



Summary of the Fourth Inter-Association Workshop | Berlin, DE

15.06.16 – 17.06.16

On the **17 June 2016**, the fourth BIOSURF Inter-Association workshop was held in **Berlin (GE)**, with 39 participants.

Welcome & Introduction to Workshop

Welcome message from **Frank Hoffman (GBA)** and introduction to the workshop by **Stefano Proietti (ISINNOVA)**.

The present status and future prospects of the biogas/biomethane industry in Europe

Jan Stambasky (EBA) introduced the European Biogas Association and members who are part of it.

Then he presented the state of the art of biogas industry throughout Europe, in terms of:

- number of plants: 17,240 in operation in Europe;
- Installed capacity : 8,293 MW_{el}
- Generated electricity: 63.6 TWh
- Generated Heat: 32.2 TWh

In Europe, the number of new **biomethane** plants commissioned per year is growing more and more, reaching +30% in 2014 with respect to the year before. Most of them are in Germany, Sweden, UK and the Netherlands.

Some figures on biomethane production in 2014 (only from anaerobic digestion) are summed up as follows:

- 200,000 Nm³/h: Biomethane upgrading capacity;
- ~1.4 Bn m³: Approx. biomethane production;
- 367: Number of biomethane plants in Europe; 70% of them inject gas into grid;
- 10%: Approx. use of biomethane in transport

According with the forecasts, the future of biogas and biomethane will see great developments, reaching almost 50 billion Nm³/year of biogas/biomethane produced (biogas 30 and biomethane 18 billion Nm³ respectively) and used in several applications: Electricity, heating & cooling (biogas) and Fuel and Grid (biomethane).

At the same time, forecasts shows the beginning of a sharp decrease in the use of natural gas since 2014 (Current average annual decrease: 22 bcm) in favour of renewables.

For what concerns transport, the use of biomethane shows a high saving potential in terms of CO₂ emissions (ranging from 40-97% less CO₂ emissions for BIO CNG vehicles with respect to LPG vehicles). It is worth also mentioning the wide potential of Liquid Biomethane which can be suitable with a larger number of applications.

For what concerns **biomethane trade**, currently, the cross-border trade is limited to bilateral agreements (CH-DE, DK-DE) and international trade is mainly done through road transport. This lack of biomethane trade prevents further biomethane developments and it comes as an obstacle to the elimination of the discrepancy between national demand and biomethane production that otherwise would be close to be met.

Green Gas Grids project have identified the biomethane potentials, while BIOSURF currently has the objective to develop national biomethane registries.

Finally, Jan Stambasky concluded stressing the necessity for a strong push on biomethane right now and highlighting that the biomethane industries can be a pillar of EU energy because of its huge technical potential.

On 27-29 September in Ghent (BE) the European Biogas Association conference will be held.

Biomethane Roadmap for Germany

Frank Hoffman (GBA) provided a brief overview on biomethane in Germany.

After being Europe's most evolving market ever since 2007, the market for biomethane in Germany is now stagnating. In 2014, the Renewable Energy Sources Act („EEG“) was amended with the result of lower feed-in tariffs. At present, no bonus for upgrading technology is foreseen as well as no special tariff for energy crops anymore. So, the current biomethane production can continue for the duration of the feed-in tariff grant (20 years), moreover, some projects stopped because other markets (heat sector and use as fuel) are growing very slowly and are risky.

Currently about 9,000 biogas plants are in operation with an installed capacity of 4.177 GWel.

About 200 new biogas plants were built in 2015: mainly small manure based plants (max. 75 kWel and more than 80% manure input). Internationalization of the German Biogas/Biomethane industry is becoming more and more important

For what concerns biomethane, nowadays 190 feed-in plants are in operation producing about 180,000 Nm³/h, the 80% of biomethane is produced from energy crops. About 15 new projects are in operation since 2015.

