Biogas in Finland – Situation Report

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Photo: Annimari Lehtomäki
Photo: Outi Pakarinen
Biogas target and potential in Finland

- Government goal: 1 TWh more biogas production in 2005-2020
  - “The use of biogas in vehicles will be promoted” (Government Program 22.6.2011) The Finnish Government is committed to promote the use of biogas.
- Finnish Bioenergy Association goal: 3 TWh more biogas production by 2020
- Biogas potential

<table>
<thead>
<tr>
<th>Source</th>
<th>Biogas potential (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>

Photo: Annimari Lehtomäki
In total 73 biogas production sites (including landfills)
Total biogas production 139 million m³ (630 GWh)
Biogas utilization was 66 % of total production
Several new biogas plants are under construction and have been started after 2010

Biogas production in Finland 2010

Reference: Huttunen & Kuittinen 2011
Biogas utilization in Finland 1994-2010

2010: Heat 314.5 GWh
electricity 107.0 GWh

Reference: Huttunen & Kuittinen 2011
Finnish Biogas Association

Photo: Annimari Lehtomäki
Biomethane and CNG as vehicle fuel

- The first upgrading plant to inject methane into grid started operation in 10/2011 (Kouvola, Mäikikylä biogas plant)
- Capacity: 7 GWh/year of biomethane injected to grid, ~1 GWh was injected in 2011
- Biomethane is distributed at the existing CNG filling stations
  - 17 public filling stations for biomethane/CNG in southern part of the country
- Share of biogas is approximately 10 % of the sold traffic methane
- Biogas got the Nordic eco-label and the Finnish label of a domestic product
- 1.44 €/kg → the most cost-effective renewable traffic fuel at the moment
- The national gas grid operator, Gasum Ltd., has several new upgrading and grid injection projects (also biogas plant projects)
  - For example biogas from Espoo wastewater treatment plant will be upgraded and injected to grid by the end of 2012, traffic fuel for 50 buses
- Gasum Ltd plans to develop the network of public biomethane/natural gas fuelling stations actively
- In total about 1,000 gas vehicles in operation
- CNG costs about half of the price of petrol (85 cent/l petrol equivalent, 03/2012)
- Gas vehicles approx. same price as diesel vehicles, 10-30 % more expensive than petrol vehicles
- Target (Gasum): biogas will cover 20 % of the total gas (39 TWh on 2011)
- Gasum is considering the construction of an LNG terminal in Southern Finland which it estimates could deal with up to 50 per cent of Finland's annual gas needs
Biomethane as vehicle fuel outside the natural gas grid

- One of the world’s first small-scale biogas upgrading systems was introduced in 2002 in Laukaa, Finland
  - New refuelling station was opened in March 2011 → 50 biogas vehicles fuelling, ~1000 MWh sold on 2011
- Haapajärvi: biogas upgrading to vehicle fuel was started in April 2012
  - Currently only for use of Haapajärvi vocational college
- Nivala: farm-scale biogas upgrading to vehicle fuel will start operation in summer 2012
- Joutsa: New biogas plant to upgrade biogas to vehicle fuel will be under construction in summer 2012

The increase in upgraded biomethane sales in years 2007-2011 in Kalmari farm, Laukaa

Photo: Jussi Läntelä, Metener Ltd.

Photo: Outi Pakarinen
Biogas Tractor

- Valtra Ltd. has developed a Dual-Fuel Biogas Tractor in Finland
  - 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

- New model was launched in 2011 with SCR technology (to clean exhaust emissions)

- Problem: EU does not yet have regulations for Dual-Fuel vehicles!
Incentives

- The feed-in-tariff system for electricity produced from biogas to force on March, 2011
  - 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
    - 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 in the order of 15-40% available for construction of biogas plants
  - An alternative to joining the feed-in-tariff system
Tax policy

- Biomethane is exempted from excise tax
- Increase in CNG excise tax, expected 20 cnt/kg by 2015
  - 12 cnt/kg on 2011, 4 + 4 cent/kg later
- 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
- Tampere University of Technology, www.tut.fi
GasHighWay - Promoting the Uptake of Gaseous Vehicle Fuels, Biogas and Natural Gas, in Europe

The project is coordinated by Jyväskylä Innovation Ltd. (Finland)

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/](http://www.gashighway.net/)
Thank You for Your Attention!