State of the art of biogas and biomethane in Europe

Agata Prządka
Secretary General
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1. What is EBA?
2. Biogas – state of the art and future prospects
3. Biomethane – state of the art and future prospects (long term)
4. EU regulations on biogas & biomethane
5. Conclusions
What is EBA?

- **Non-profit association** founded in 2009
- Covers biogas and biomethane from **anaerobic digestion** and biomass **gasification**
- Well-established **network and communication platform** for exchanging information and expertise in biogas
- Member of EREF and EUFORES, co-operation with NGVA and ECN
- Based in Brussels, **Renewable Energy House** (REH)
European Biogas Association

25 countries – 34 national organisations – 39 companies and universities

www.european-biogas.eu
Biogas & biomethane can do ... A lot!

- Waste management
- Nutrients recycling
- Clean air

Bio-fertiliser (Digestate)
- Biofuel
- Heating
- Electricity

Energy independence
- Rural development
- Jobs
- Investment and growth

Photo: HAASE Energietechnik AG
All data from EBA’s biogas report

- Annual statistical report

- Based on expertise of the national associations or other experts

- Covers EU (apart from Malta) and Switzerland

- Press release and free graphs: [european-biogas.eu/2014/12/16/4331/](european-biogas.eu/2014/12/16/4331/) (Full report can be purchased)
State of the art and future prospects

BIOGAS
14,563 biogas plants in Europe with total installed capacity of 7,857 MW_{el} (2013)
Types of plants in Europe 2013

- Agriculture 72%
- Sewage 16%
- Landfill 7%
- Other* 5%

*other – biowaste and industrial biogas plants

Source: EBA 2014
Biogas plants in European countries by type in 2013

Feedstock is not the same across Europe

Source: EBA 2014
Biogas utilization as an energy source in Europe in 2013

- **Installed electrical capacity**: 7,8 GW
- **Generated electricity**: 48,9 TWh
- **Thermal energy production**: 48,5 TWh

Data from AT, BE, FI, DE, HU, GR, IE, IT, PL, PT, SE, CH

Source: EBA 2014
Electrical and thermal power from biogas in Europe

Consumption of 5,4 Mio households (Belgium + Slovenia) = 15 coal power plants of 500 MWel

...and thousands of tonnes of fertilizer, avoided GHG, recycled waste and residues

Source: EBA 2014
Support schemes for biogas 2014

- Feed-in Tariff (FIT)
- Feed-in Premium (FIP)
- Quota system
- Suspended support
State of the art

BIOMETHANE
282 biomethane plants in Europe producing 1.303 billion m³ of biomethane annually (2013)
Biomethane production in Europe in 2013

Anaerobic Digestion only

- **Biomethane upgrading capacity**: 148,800 Nm$^3$/h
- **Approx. biomethane production**: 1,3 Bn m$^3$
- **Number of biomethane plants in Europe, over 60% of them inject gas into grid**: 282
- **Approx. use of biomethane in transport**: 10%

2015: >50 biomethane plants in the UK only

Source: EBA 2014
future prospects (long term)

BIOMETHANE
European Biomethane Roadmap

Maximal technical biomethane potential* in 2030
Total: 246 billion m³/year | 8.884 PJ/year
*upgraded biogas and gasification

<table>
<thead>
<tr>
<th>Source</th>
<th>Billion Nm³</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woody biomass</td>
<td>66</td>
<td>43.7 - 26.8</td>
</tr>
<tr>
<td>Herbaceous biomass</td>
<td>11</td>
<td>7.6</td>
</tr>
<tr>
<td>Wet biomass residues</td>
<td></td>
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</tr>
</tbody>
</table>

Herbaceous biomass
12 billion m³/year | 4.5%

Wet biomass residues
27 billion m³/year | 10.6%

Energy crops
151 billion m³/year | 58.1%

Assumption: 30% of potential could be realised if there is a good political will

Source: DBFZ, 2014
Biogas/biomethane potential
(anaerobic digestion + gasification)

