The Present Status and Future Prospects of the Biogas Industry in Europe

BIOSURF Trans-Association Workshop
13/07/2017 Budapest

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European Biogas Association
25 Countries – 36 National Organisations
55 Companies – Representing >7,000 Stakeholders

www.eu4biogas.eu
European Biomethane Industry

- Including Anaerobic digestion followed by biogas upgrading
- Including Gasification of renewable organic matter followed by syngas conversion to biomethane
- Including other technologies producing methane fuel from biogenic carbon or utilizing biological pathways (Power-to-Gas)
European Biomethane Industry

**Anaerobic digestion**
- Organic waste, manure, crops
  - Landfill
  - Anaerobic digestion
  - Sewage sludge
  - Upgrading
    - Grid injection
  - CO₂
  - CH₄

**Gasification**
- Lignocellulose: wood, straw
  - Gasification
    - CO/H₂
  - Methanation
    - CH₄
  - Grid injection
  - CO₂

**Power-to-Gas**
- Electricity: PV, wind
  - Electrolysis
    - H₂
  - Methanation
    - CH₄
  - Grid injection
Biogas & Biomethane can do... A lot!

Substrates
- Manure
- Source separated organics
- Restaurant/Food waste
- Waste water treatment sludge
- Energy crops
- Industrial waste

Anaerobic digestion

Products
- Electricity
- Reusable water
- Biogas
- Renewable fuel
- Biofertiliser
- Compost
Overview of the European Biogas Industry
Domestic, Decentralised, Secure

<table>
<thead>
<tr>
<th>Year</th>
<th>Existing plants</th>
<th>New plants</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>6,227</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>6,227</td>
<td>4,281</td>
<td>+69%</td>
</tr>
<tr>
<td>2011</td>
<td>10,508</td>
<td>1,889</td>
<td>+18%</td>
</tr>
<tr>
<td>2012</td>
<td>12,397</td>
<td>1,415</td>
<td>+11%</td>
</tr>
<tr>
<td>2013</td>
<td>13,812</td>
<td>849</td>
<td>+6%</td>
</tr>
<tr>
<td>2014</td>
<td>14,661</td>
<td>2,173</td>
<td>+15%</td>
</tr>
<tr>
<td>2015</td>
<td>16,834</td>
<td>542</td>
<td>+3%</td>
</tr>
</tbody>
</table>
There is More to Come…

* (data from previous year)
Biogas in Combined Heat & Power

- **Installed electrical capacity**: 8.3 GW
  - No data from DK, FI, LU, SE

- **Generated electricity**: 63.6 TWh

- **Generated heat**: 32.2 TWh
  - No data from: BG, IE, PT, RS, SK, ES, CH, UK
Biomethane Production Follows

Number of biomethane plants

<table>
<thead>
<tr>
<th>Year</th>
<th>Existing plants</th>
<th>New plants</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>187</td>
<td></td>
<td>187</td>
</tr>
<tr>
<td>2012</td>
<td>187</td>
<td>45</td>
<td>232</td>
</tr>
<tr>
<td>2013</td>
<td>232</td>
<td>50</td>
<td>282</td>
</tr>
<tr>
<td>2014</td>
<td>282</td>
<td>85</td>
<td>367</td>
</tr>
<tr>
<td>2015</td>
<td>367</td>
<td>59</td>
<td>+16%</td>
</tr>
</tbody>
</table>

Existing plants: 
New plants: +24% in 2012, +22% in 2013, +30% in 2014.
Biomethane Boom in Europe

- Germany: 185
- Sweden: 61
- United Kingdom: 47
- Switzerland: 35
- the Netherlands: 21
- France: 20
- Austria: 13
- Denmark: 12
- Finland: 10
- Norway: 8
- Italy: 6
- Luxembourg: 3
- Hungary: 2
- Iceland: 2
- Spain: 1

European Biogas Association
Biomethane Production in Europe in 2014

- Biomethane upgrading capacity: 200,000 Nm³/h
- Approx. biomethane production: ~1.8 Bn m³
- Number of biomethane plants in Europe; 70% of them inject gas into grid: 367
- Approx. use of biomethane in transport: 10%
Biogas/Biomethane Potential
(anaerobic digestion + gasification)

Biogas/Biomethane* potential
*upgraded biogas and gasification  **projected potential share of total biogas upgraded to biomethane

Grid, fuel

Electricity, heating and cooling

EBA
European Biogas Association
Source: GreenGasGrids, 2014
Natural Gas Consumption EU28

Primary energy consumption - Natural gas (EU 28, in Mtoe)
Gas Future is Out There...

Current average annual decrease: 22 bcm
Gas Future: 2nd Transition is Coming

France – scenario from ADEME of gas energy in the grid
Source: GRDF 2016

Gas History in France

1818 First Gas Company
1956 Operation of the Gas Deposit of Lacq
1970 End of Town Gas
2012...
2050 ?

Source: ENGIE 2017

Natural gas
Renewable gas
Biomethane in Transportation
Biomethane Cuts CO₂ Emissions

Well-To-Wheel (WTW) - GHG emissions in CO₂ g/km

Fossil fuel:
- Petrol: 164* g/km
- Diesel: 156 g/km
- LPG: 141 g/km

Natural Gas & Biomethane:
- CNG: 124 g/km
- BIO-CNG (20%): 100 g/km
- BIO-CNG (100%): 5 g/km

Electricity:
- Ethanol (Basis: Wheat): 114 g/km
- Biodiesel (Basis: Rape): 95 g/km
- Hydrogen Fuel Cell (Basis: EU-Mix): 128 g/km
- Hydrogen Fuel Cell (Basis: Wind energy): 8 g/km
- E-Mobility (Basis: EU-Mix): 75 g/km
- E-Mobility (Basis: Wind energy): 5 g/km

CNG: Best CO₂ potential > 130 octane

Source: dena, JEC

*Basis: (Petrol, naturally aspirated engine), Fuel consumption: 7l/100km
Liquefied Biomethane Offers Most

- Targeting large consumption applications
- Sharing infrastructure (shale LNG imports)
- Replacing diesel and fuel oil (bunker fuel)
  - Bunker fuel - up to 3.5% Sulphur (2012, open ocean)
Enabling European Biomethane Trade
Lack of biomethane trade prevents further biomethane developments

Cross-border trade is limited to bilateral agreements (CH-DE, DK-DE); international trade is mainly done through road transport

The potential of biomethane production is not equal to the national demand and the international trade would eliminate this discrepancy

Green Gas Grids have identified the biomethane potentials, while BIOSURF currently has the objective to develop national biomethane registries
Strategy for Biomethane Industry

➢ European Biogas Industry goes far beyond renewable electricity

➢ *Biomethane offers high GHG savings for natural gas blends, enabling gas greening*

➢ Biomethane industry can be a pillar of EU energy
  ➢ Tremendous technical potential
  ➢ Biomethane industry needs *strong stakeholders*
  ➢ Methane fuels *must overcome coal and oil usage*

➢ Need for a *strong biomethane push right now*
Thank you

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