nation. Biogas reduces greenhouse gas emission in Norway, and contributes to the reduction of local air pollution and can reduce noise disturbance from heavy vehicles»
Thank you for Your attention!