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

[Graph showing potential in billion Nm3/year for 2010, 2020, and 2030 with the following values:
- 2010: 0.3 billion Nm3/year (2% upgraded**)
- 2020: 12 billion Nm3/year (26% upgraded**)
- 2030: 30 billion Nm3/year (37.5% upgraded**)
- 2020: 18 billion Nm3/year (Biogas)
- 2030: 18.0 billion Nm3/year (Biomethane)

Grid, fuel
Electricity, heating and cooling]
Biogas/biomethane potential (anaerobic digestion + gasification)

Biogas/Biomethane* vs. natural gas

*upgraded biogas and gasification  |  **potential share of biogas/biomethane in total natural gas potential  |  ***National Renewable Energy Plan

- 2012: 444 bln Nm³/y
- 2020: 500 bln Nm³/y
- 2030: 552 bln Nm³/y

GreenGasGrids roadmap: 48 bln Nm³/y

- Biogas/Biomethane
- Natural gas
EU REGULATIONS ON BIOGAS & BIOMETHANE
Biogas & Biomethane related policies on the EU level

- **Transport**
  - ILUC proposal
  - Future Transport Fuels
  - Bio-methane Standards (CEN)

- **Power and heating**
  - Sustainability recommendations

- **Digestate**
  - End-of-Waste Criteria for digestate
  - Revised Fertiliser Regulation
  - REACH

- **Waste policies**
  - Revision of Waste Framework And Landfill Directives

- **Support schemes**
  - State Aid Guidelines on Energy and Environment

- **Targets**
  - 2030 Target for RES
  - National Renewable Energy Action Plans

+ Energy Union
+ ETS
+ Emissions in medium combustion plants
+ Renewable heating & cooling strategy
+ European Energy Security Strategy
+ CEN/TC group on biogas definition
+ many more to come...
Recently approved on the EU level:

- **2030 targets for the EU:**
  - 40% GHG reduction
  - 27% target for renewable energy (non-binding for the MS)
  - 27% energy efficiency

- **State Aid Guidelines for Energy:**
  - To be implemented nationally in 2016; full effect by 2017
  - Phase out of Feed-in Tariffs
  - Promotion of renewables through Feed-in Premium, market-based certificates
  - Technology neutral bidding process

- **Alternative Fuels Infrastructure Directive:**
  - Countries to provide national plans for filling station coverage:
    - CNG by 31 December 2020
    - LNG by 31 December 2025
    - Biomethane within natural gas targets
HOW TO UNTACKLE BIOMETHANE POTENTIAL...?
Biomethane in Europe – the way forward

- Establish basics for biomethane cross-border trade in Europe:
  - National biomethane registries in every biomethane producing country (7 biomethane registries now: DE, AT, DK, NL, FR, CH, UK)
  - Connection/cooperation/harmonisation among national registries - compatibility of individual registries

- Anaerobic Digestion and biomass gasification must go together, because they are complimentary technologies

- There is a need for the national biogas & biomethane association to represent the national interest.
BIOSURF project

**BIO**methane as **SU**stainable and **R**enewable **F**uel
11 partners from 7 countries

**Objectives:**
- To develop a value chain analysis from production to use depending on the territorial, physical and economic features
- To analyze, compare and promote biomethane registering, labelling, certification and trade practices in Europe
- To address traceability, environmental criteria and quality standards
- To identify the most prominent drivers for CO2-emissions along the value chain as an input for future optimization approaches; and
- To exchange information and best practices all along Europe concerning biomethane policy, regulations, support schemes and technical standards.

