Summary of the First Trans-Association Workshop | Wien, AT

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On the 27 February 2015, the first BIOSURF Trans-Association workshop was held in Wien, Austria, with 40 participants.

Welcome message from **Franz Kirchmeyr** (AKB) and introduction to the workshop by **Stefano Proietti** (ISIS).

Jan Stambasky (EBA) presented the state of the art of biogas industry throughout Europe, in terms of production (m3), number of plants and installed capacity (MW).

Countless are the uses of biogas and this makes it an important sustainable resource on different aspects: it allows the decentralization of energy production, can be aimed at different uses (heat, electricity and fuel for transportation), allows a better waste management, contributes to GHG savings, etc.

Due to its multifaceted nature, there are many opportunities that biogas can offer, including the use of natural gas distribution and storage systems, a new geographical and commercial dimension made possible thanks to cross-border transactions and, last, the increase of its use in transport.

It is then highlighted the problem of energy dependence from Russia and Gulf countries. The development of biogas / biomethane can be a possible solution to the problem.

Franz Kirchmeyr (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.

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.

12 biogas upgrading plants with a capacity of 2400 Nm^3 biomethane are running at the moment. They mainly use bio-waste as feedstock. Additionally energy crops and gas from sewage sludge is used.

Actually, about 180 CNG public filling stations are existing.

- Thereof 3 are directly linked to a biogas plant and upgrading station.
- Thereof about 60 have a blend with biomethane.

Furthermore, in Austria the electricity and gas grids are well developed and they must be taken into account in order to reach the 2050 climate and energy targets. At the moment, we see only a focus on the electricity grid. The gas grid has to be involved into 2050 energy and climate targets otherwise this important energy grid would automatically lose amounts of transported energy and therefore the grid costs would have to be raised and so the gas grid will lose competiveness. Support to transform the gas grid also becoming more and more renewable is of high importance for the competiveness of the gas grid on the longer run.

Among the main challenge identified: the change in the used feedstock with a big potential from non-food/feed sources and the need for technology improvements. At the end we see the biogas technique as the end step of cascade use of food, feed bio refinery processes using all kinds of organic matter producing renewable energy and organic fertilizer from their left overs. However, it must take into account some obstacles to overcome: lack of political interest, lack of market demand: few cities with methane busses, few lorries, CHP after grid injection is at the beginning.

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Jean-François Delaitre (GRCETA) showed the current legislative situation in France concerning biomethane production and National Biomethane Registries.

Overall, in France there are 6 existing upgrading plants injecting into the natural gas grid (4 on agricultural waste/ 2 Bio-waste) producing 70GWh/yr. There are 290 filling stations with 3 options CNG / EcoCBG / BioCBG.

The main barriers in the development of biomethane are identified in the lack of connection between farmers, the public, politicians, waste companies and gas grid operators (GrDF / GrT Gaz); furthermore, delays in terms of funding, production and marketing of the CNG / CBG cars do not help.

To overcome these obstacles, a will to make changes is necessary, the farmers are often conservative, a new generation with more enthusiasm is needed.

Cooperation between gas grid operators and taking inspiration from the German Model (maize silage / out Sustainability, growth rate) are important drivers as well as improvement of the coordination between administrations, review French fuel taxes, developing training program.

Sandra Rostek (GBA) provides 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 feed-in tariffs for usage in CHP plants were abolished with the Renewable Energy Sources Act (“EEG 2014“) and there is no longer a bonus for upgrade technology and no tariff for energy crops. So, the current biomethane production can continue for the duration of the feed-in tariff grant (20 years). All project planning is on hold because the other markets (heat sector and use as fuel) are growing very slowly and are risky. Currently in Germany, there are 151 feed-in plants in operation producing about 93,650 Nm³/h. 46 projects are in the planning phase or under construction (but many to be stopped).

The 90 % of gas is used in CHP plants.

There are about 1,000 methane filling stations in Germany.

- Thereof about 170 offering a blend of biomethane and natural gas
- Thereof 119 are pure biomethane filling stations

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 subsidized (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;
- 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 significant substrate potential also beyond energy crops (e.g. organic household waste, manure…);

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- 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 fuel sector, if ever political attention were to be applied, holds immense potential;
- Independency of foreign gaseous sources might become a more important issue for the EU.