80% of the total production of biomethane is used in CHP plants, 10% for heating and 10% for fuel. There are about 120 biogas filling stations in operation; additional 170 filling stations offer a blend of biomethane and natural gas. The political goals of producing 6 billion Nm³/y in 2020 and 10 billion by 2030 are not yet relevant.

Barriers have been mostly identified in:

- The CHP sector: no sufficient compensation according to the Renewable Energy Sources Act;
- Heat market: sole heating applications are hardly supported (obligation to use in CHP due to higher CO₂-reduction);
- Fuel sector: stagnating CNG vehicles sales, new regime CO₂-Quota bear many risks and uncertainties, lack of transparency at fuelling station totems (price signs at fueling station);
- International Trade: Prohibitive national legislations, lack of EU-wide mass balance system.

Due to the barriers mentioned above, national drivers are rather scarce at the moment, but interest in German biomethane upgrade technology and cross-border trade from abroad is growing.

Several perspectives for development are still valid.

- There is still a significant potential for development (e.g. organic household waste, manure...)
- The future role of biomethane in the electricity sector will be to provide flexibility to the system (balance fluctuation from wind and solar energy); this role will become ever more important as the energy transition progresses;
- The transportation sector is a huge potential for biomethane. More Renewables in transport sector are needed but electrification is limited. Political support needed
- Independency of foreign gaseous sources might become a more important issue for the EU.
- Interest in Liquefaction of methane (and separation of pure CO₂) is growing.

Concerning the next future, the next reform of the Renewable Energy Sources Act is coming up in 2016. A tender system is going to be introduced for all renewables with 2016 reform. The government is currently revising the electricity market system as a whole and has announced to make major changes to the current design by 2016. (Fossil) CHP-legislation is under revision, possibly with a new momentum regarding CO₂-saving and chances for biomethane, also regarding future revision in 2018. THG-Quota in the fuel sector is to be implemented and proven in practice.

Finally, International barriers need to be addressed in order to provide market uptake

Biomethane Roadmap for Austria

Franz Kyrchmeyr (AKB) provided a short presentation on the state of the art of biogas and biomethane in Austria, focusing on the currently feedstock used, mainly coming from renewable resources from agricultural land.

An overview on the biogas and biomethane developments in Austria in recent years was provided. The main figures are summed up as follows:

- CHP
 - ~ 290 plants producing electricity and heat
 - ~ 550 GWh_{el.} + 300 GWh_{th.}
- Biomethane production
 - 12 plants have installed an upgrading system and connection to the gas grid
 - ~ 2,500 m³ installed capacity
 - ~ 15 Mio Nm³ biomethane production capacity but not reached yet
- One new plant is running to treat spent grain and produce steam and heat

Concerning feedstock, the potential from bio waste, waste from farmland and farm fertilizer must not be neglected and biogas could be the key technology using the left over from previous production steps as food, feed or chemistry production and organic waste. Data shows the total potential of biomethane is around 535 Million Nm³, of which 70 are from bio-waste.

In Austria energy grids (power and gas) are well developed and fixing 2050 climate and energy targets without involving the gas grid is a great mistake.

What must be done to create a win win situation? FK answered to this question highlighting that, according to the expected forecasts, there would be a reduction of 2% per year in the energy demand and this would lead to higher grid costs and chain reactions. To contrast this, a possible shift to renewables is important to favour stable costs, renewable electricity on demand (2500 GWh_{th.} biomethane for power), renewable transport (1600 GWh biomethane) and, of course, mitigation of GHG.

Finally, among the main challenge identified, FK highlighted: the change in the used feedstock with a big potential from non-food/feed sources and the need for technology improvements. The current energy situation is not a driver for further development and, since 2050 climate targets are not taking into account developments in the energy grids, good cooperation between biogas/biomethane and natural gas stakeholders is necessary.

A big lack can be found in the missing political interest in biomethane and in the market demand. To conclude, a more favourable political framework is necessary and an agreement on political level about the future part of the gas grid and biomethane in a 2050 target is needed.

