Biogas in Finland – Situation Report

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## Biogas potential in Finland

<table>
<thead>
<tr>
<th>Source</th>
<th>Technically feasible by 2015 (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal solid waste</td>
<td>0.5-0.8</td>
</tr>
<tr>
<td>Food industry</td>
<td>0.2-0.3</td>
</tr>
<tr>
<td>Sewage sludge</td>
<td>0.2</td>
</tr>
<tr>
<td>Manure and straw</td>
<td>3.1-13.6</td>
</tr>
<tr>
<td>Energy crops (set aside cropland only)</td>
<td>2.1</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>6.7-17.6</td>
</tr>
</tbody>
</table>
Biogas plants in Finland 2009

- In total 68 biogas production sites in 2009 (including landfills)
- Landfills are currently the largest biogas producer in Finland

Reference: Finnish Biogas Association
Green dots: Biogas plants in Finland

Red line: Natural gas pipeline

Reference: Finnish Gas Association
Biogas production in Finland 2009

- Total biogas production 145 million m³ (640 GWh) in 2009
- At least 5 new co-digestion plants in 2009-2010

Biogas production by source 2009 (million m³)

- Landfill: 110.9
- Sewage, municipal: 24.8
- Sewage, industrial: 1.2
- Co-digestion: 6.8
- Farm: 0.8

Reference: Finnish Biogas Association
Biogas utilization in Finland

- Biogas utilization was 68% of total production in 2009
- 208 GWh of energy was wasted due to torching of biogas (32%)

Biogas utilization in Finland 2009 (GWh)

- Heat: 378.3 GWh
- Vehicles: 0.41 GWh
- Torching: 208 GWh
- Electricity: 58.1 GWh

Reference: Finnish Biogas Association
Biogas utilization in Finland 1994-2009

Reference: Finnish Biogas Association
Heat and electricity production from biogas 1994-2009

Reference: Finnish Biogas Association
Objectives

- Government goal: 1 TWh more biogas production in 2005-2020
- Finnish Bioenergy Association goal: 3 TWh more biogas production by 2020
- -> Incentives
Incentives

- The feed-in-tariff system for electricity produced from biogas to force on March 25, 2011
- Preparation of the system took 4 years!
- Guaranteed price 83.5 €/MWh + 50 €/MWh heat bonus, if 50% total efficiency is obtained (=133.5 €/MWh).
  - Generator power ≥ 100 kVA (~85 kWe)
  - Only new plants
  - All new parts (old sludge tanks etc. cannot be used)
  - Landfill gas and municipal plants excluded
  - Plants can be included in the feed-in-tariff scheme for 12 years
- 2 M€ reserved in 2011 budget
- Biogas plants can be accepted to the feed-in-tariff scheme until their total efficiency reaches 19 MW (only 10 x 2 MW plants)
Investment grants

- Investment grants in the order of 15-40% available for construction of biogas plants
- An alternative to joining the feed-in-tariff system
Biogas in Finland

- Biogas mainly used in combined heat and power production

- Growing interest for biomethane as vehicle fuel
CNG as vehicle fuel

- 16 public filling stations for CNG in southern part of the country
- The CNG filling station network is expanding
  - The national gas grid operator (Gasum Ltd) plans to develop the network of public natural gas fuelling stations actively
- In total about 1,000 gas vehicles in operation
- CNG costs about half of the price of petrol (80 cent/l petrol equivalent, 03/2011)
- Gas vehicles approx. same price as diesel vehicles, 10-30 % more expensive than petrol vehicles
Biomethane as vehicle fuel

- One of the first world’s first small-scale biogas upgrading systems on farms was introduced in 2002 in Laukka, Finland
  - > 40 biogas vehicles fuelling, capacity 400 m³ methane/day

- Construction of the first upgrading plant to inject methane into grid on-going, expected to start operation in 2011

- Biomethane is expected to be distributed at the existing CNG filling stations by the end of 2011

Photo: Metener Ltd.
Tax policy

- Biogas as vehicle fuel free from fuel tax
- Increase in CNG tax, expected 20 cnt/kg by 2015
- Vehicle tax consists of two parts: Basic tax + Tax on the propelling force
- Gas vehicles have been exempted from the Tax on the propelling force, but this is going to change in 2013 -> ~250 € yearly tax for passenger cars, ~90 € for vans
Biogas - Research Activities

- Processing digestate to value added products
- Developing sustainable crop cultivation for biogas production
- Developing use of biogas as vehicle fuel

Main actors:
- University of Jyväskylä, www.jyu.fi
- Agrifood Research Finland, www.mtt.fi
Biogas Tractor

- The Finnish company Valtra Ltd. has developed a Dual-Fuel Biogas Tractor
  - 70-80% of power is generated by biogas, small amount of diesel or biodiesel is used for ignition
- Biogas concept tractor was presented in Sweden in summer 2010
- Testing and further development work is going on
- Problem: EU does not yet have regulations for Dual-Fuel - vehicles!
GasHighWay - Promoting the Uptake of Gaseous Vehicle Fuels, Biogas and Natural Gas, in Europe

Aim of the Project:
- To increase the use of environmentally-benign gaseous vehicle fuels in the transportation sector
- To promote the production and upgrading of biogas for vehicle fuel
- To facilitate the increase of the use of upgraded biogas in the natural gas grid

The long-term objective of the project
to promote the realisation of a network of filling stations for biogas and natural gas from Sweden and Finland in the North to Italy in the South

- Countries include: Finland, Sweden, Estonia, Latvia, Lithuania, Poland, Germany, Czech Republic, Austria and Italy
- Funded from the IEE – Intelligent Energy for Europe-programme 2009-2012, 1.8 M€
- http://www.gashighway.net/

The project is coordinated by Jyväskylä Innovation Ltd. (Finland)
BIONUTCUT- Realizing the Potential of Biogas Technologies in Cutting Down the Nutrient Loads in the Baltic Sea Region

Aim of the Project:
- Advancing the **uptake of biogas technologies in treatment of organic wastes and side streams from municipalities, industry and agriculture** in the Baltic Sea Region
- **Decreasing the nutrient loads to water bodies** from treatment of waste and side streams in the Baltic Sea Region through uptake of biogas technologies, which enable **efficient recirculation of nutrients**
- A **practical and business-oriented approach** has been selected to tackle this opportunity, aiming at **promoting the investments**

The project will focus in targeting the following countries: **Finland, Russia, Poland and Baltic countries**

- Project application to the EU Baltic Sea Region Programme in March 2011
- 2,7 M€, 2012-2014
Thank You for Your Attention!