Moreover, the next reform of the Renewable Energy Sources Act is coming up in 2016, auctions are going to be introduced for all renewables by 2016. The government is currently revising the electricity market system as a whole and announced to make major changes to the current design. (Fossile) CHP-legislation is under revision, possibly with a new momentum regarding CO2-saving and chances for biomethane.

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

In Hungary, biomethane is underdeveloped and political support is limited. This is because the domestic regulations are slow and very bureaucratic and nuclear is preferred at the expense of renewables that are not supported.

As for biogas, less than 5% of capacity is utilized. Several biogas plants from agricultural feedstock and waste water sludge are in operation but only one 1 site producing biomethane exists.

Therefore legal, technical and economic barriers need to be overcome bur there are some perspectives of development:

- Studies and detailed analyses on the local benefits from biomethane production (public transportation and utility vehicles), purchase of such vehicles with EU support.
- Advocating social, political and economical benefits in workshops and public appearances.
- Training of experts and operators.
- In collaboration with the natural gas grid operators, the development of conditions to support biomethane based transport.
- Implementation of “best practices” (with the help of BIOSURF project).
- Introduction of research and development results.

Lorenzo Maggioni (CIB) provided a short presentation on 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.

Actually, in Italy, there are 1,300 biogas plants. Only 2 biomethane plants are in operation without connection to the grid. As for transport, Italy holds the first place in the number of NG Vehicles (823,000) and NGV fuelling stations (1,022).

On December 2013, the biomethane decree, which introduces and regulates the incentive system, entered into force and the main technical barriers have been overcome.

The potential of biomethane is not to be overlooked, particularly from the economic point of view: 1 billion cubic meters of biomethane produced per year may involve investments of 4 billion euro.

A realistic development plan of methane/biomethane within 2020 is needed and it should include:

- doubling the fueling station (from about 1,000 to 2,000);
- doubling current means of transport using CNG (preferably LNG) up to about 2 billion Nm^3 by 2020;

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- Increasing biomethane consumption up to 35% of the total consumption, about 700,000,000 Nm^3/year.

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

The Renewable Energy Directive fixed targets for UK, for which, within 2020, the 15% of total energy produced must come from renewable energy sources.

In order to reach these objectives, incentives were made available, in particular the Renewable Heat Incentive (RHI), for supporting heat and biomethane injection (new Incentives are available from 9 February 2015).

Since 2010, the number of projects on biomethane increased exponentially from 1 in 2010 to more than 25 in 2014. According to data and forecasts there will be more than 50 projects before 2016 and over 60 before 2017.

As for transportation, Green Gas Certificates and Funding for NGV are available.

Among the barriers:

- budget restraints and future tariff regression
- 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 < 125.28 kg CO2 equivalent (34.8gCO2e/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

UK total gas demand now is around 800 TWh/annum. Biomethane injected by the end of 2015 will be around 2.00 TWh. The maximum potential estimated for biomethane by 2030 is around 20TWh.

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

- What is needed for substantial cross-border biomethane trade in Europe?;
- Sustainable raw material supply for the production of biomethane;
- Assessment of environmental impacts from the production and use of biomethane

Table 1- What is needed for substantial cross-border biomethane trade in Europe? (moderated by Attila Kovacs, EBA)

The following questions were addressed to the participants and the main outcomes of discussion are reported below:

1. **Why cross-border biomethane trade needed?**

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Biomethane can be blended with natural gas at any ratio and – as such – can be distributed all over Europe through the natural gas pipeline network. This enables production of biomethane in those regions of Europe where sustainable biomethane raw materials are available but there is no local market for the product (for any reason). The biomethane produced there should be transported to those parts of the continent where the demand exceeds the volumes which can be produced locally on feasible terms. Thus the cross-border trade is needed to establish and maintain the supply-demand balance on regional and European levels.

2. Is cross-border biomethane trade needed for enabling 100% load of the existing biomethane producing capacities?

The existing biomethane producing capacities are small in comparison with the size of the natural gas market and it must be possible to place the volumes within the national borders. Nevertheless, cross-border biomethane trade is absolutely needed to provide a bigger and more flexible market flexibility for future biomethane producing installations.

3. What should be first: trade system or production?

The cross-border biomethane trade system should be organised as soon as possible without waiting for substantial increase in biomethane output. The availability of the European biomethane trade system can be considered as a precondition for new, export-oriented investments.