Biomethane Roadmap for France

Marie Verney (ATEE) presented a brief state of the art of the biomethane development in France. Concerning political targets in France, a national call for tenders « 1,500 AD plants in 3 years » was launched in France in 2014 and also a national plan « EMAA » aiming at 1,000 on-farm AD plants was issued.

Moreover, the National Law on Energy Transition for Green Growth (LTECV) set several objective in the field of energy:

- Renewable energy : 23% of the energy mix by 2020
- Renewable energy : 32% of the energy mix by 2030
- **Green gas : 10% of the total gas consumption by 2030**
- Green fuel: 15% of the total fuel consumption by 2030.

In this framework, ADEME carried out prospective scenario for biogas development, estimating, in the best case, an increase of 80 unit/year (MW) in the period 2015-2020.

Concerning biomethane, targets were fixed for the injection of 1.7 TWh by 2018 and 8 TWh by the end of 2023.

Currently, 20 biomethane units are operating in France, mainly producing biogas/biomethane from agricultural feedstocks and in small part from agro-industrial waste and household waste. The annual injection volume in 2015 has been around 70 GWh, enough to cover the annual gas consumption of about 6,000 households, while in 2016 it reached 82 GWh/year.

In June 2014: 400 projects for the distribution grid and 70 projects for the transmission grid were developed and in February 2015 about 600 biomethane project were started, 400 for the distribution grid, 200 for the transmission grid.

Feed-in tariffs are adopted as the main support mechanism for biomethane injection, varying from 6.5 to 12.5 cent/kWh depending on the type of feedstock used (agricultural input and agro-food waste, household waste, catering waste and public waste, etc.). The feed-in tariff mechanism is also applicable to biomethane as a fuel and upcoming evolutions are foreseen for electricity.

There are also other support schemes adopted for injected biomethane used:

- in households:
 - Subsidies
 - Domestic consumption tax on natural gas
 - Guarantee of origin (GoO) sold by the supplier to the customer (25% of the price goes to the supplier).
- As a fuel in transport:
 - Subsidies
 - Domestic consumption tax on natural gas
 - Guarantee of origin (GoO) sold by the supplier to the customer (100 % of the price goes to the supplier)
 - Tax incentives : exoneration on the cost of registration certificates for vehicles
 - Amortization of the purchase of a bioNGV vehicle (up to 18,300 € / year).

For non-injected biomethane, used as a fuel, no feed in tariff are foreseen as well as no guarantees of origin.

As for the mechanism of certification:

- The French guarantee of origin (GoO) system has been created in 2011
- The gas suppliers buy green energy to the producers and then ask the register manager to certify the production. The GOs are then sold to the costumers as part of “green” offers. All the GoO operations (creation, transfer, use towards end customer, deletion of GoOs by GoO manager) are marked in the register.
- GRDF is the register manager for biomethane production (appointed for five years).

Finally, other incentives are set in support of biomethane:

- Priority to injection in the new governmental decrees on feed-in tariffs for electricity production for units over 300 kW (upcoming)

The legislation on large-scale producers of biowaste sets an obligation for these producers to recover their biowaste, with an increasing scope (see presentation for details).

Biomethane Roadmap for Hungary

Kornel Kovacs (HBA) provided a brief overview on biomethane in Hungary.

In Hungary the biomethane market is not yet developed (there are only 2 biomethane plants). Within the BIOSURF project the exchange of experiences is a big opportunity for learning and starting up the market.

Nevertheless, several activities have been undertaken to promote the theme of biomethane trade and registries. In particular there were and will be held events to discuss about this hot topic.

Then he focussed on the process behind the Power to Gas technology highlighting the sustainability criteria and giving a short explanation on the hydrogenotrophic methanogens process.

In August 2016, the conference “Biogas Science 2016” will be held in Szeged (HU).

Biomethane Roadmap for Italy

Lorenzo Maggioni (CIB) introduced the state of the art of biogas and biomethane in Italy, focusing principally on legislation, outlining the main barriers and showing the effective potential of investing in this area.