[www.biosurf.eu](http://www.biosurf.eu)
1. EBA newsletter (online subscription via website) and twitter
2. EBA biomethane workshop – 3 September 2015 (check: http://european-biogas.eu/events/fabbiogas-biomethane/)
3. Become a member and get regular updates!
Thank you

Agata Prządka
przadka@european-biogas.eu

Renewable Energy House
Rue d'Arlon 63-65
B - 1040 Brussels
+32 24.00.10 87
www.european-biogas.eu
BACK-UP SLIDES
Electricity generation from biogas per capita in 2013

Average 93.8 kWh per capita

Source: EBA 2014
The nearest future

**Ups:**

- **UK** – excellent development, FIT and Renewable Heat Incentive (RHI) in place, the latter one being updated
- **Italy** – boom in 2012 (doubled capacity), more to be expected on biomethane
- **Denmark** – increased premiums, targets for manure in AD plants
- **Poland** (?) – Renewable Energy Act in 2015, FIT distributed in bidding process, FIT for micro-scale plants up to 10 kW
- **Sweden, France** – constant development
- **Serbia, Bulgaria, Romania** – new markets
The nearest future

**Downs:**

- **Germany** – EEG 2014 will stop biogas development in the country, lowered FIT, direct sale of electricity to the market (plants above 100 kW), cap on annual added capacity, overall bad conditions
- **Czech Republic** - support ceased in 2014
- **Austria** – stagnation
- **Cyprus** – suspended support
Biomethane production in Europe in 2013

- **Grid injection in countries:**
  AT, CH, DE, DK, ES, FI, FR, HU, IS, IT, LU, NL, NO, SE, UK

- **Transportation fuel use in:**
  AT, CH, DE, DK, ES, FR, FI, HU, IS, IT, NL, SE, UK

- **Quick technology and industry development thanks to:**
  - improved efficiency,
  - lower operational costs,
  - higher CH₄ contents,
  - smaller capacity units becoming feasible
Split of biomethane upgrading units in Europe in 2013

- Pressure Swing Adsorption: 21%
- Water Scrubber: 40%
- Physical absorption: 30%
- Chemical absorption: 5%
- Membrane separation: 3%
- Cryogenic separation: 1%
The nearest future

**Ups:**

- **UK** – excellent overall conditions, biomethane incentive (RHI) in place, around 25 projects in the next 1-2 years
- **Sweden** – constant development, condition: tax exemptions maintained after 2015
- **Finland** – constant development
- **Denmark** – incentive for biomethane in place, more projects in pipeline
- **Italy** – after adoption of respective regulations (2015?) expected boom on biomethane due to highly developed biogas industry and large number of NG vehicles
European Biomethane Roadmap

Assumptions of the study:

- Full political support to deploy biomethane potential
- Includes biomethane from anaerobic digestion and gasification
- Gasification becomes fully industrialized technology
- By 2030 40% of biogas will be upgraded

Digestate: Fertilizer Regulation

**Scope:** integrate organic fertilisers such as digestate to European fertilisers market
  - Commission preparing proposal:
    - End of Waste and product requirement rules

**What’s in it for biogas and biomethane?**
  - Have clear rules to sell digestate abroad (not possible today)
  - Compete with mineral fertilisers and prove value of digestate

  - REACH registration: biogas excluded but unclear if digestate is
    - Exemption crucial to avoid producers unnecessary administration and costs
Hot topic: Energy Union

**Scope:** Published last month by Vice-President Sefcovic, outlines EC’s strategy for the coming years

**What’s in it for biogas and biomethane?**

- Strong focus on Energy Security (particularly natural gas)
  - Biomethane offers an excellent domestic alternative
- Commitment to develop badly needed infrastructure
- Tighten CO₂ standards for personal vehicles, set standards for heavy duty vehicles
Biogas production in National Renewable Energy Action Plans (NREAPs)

EU-27 biogas production in ktoe

- 2003: 5,000 ktoe
- 2004: 6,000 ktoe
- 2005: 7,000 ktoe
- 2006: 8,000 ktoe
- 2007: 9,000 ktoe
- 2008: 10,000 ktoe
- 2009: 11,000 ktoe
- 2010: 12,000 ktoe
- 2015: 19,000 ktoe
- 2020: 25,000 ktoe