4. Which countries could be the main importers?

European countries which

- have highly developed biogas industries,
- are already processing most of the available organic waste materials,
- have no substantial additional raw material sources for future projects,
- have no major potential for increasing the output of the food processing industries,

could be those ones where the demand for biomethane will – temporary or on longer term –exceed the domestic supply.

The development of national biomethane markets depends highly on national policies, which may change over time, the interest to import or export might also arise over time. National governments are not obliged to provide the same financial benefits to imported biomethane as offered for domestic production but may still elect supporting biomethane imports for the purpose of achieving renewable energy/biofuel targets.

5. Which countries would be the main exporters?

Countries with huge volumes of untreated organic waste with very weak local markets for renewable energy (like PL, RO) and with substantial potential in further development of agricultural production and food processing industry (like FR, IT, ES).

6. Who is interested in developing the cross-border biomethane trade?

- investors into new animal farms, food processing factories etc.,
- technology and equipment suppliers, including suppliers of biomass gasification technology,
- natural gas industry, natural gas vehicles industry (biomethane contributes to public acceptance and more speedy expansion of use of methane in transportation).

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7. Where is the volume potential for cross-border biomethane trade?

The total biomethane production potential estimated for 2020 is in the range of 6,5 billion m^3, and at 18 billion m^3 for 2030. Deducting the volumes used domestically and the volumes supplied to customers directly, and further assuming a 40% export share the following cross-border trade volumes can be expected: 2,5 – 3,0 billon m^3 in 2020; 6,0 – 8,0 billion m^3 in 2030. Nevertheless, these forecasts and estimates must be checked and verified in course of the BIOSURF project.

8. What are the key regulatory/administrative preconditions for cross-border biomethane movements?

- solving mass-balancing on European level;
- international cooperation among the national biomethane registries;
- equal access to support systems for domestic and imported biomethane;
- biomethane to be compared to the European mix of fuels for every application (instead of comparing to natural gas only).
- Involvement of natural gas industry companies and their customers.

Table 2 - Sustainable raw material supply for the production of biomethane (moderated by Christoph Neitzel, FNR)

The following key aspects were discussed in the workshop:

1. The main challenges for a sustainable raw material supply for biomethane production;
2. The advantages of producing biomethane from sustainable raw materials;
3. Needed actions to overcome barriers.

The results of the discussions are shortly summarised below:

1. **Challenges:**

Why is sustainable raw material supply for biomethane production a problem?

- *Policy*
  - Creation of a reliable climate and energy framework that acknowledges the role of biomethane in the energy mix.
- *Economy*
  - Higher costs of electricity production from bioenergy compared to other renewables (and fossil resources), due to continuous costs for input (substrates);
  - Prices for energy crops, such as maize, increase so it becomes more unprofitable to use them for biogas plants. Hence, other substrates, like bio-waste, animal waste and second/intercrops become more interesting.
- *Environment*
  - Get to know what the available feedstock potentials are and provide information about their sustainability;
  - Elaborate on and identify the impact on food security;
  - Increased competition for land and biogenic raw material by the four F's (Food, Feed, Fibre and Fuel) of a bioeconomy;
  - LUC / ILUC / Water / Soil quality / Biodiversity.
- *Society*
  - Decreasing public acceptance of using energy crops for energy;
  - General vague knowledge about the possibilities to integrate into a farming system the production of substrates for bioenergy production. The production of substrates for

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bioenergy production into a farming system as using manure, catch crops, straw and other left over from agricultural production. The additional use of organic waste brings besides energy the advantage of a nutrient cycle trough digestate.

- *Technology*
  - Further development for efficient pretreatment of alternative feedstock (i.e. other than maize) still needed.

2. Advocacy:

What are arguments in favor of using biomass for biomethane production?

- Biomethane is a strong support of rural development and emphasizes the value of local production.
- Biomethane fosters decentralized energy production.
- The possibility exists to integrate it into a power-to-gas concept.
- Biomethane is multifunctional (heat, electricity, fuel) and is storable, in comparison to other renewable energy sources.
- Biomethane reduces the dependency from fossil and nuclear energy; and in particular third countries like Russia and Gulf countries so that money is also kept within EU.
- As compared to fossil fuels (Natural Gas versus Biomethane), the GHG reduction potential, and thus the climate benefits, are evident.
- Alternatives for energy crops do exist, such as bio-waste and intercrops, without neglecting/reducing the food production.
- Biomethane offers an additional market branch for farmers besides covering the demand from food and feed industry.