Firstly, the BIOGASDONERIGHT model was introduced, which consists is a technological platform that combines Anaerobic Digestion (AD) technologies and other Industrial and Agricultural practices, that when applied synergistically are able to:

- produce additional carbon both in already farmed land and in land that suffer desertification or lowered productivity, especially in dry lands;
- simultaneously increase the World Net Primary Production (NPP) of farmland and lower the negative externalities associated with modern conventional agricultural practices;
- continuous increase (until an equilibrium is reached) of the organic content of soils sequestering carbon at the required scale (> 1 Gton C per year);
- realize this at very low cost;
- contribute at the same time to an ecological agricultural intensification.

As for biogas production, Italy holds the third position in the world after China and Germany. About 4 Billion € have been invested in the last 5 years in this sector. Actually, there are more than 1,800 biogas plants for a total installed capacity of more than 1,300 MW_e and about 3 billion of biomethane equivalent Nm³/yr are used, for the moment, only for electricity production.

For what concerns biomethane, only 6 biomethane plants are in operation without connection to the grid.

On December 2013, the biomethane decree, which introduces and regulates the incentive system, entered into force and the main technical barriers have been overcome. Now in Italy it is possible to produce biomethane from agriculture and kitchen waste.

The new rules introduced with the Decree will apply to different kinds of plant and incentives will cover both new plants and the construction of upgrading units in existing biogas plants (for which incentives will be lower).

According with the Decree, *“The “natural gas grid” includes not only the transport and distribution grids of natural gas, but also other useful systems for the transport of biomethane as dedicated grids, the CNG trailers and distributors (gas station), including the agriculture, also not connected to the networks of transport and distribution of natural gas”*

Moreover the decree foresees different scenarios depending on the final use of biomethane:

Case 1: Biomethane injected in the natural gas grid:

- PREMIUM TARIFF linked to the market price of natural gas
- Duration of the incentive: 20 years
- Supplementary incentives for use of by-products and if < 500 m³ CH₄/h

Case 2: Biomethane used in transport:

- Issue of “CIC” (*Certificati di Immissione in Consumo di biocarburanti*- certificates of release for consumption of biofuels)
- 1 CIC corresponds to 10 Gcal
- A double counting is foreseen for use of by-products and waste (1 CIC - 5Gcal)
- Duration of the incentive: 20 years

Case 3: Biomethane used in high efficiency cogeneration plants:

- there are different incentives according to the feedstock used, the installed capacity of the plants and their working life. This scheme of incentives is under review but will not be very different to the one proposed in the Decree.

Beyond this strong recent development, several weaknesses can be identified in many uncertainties concerning the quality parameters and quality measurement, the value of certificates and the specification on the injection into the grid. During the next Summer a new Decree for biomethane subsidies will be published and, hopefully, many of these issues will be clarified.

The potential of biomethane is not to be overlooked, indeed, according to Italian Biogas Consortium a realistic development plan of methane/biomethane within 2020 should include:

- doubling service stations to 2,000;
- Doubling current means of transport consumption of CNG methane (preferably LNG) up to about 2 billion Nm³ by 2020;
- Increasing biomethane consumption up to 25% of the total consumption, about 500,000,000 Nm³/year (bio-CNG or bio-LNG)

Currently, around 30 companies have obtained the permission to build new biomethane plants with sizes from 250 to 1,000 m³/h biomethane, using kitchen waste and agricultural feedstock.

Finally, LM concluded introducing a particular case study under development in Italy: Arborea project.

Arborea is a cooperative founded in 1956, with 248 shareholders owning farms with milk production. The goal of the project is to start producing LBM from manure by the end of 2017.

The main milestones and steps to reach the above mentioned objective are:

- March 31, 2016: closing terms for the tender's presentation.
- End of May 2016: contract signature and start authorization process.
- End 2016: start of construction of the plant.
- End 2017: completion of work and first LBM production.

