IEA Bioenergy
Conference 2015

UK Biomethane Market Update

*50 Plants Injecting Gas by End 2015*

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UK Biomethane Market Update

1. CNG Services Ltd
2. UK Gas Grid
4. Bio-CNG
5. Benefits and Market Forecast
6. Conclusions

47 new projects in 2014 and 2015
CNG SERVICES LTD
CNG Services Ltd

- Supports projects to inject biomethane into the gas grid
  - 50 projects by end 2015, we have worked on 45
- Bio-CNG as a fuel for trucks
  - Part own CNG Fuels Ltd which owns UK’s largest CNG filling station and is developing a new one in Leyland
  - Sells Bio-CNG (100% biomethane)

We work on innovation in natural gas
Gas pressure is measured in bars and the pressure reduces as it moves through each stage of the system. From under the sea into people’s homes and businesses.
UK Gas Distribution Networks

- 250,000kms of Pipelines
- Pressure Reduction Stations
- 21 million Consumers
UK BIOMETHANE MARKET END 2015 STATISTICS
Biomethane projects per year 2010-2015

1 in 2012, 2 in 2013, total of 50 projects injecting gas by end 2015
Proportion of Projects in Each Feedstock Category

<table>
<thead>
<tr>
<th>GGG Feedstock Category</th>
<th>Number projects in Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage Sludge</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Agricultural</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>Food Waste</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>Food Processing</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Biodegradable</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total Projects</strong></td>
<td><strong>50</strong></td>
<td></td>
</tr>
</tbody>
</table>

Proportion of Projects in each Feedstock Category

- Sewage Sludge: 10%
- Agricultural: 58%
- Food Waste: 22%
- Food Processing: 8%
- Biodegradable: 2%
- Unknown: 0%
Proportion of Projects by CO2 Removal Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Number of Projects</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Wash</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>Membrane</td>
<td>34</td>
<td>68%</td>
</tr>
<tr>
<td>Chemical Wash</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td>TBC</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Projects</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
Annual Biomethane to Grid and Financial Support (RHI) for 2012-2015

Note – RHI commitment is max based on capacity, actual lower in 2015 due to project build up

Biomethane to grid is Renewable Heating technology with highest kWh
BIO-CNG USING 30 BAR GAS GRID
Dedicated CNG tractors are here after 14 years of waiting........first 5 in UK in a project led by CNG Services Ltd
Benefits of Using LTS

• Lower pressure lift
  • Reducing electricity used in compression
  • Reduces number of stages of compression from 5 to 2

• Higher flow rates
  • Compressors run for less time, lower maintenance
  • Very high capacity per CNG station

• No leakage of gas in LTS
  • Higher pressure grids have no methane leakage

• Dry Gas
  • No gas drier needed

The 6,000 km of 20 – 35 bar LTS means that 95% of major UK distribution centres are within 2 km of the ideal energy source is a vital national asset
Leyland LTS CNG Station – 30 Bar grid
Leyland LTS CNG Station - Overview

1. Leyland LTS CNG station can refuel 500+ HGVs/day and supply 100% renewable Bio-CNG to parties such as Waitrose
2. Accessible 24/7/365 and will operate on an unmanned basis
3. Scheduled to open in December and will be equipped with:
   • 2 CNG compressors with a total annual capacity of more than 25 million kg
   • 2 refuelling lanes with 4 independent fast-fill refuelling dispensers
   • 2 separate loading bays offering fast-fill for CNG trailers
Leyland LTS CNG Station

UK has 6,000 km of 30 bar grid located close to most major distribution centres
CNG Fuels and Barrow Shipping Ltd

Gas can be used to fuel trucks on CNG

Leyland Customers

Sale of CNG in Leyland

Barrow Shipping

Normal grid gas

Inject gas into grid

Gas Distribution Network

Purchase of biomethane energy

Inject gas into grid

Clean-up plant and grid injection

Organic Material

Processing via Anaerobic Digesters

AD Developer

24 Projects signed up with Barrow Shipping and REAL GGCS

24 Projects signed up with Barrow Shipping and REAL GGCS
Biomethane to Grid Conclusions

• Over 50 projects by end 2015, further 100 by end 2020 if tariffs OK
  • 46 projects completed in period 1 June 2014 to 31 Dec 2015
• Around 2 TWh by end 2015
  • UK total gas demand 750 TWh
  • 140,000 tonnes of LNG not imported
• Bio-CNG using 30 bar grid and dedicated CNG trucks is a great way to decarbonise haulage

UK biomethane market growing fast, delivering significant benefits and helping meet 2020 renewable energy targets