Country update Biogasproduction in the Netherlands:
Evaluation of biogas sector in NL Phase 2; process monitoring

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Focus on sustainability, innovation and international
Contents

◊ Bio-energy statistics

◊ Results Evaluation of Process Monitoring of digesters in NL
Number of plants: 492

Installed Capacity:
- Heat: 1.892 MW
- Electricity: 1.512 MW
- Green Gas: 11.905 Nm3/h
### Overview Biogas Production in NL

<table>
<thead>
<tr>
<th>Type of biogasproduction</th>
<th>Number of plants</th>
<th>Capacity Heat (MW)</th>
<th>Capacity Electricity (MW)</th>
<th>Capacity Green Gas (Nm³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Water Treatment</td>
<td>82</td>
<td>8</td>
<td>46</td>
<td>470 (N=3)</td>
</tr>
<tr>
<td>landfills</td>
<td>41</td>
<td>0</td>
<td>15</td>
<td>1.625 (N=5)</td>
</tr>
<tr>
<td>Co-digestion</td>
<td>105</td>
<td>18</td>
<td>129</td>
<td>606 (N=2)</td>
</tr>
<tr>
<td>Organic industrial waste</td>
<td>13</td>
<td>0</td>
<td>18</td>
<td>5.312 (N=4)</td>
</tr>
<tr>
<td>Municipal organic waste</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>3.892 (N=6)</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>252</strong></td>
<td><strong>37</strong></td>
<td><strong>219</strong></td>
<td><strong>12.530 (N=20)</strong></td>
</tr>
</tbody>
</table>

New developments in NL

◊ Change biogas sector to cheaper substrates (grases, manure)

◊ Need for recovering of minerals on behalf of fertiliser act

◊ Introduction of monodigesters (manure as feedstock)

◊ New energy agreement (private-public) with focus on wind energy (on and offshore) and decentral renewable energy production
Results of Evaluation Biogas Sector NL Phase 2: process monitoring

Link to report: http://www.agentschapnl.nl/actueel/nieuws/rapportage-procesmonitoring-verbeterpunten-voor-vergisting
Setup evaluation project

◊ Phase 1 concerning: Representative overview of the sector; published in November 2011; (results of 84 biogasplants)
◊ Phase 2 target: evaluation of process control over a period of one whole year (19 biogasplants)

With:
• weekly collection data and periodical analyses of samples in the digester (input and output)
• Economical evaluation
• energy-efficiency

Evaluation is concerning projects which were in full operation since 2010.
All projects using the former feed-in system called MEP.
Input mixes in several digesters during the year
Results of project evaluation
Phase 2: process monitoring

- Class A: Co-digestion < 500 kWe
- Class B: Co-digestion between 500 and 1000 kWe
- Class C: Co-digestion ≥ 1000 kWe
- Class D: Industrial digesters, VGF-digest
Variations of weekly input
Distribution of the cost price of co-substrates
Variation of the biogas potential of the input for 19 AD-plants
Variation of CH₄ and H₂S-content in 19 AD-plants
Variation of the net energetic efficiency of 19 AD-plants
Distribution of the biogas energy content as converted and used in different categories
Variation of the net energetic efficiency of 19 AD-plants

Average full load hours for the 4 digestion classes

<table>
<thead>
<tr>
<th>Class</th>
<th>Type</th>
<th>Phase I (n = 69)</th>
<th>Phase II (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>Co-digestion &lt; 500 kWₑ</td>
<td>6 439</td>
<td>3 768</td>
</tr>
<tr>
<td>Class B</td>
<td>Co-digestion 500-1000 kWₑ</td>
<td>6 537</td>
<td>5 199</td>
</tr>
<tr>
<td>Class C</td>
<td>Co-digestion &gt; 1000 kWₑ</td>
<td>7 093</td>
<td>6 277</td>
</tr>
<tr>
<td>Class D</td>
<td>Industrial digestion</td>
<td>5 966</td>
<td>5 420</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>6 675</td>
<td>5 582</td>
</tr>
</tbody>
</table>
Distribution of the different end products

- Digestate: 39.9%
- Liquid fraction: 27.0%
- Press/centrifuge cake: 27.9%
- Dried cake: 5.0%
- Dischargeable water: 0.2%
Distribution of disposal costs of the digestate
Comparison of costs and revenues
Conclusions

◊ Price of co-substrates increased and so the biogas sector is looking for alternatives
◊ Low level of transparency in relation to price / biogas potential of substrates
◊ Technical failures of “older” plants leads to the need for additional investments: problems in biogas processing lead to decreasing biogas production and lack of return
◊ Process optimization doesn’t have the priority it deserves; there is a big potential for increasing biogas production and economical optimisation of biogas plants
◊ Use of additional feed-in incentive for renewable heat utilization of biogas plants is very effective for larger installations
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