Biomethane roadmap for the United Kingdom

David Collins (REA) provided a short presentation on the state of the art of biogas and biomethane in UK.

According to the RED targets, 15% of total energy in the UK must be from renewable (heat, electricity, transport)

The Renewable Heat Incentive, introduced in 2011, is the primary policy which supports biomethane in the UK and is the world-first financial incentive to promote the generation of renewable heat and biomethane injection.

Since 2010, the number of projects on biomethane increased exponentially from 1 in 2010 to more than 50 in 2015. According to data and forecasts there will be more than 60 projects in 2016 and an increase of about 20 projects per year is expected until 2021.

An overview of biogas projects by flow rate (m³/hour), CO₂ removal technology and feedstock can be found in the presentation followed by an overview of the total production, which reached 3.01 TWh in 2016, and RHI costs for the period 2012-2016.

Currently the UK total gas demand is around 800 TWh/annum, of which around 50% for domestic heating, 25% for power gen and 25% for industry.

The biomethane injected by end 2015 into the grid is around 2 TWh. The maximum potential estimated for biomethane by 2030 is around 20TWh.

For heat in cities there are few practical/economic alternatives: Biomass (air quality), heat pumps (do not work in very cold weather), district heating (too late to dig up cities).

Among the barriers to the development of biomethane, there are:

- budget restraints and future tariff decreasing
- availability of waste feedstocks
- the use of crops still under debate
- gas grid capacity
- cost of grid connections/delays
- energy content (CV) of biomethane v grid (propane)
- Sustainability Criteria- in force 5th October 2015
 - 60% GHG savings compared to GHG EU fossil heat average
 - Lifecycle emissions of < 125.28kg CO₂ equivalent (34.8 g CO₂e/MJ) of biomass heat generated
 - Consignment basis – no averaging
 - Waste exempt – emissions up to the process of collection
 - Land criteria requirements to be introduced by April 2015
 - All existing plants will have to comply

Workshop – Setting the scene and introduction

Stefano Proietti (ISIS) introduced the aims and rules of the workshop, with three sessions based on three topics:

- Sustainable biomethane production - Relevant Sustainability Criteria and Management practices in different countries
- Carbon foot printing within the context of the BIOSURF project
- Concept for biomethane cross-border trade administration and biomethane mass balancing case before the European Court of Justice

Different aspects connected with these topics were presented to the audience followed by short discussions of the whole group predominantly carried out by the present BIOSURF partners and some of the invited stakeholders.

The audience was very interested in the presented topics and there were many lively discussions during the get-together afterwards.

Sustainable biomethane production – Relevant Sustainability Criteria and Management practices in different countries

The moderator **Kristin Sternberg (FNR)** introduced the fundamental EU regulations on sustainability in the area of renewable energies, which set the basic requirements and standards that needed to be transposed into national law. This was followed by a comparative analysis of the corresponding national regulations in the six BIOSURF countries (GER, UK, AU, HU, IT, FR) with a special focus on specific additional sustainability requirements or respective gaps in those countries. Furthermore, international and national management practices and sustainability verification/certification schemes were shortly addressed. In this context, one of the mentioned national voluntary sustainability schemes was presented: **Antje Fehr**, a representative of the organisation that issues the German label “*Grünes Gas-Label*” for sustainable biomethane products gave a more detailed overview of the involved measures and criteria for this specific voluntary scheme.

The last short presentation was used as starting point for further discussion. The moderator tried to encourage the audience to provide feedback on the presented topic and to share some own experiences with sustainability requirements and the connected verification procedures.

The most of attention was raised by the presentation on the *Grünes Gas-Label*. The stakeholders wanted to get more clarification regarding the trade of the label for sustainable biogas.