3. Need for action:

What is needed to overcome the challenges and unfold the full potential of biomethane produced from sustainable raw materials?

- *Policy*
  - Implementation of favorable/reliable political and legal frameworks.
  - Raising prices for conventional energy carriers that reflect externalities.
  - No subsidies if sustainability of the biomethane production is not proven. That said, the respective assessment must become easier for the stakeholders.
- *Socio-ecological*
  - Consideration of sustainability aspects, e.g. via certification, guidelines, and develop a common sense on sustainability.
  - Improvement of PR activities for more acceptance.
  - Being transparent in the whole process of developing biomethane value chains and involving the relevant stakeholders so that a consent on using bioenergy exists at a local/regional level.
  - Avoiding discussions about food security by using smart cropping systems (that includes for instance, inter-cropping and an efficient transportation system/ decentralized approaches)
- *Technology*
  - Quantify raw material potentials.
  - Development of alternative substrates (e.g. algae) and second (energy) crops in an intercropping farming system.
  - Increasing use of residual matter and waste materials in the production.
  - Research on and demonstration of process optimization (e.g. process control, substrate pre-treatment, microbial processes).

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- Raising efficiency in production and use of bioenergy.
- Flexible and demand driven bioenergy production
- Combination of bioenergy with fluctuating renewables.
- Securing a constant and diversified production of biomass and other feedstock that can be used for biomethane production is more important on the long term than trying to constantly maximize the production and mostly facing high production variations in this process. A mix of substrates will be optimal in regard to sustainability of the feedstock. Biomethane plants could be considered as bond between farmers and waste companies.

▪ *Economy*
- New business models, such as bioenergy villages/regions, renewable energy villages/regions, where the sector demonstrates the important role of biomethane in the energy mix.
- Develop partnerships with a variety of stakeholders on the supply side and agree on long-term (e.g. 5 yrs) contracts for substrate provision; for instance with the municipalities about and their waste materials.

Table 3 - Assessment of environmental impacts from the production and use of biomethane (moderated by Stefan Majer, DBFZ)

After a short introduction about Greenhouse gas emission reduction (&) certification, the following questions have been discussed with the workshop participants:

- What are the main challenges with regards to the calculation of GHG emissions from biomethane production and use (data and methodology)
- What are the most interesting scoping questions from the perspective of the participants (e.g. to calculate the GHG mitigation potential, to discuss optimization approaches, etc.).

During this discussion, three main topics to be addressed were identified.

The topics can be summarized as follows:

During the workshop, the importance of a profound scientific base for data and assumptions regarding the emissions and potential emission savings during the production and use of biomethane has been discussed. Especially, the following topics are of high importance:

- manure,
- catch crops,
- organic waste,
- straw and
- synthetic fertilizer (as comparator calculating GHG savings through the use of digestate).

These aspects will be addressed particularly within future work in the project to review the existing database and to identify potential gaps.

1. **Methodology**

   It was agreed that the basis for the GHG calculation approaches within WP5 will be the methodology of the EU RED. This methodology has slightly adopted for biomethane given that the focus of this methodology is yet on liquid biofuel products.

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2. Presentation of the results

The results of GHG calculation shall be understandable, robust and have to consider the specific claims of various stakeholders along the biomethane value chain:

- farmers;
- traders;
- plant owners;
- politicians;
- clients.

At the end of the workshop, the three moderators reported to the entire audience the main issues addressed and discussed during the three tables.

During the final discussion, **Stefano Proietti** (ISIS) asked how to deal with the fear of countries less advanced in the biomethane domain towards the threat of been “invaded” by biomethane coming from countries more advanced.

Attila Kovacs (EBA) answered stressing the need for clear and transparent rules regulating the European market, while keeping flexibility and the possibility to adopt some safeguard and limitation options.

Kornel Kovacs (HBA) considered important to shift threat and fear in an opportunity, as driver to push and contribute to develop biomethane markets yet at their initial steps and to overcome existing barriers.

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