Country Report Denmark

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# Biogas Plant Inventory

Produced raw biogas in Denmark, according to Energistatistik 2012

Source: Danish Energy Authority (2014)

<table>
<thead>
<tr>
<th>Substrate/Plant type</th>
<th>Number of plants</th>
<th>Production (GWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage sludge</td>
<td>57</td>
<td>250</td>
</tr>
<tr>
<td>Biowaste</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Agriculture</td>
<td>67</td>
<td>861</td>
</tr>
<tr>
<td>Industrial</td>
<td>5</td>
<td>51</td>
</tr>
<tr>
<td>Landfills</td>
<td>25</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>154</strong></td>
<td><strong>1218</strong></td>
</tr>
</tbody>
</table>
Geographic location of biogas plants in Denmark

Source: Danish Energy Authority (2014)
The interest for using biogas as a fuel for cars is increasing. The Danish government believes that biogas will be an important vehicle fuel in the future, especially when replacing fossil fuels for the heavy duty vehicles.

The first Danish biogas upgrading plant is operating in Fredericia. A number of biogas upgrading projects are in the planning stage.

Four biogas filling stations are in operation and several are about to be established.

81 CNG cars are in operation in Denmark.
Biogas Trends

Projection of the development of biogas production and of animal manure amounts up to 2020.

New projects, representing about 1.5 PJ, have already reached a final decision.

Further projects, are in various planning phases. If implemented, they will contribute to an increase of the total biogas production to 15 - 16 PJ. However, it is uncertain whether and when they can be realized, and if they will be realized within the current framework conditions or if it will require that some of the existing barriers to be diminished or even removed. New projects are likely to pop up instead.

Complete overview is expected to be available by end of 2014.

Biogas production will be more than doubled from 4.3 PJ, to around 10 PJ by 2020. The main driver in this expansion is the increased support for the use of biogas for electricity production and upgrading.
### Biogas Utilisation

#### Utilization of biogas in Denmark (values from 2012)

Source: Energistatistik, 2012 and Danish Energy Authority, 2014

<table>
<thead>
<tr>
<th>Utilisation type</th>
<th>GWh</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>808</td>
<td>66</td>
</tr>
<tr>
<td>Heat</td>
<td>242</td>
<td>20</td>
</tr>
<tr>
<td>Vehicle fuel</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
<tr>
<td>Flare</td>
<td>122</td>
<td>10</td>
</tr>
</tbody>
</table>
Digestate handling

- Digestate from agricultural plants are used as fertiliser and applied according to the same rules as animal manure and slurries.
- Co-digestion of sewage sludge from WWTP with manure is limited due to quality restrictions on waste material that can be applied on land.
Improved financial support for the biogas sector was adopted and approved by the EC at the end of 2013. The support cannot be overlapped (e.g. cannot be received by the same plant for both investment costs and for operation costs).

The main elements are:

• 0.056 EUR/kWh for biogas used in a CHP unit or injected into the grid (115 DKK/GJ).
• 0.037 EUR/kWh for direct usage for transport or industrial purposes (75 DKK/GJ)

These tariffs include natural gas price compensation of maximum 0.012 EUR/GJ (26 DKK/GJ) and temporary support of 0.005 EUR/GJ (10 DKK/GJ) up to 2016.

It is also possible to apply for investment grants for plants digesting mainly manure. 19 new biogas projects received governmental grants in 2013 with a total value of 268 MDKK (36 MEUR).

Support for upgraded biogas supplied to the natural gas network in calendar year 2013 is 111.6 DKK per GJ. The support is payable to both upgraded biogas supplied to the natural gas grid and to purified biogas entering a town gas grid. This support is provided with effect from 1 December 2013.

In the energy agreement, new support frames for biogas to transport, process and other applications were also agreed.
National Strategies

The main frame for the actual and future development of biogas in Denmark is the Energy Agreement from 2012.

- The "Green Growth" initiative formed the basis for a political agreement made in 2009, which includes the objective that 50% of the livestock manure is to be used for green energy in 2020. This requires a significant acceleration of the current development in biogas deployment.

- In March 2012, the Danish Government entered into a broad energy policy agreement for 2012–2020. The agreement includes several elements and calls for a significant enhancement of the share of renewables in the Danish energy supply. The aim is to have 35% of energy supply renewable by 2020, and to make Denmark fossil fuels free by 2050. Biogas is a key area of the agreement. The Danish Energy Authority, in its projection from 2012, predicted that it is possible to have a 4-fold increase (to 16.8 PJ) of the total biogas production by 2020. The realistic growth will be a doubling, to around 10 PJ in 2020. Danish politicians have indicated that biogas in Denmark should not be developed based on energy crops, and have therefore introduced limitations for the share of energy crops used for biogas production. In exchange, there is now growing interest in using deep litter and straw in the production of biogas in Denmark.
The legislative framework impacting the Danish biogas sector

**EU**
- The Waste Framework Directive
- Animal By-product Regulation
- RES Directive
- Env. Impact Assessment Directive
- The Habitats Directive
- Nitrate Directive
- Water Framework Directive

**Climate, Energy and Building Ministry**
- The Renewable Energy Law
- Heat supply and project Ordinance
- Electricity Supply
- Natural gas law
- Climate Plan
- Strategic energy planning
- RE in the process

**Ministry of the Environment**
- Planning Act
- Env. Impact Assessment Decree
- Habitat Ordinance
- Environmental Protection Law
- Sludge Ordinance
- Waste Ordinance
- Resource Strategy
- Nature Agency biogas mobile team

**Ministry of Food**
- Support /ha agriculture
- Rural development
- Statutory order for fertilizer and plant cover

**Economy-94 and Ministry of Internal Affairs**
- Local Proxy Rules

**Ministry of Taxation**
- Tax Laws
Obstacles for the Biogas Development

Obstacles and Challenges:

1. Increase the availability of biomass feedstock
2. Maintain utilization of biogas for CHP production
3. Promote the sale of biogas through the natural gas grid
4. Reduce financial barriers
5. Encourage the use of biogas for transport
6. Encourage the establishment of local biogas infrastructure
7. Simplify approval procedure
8. Adjust the support frames, to better fit biogas objectives
Biogas Research

One of the main research topics is finding co-substrates to be co-digested with slurry, if the aim of treating more than 50 % of the produced animal slurry should be achieved.

Among the eligible substrates, the main priority is given to straw and deep litter. As more knowledge is needed on how to optimise their co-digestion with slurry, a number of research projects, where universities and biogas plants collaborate, aim to provide the missing information.