Antje Fehr explained that “*Grünes Gas-Label*” is a German seal of quality for eco-friendly, sustainable biogas products for end-consumer. Certified products have to contain at least 10% biomethane in “*Grünes Gas*” standard. The Provider of a *Grünes Gas*-certified biomethane-product has to buy biomethane that meets the criteria for sustainable biogas production and processing, directly from a supplier. Prerequisite for the trade and the transfer of certificates is the mass balancing of injected and withdrawn biomethane (physical coupling).

. For this amount of biomethane an additional (premium) prize can be received. Mrs Fehr further mentioned that the label is used in the free gas market and not in the supported one. The additional requirements of the label are mainly used for marketing reasons by the respective biomethane customers.

Carbon footprinting for biomethane in BIOSURF

During the session “Carbon footprinting for biomethane in BIOSURF”, **Stefan Majer (DBFZ)** presented the topics related the GHG-assessment included in BIOSURF WP5 and first results of the WP. Amongst others, the specific challenges for the GHG emission calculations for Biomethane in the context of the EU RED sustainability certification have been highlighted. These main challenges are:

- The allocation of by-products: according to the RED methodology, by-products can only be allocated following their lower heating value. However, digestate as the main by-product of the biogas process usually has a high water content and can therefore often not be considered adequately.
→ first results from D5.1 have been presented which include options to deal with this issue.
- GHG mitigation effects from the use of agricultural wastes and manure: The use of agricultural waste materials for biogas production can help to avoid emissions associated with the conventional storage and handling of these materials. However, accounting for this benefit within the GHG calculation for biomethane production is not clearly defined within the RED methodology.
→ the approach for D5.2 has been introduced. This Task will provide a database for future calculations

Stefan Majer explained the BIOSURF approach of dealing with the identified challenges to support the various stakeholders.

In the following discussion a number of specific points regarding this topic have been mentioned:

- One of the main challenges regarding this topic are the insufficient and incomplete default values for biomethane. We should discuss to which extent BIOSURF results could help to establish respective values for biomethane.
- Averaging of credits in calculation of greenhouse gas-emissions is not allowed and not possible, which makes the calculations difficult and extensive, especially for small plants.

BIOSURF WP5 should give some advice on the GHG calculators available.

Concept for biomethane cross-border trade administration and biomethane mass balancing case before the European Court of Justice

The moderator **Attila Kovacs (EBA)** informed the participants about the work carried out within BIOSURF in relation to the establishment of the European market for biomethane. In the course of the project a concept for administering the cross border biomethane movements within the European natural gas network was elaborated.

A special purpose voluntary scheme is proposed under the name ERGaR (European Renewable Gas Registry) with the function of mass balancing of biomethane distributed along the European natural gas network. The core documents for the administration will be the European Biomethane Guarantees of Origin issued by the national biomethane registries.

ERGaR is intended to be the Europe-wide recognised organisation for administering and mass balancing volumes of biomethane virtually distributed along the European natural gas network. ERGaR will rely on the national biomethane registries as primary source of documentation and will follow jointly agreed procedures for issuing and cancelling Guarantees of Origin for consignments with export destinations.

The participants considered the initiative very important and timely and expressed support to the concept. A detailed discussion evolved about the interpretation of the terms „mixture” and „mass-balancing” (used in the RED and FQD) in relation to biomethane injected into the natural gas pipeline. The participants agreed the term „mixture” can be logically applied to the blend of fossil natural gas with renewable biomethane and – correspondingly the application of the „mass-balancing methodology” to this situation is appropriate.

A presentation by an invited speaker (**Dr. Max Peiffer**, energy lawyer) informed the participants about the running case before the European Court of Justice (E.ON Sweden vs. Swedish Energy Agency) which is directly related to mass balancing biomethane within natural gas systems.

The issue of sustainability verification was another topic of great interest. According to the RED and FQD such verification is mandatory for biomethane if used as transportation fuel. For other applications (electricity generation, heating) there is no Europe-wide commitment in place, but there are national regulations.

There was a consensus among the participants of the workshop that the cross-border biomethane administration scheme (ERGaR) should transfer the sustainability claims attached to the biomethane consignments.