Policy Brief No13

Biogas production from agricultural waste and other innovative feedstock / Biomethane upgrading for local consumption or grid injection

What is the challenge?

Biogas production from livestock waste is a common practice today, but numerous livestock farms have not yet integrated such systems for technical, economic, and social reasons. Some farmers tend to be sceptical towards new methodologies as they are not sure about the advantages gained from doing a transition from already tested practices. Hence, national policies should be further promoted to educate and convince farmers to apply anaerobic digestion (AD), also known as biogas production, of their waste for energy and environmental reasons.

Besides livestock waste, also other feedstock types (e.g., straw, grass, etc.) can be used for biogas production, opening further opportunities for this sector to grow. Studies have shown that **using different feedstock types to produce biogas via the multi-feeding mode have worth mentioning advantages** when compared to the anaerobic digestion only of livestock waste. The most important one being, the **extended lifespan of the anaerobic digester** and the respective increase of the biogas production.

Biogas systems are mainly installed to run Combined Heat and Power (CHP) systems which feed in the electricity to the power grid. However, recently the upgrading of biogas to biomethane after cleaning the contained CO_2 and other non-useful gases is also a solution that can facilitate to cover the fuel demand of tractors and machinery of the farms with **independent energy, thus defossilising agricultural machineries** (see Policy Brief "Alternative Fuels for Agricultural Machinery" and "Facilitating the development of energy independent farming in Livestock"). The other option is to inject the biomethane into the natural gas grid and provide green energy to non-agricultural consumers. This enables, for example, to provide renewable energy to energy communities which would be beneficial to all participants (see Policy Brief "Enabling the creation and growth of energy communities in rural areas").

One of the most important countries of biogas development is Germany with nearly 10,000 biogas plants (2022)[32], which shows the feasibility and added value of the technology. Also in some other countries, there is considerable development of biogas plants which should be applied across whole Europe.

For instance, in Spain, there is a company named Biometagàs La Galera, which is owned by several cooperatives. **This company utilizes almost 150 tonnes of organic residues such as manure and olive tree residues. It produces biogas that is used to power the village in which the company is located.** According to their results they manage to **produce 50 GWh/year which is the medium consumption of 6300 houses in the area**. It should be mentioned that this was the first time in Spain that a private company made a biogas connection to supply nearby houses. **Before this, there was no regulation** and that was the main reason for a very long implementation time. Initially, the produced biogas from the company was used to power a fleet of buses that were serving as public transportation for the village. From this example the advantages of creating energy communities are evident, but at the same time, the lack of legislation for such cases still needs improvements.

Another successful example of biogas production and use is in Denmark where there are multiple schemes supporting biogas production**. The annual production of biogas in Denmark from 2012 to 2020, reached 15 PJ.** To date most of the produced biogas is used in electricity production. In the future it is expected that a greater share of the produced biogas will be upgraded and delivered to the natural gas grid. The Danish Energy Agency which is responsible for the rules and regulations regarding the support schemes and the criteria of sustainable biogas production is set on facilitating the advancement to more sustainable energy sources.

Therefore, the challenge is to **create a unified methodology/legislation on how this framework support can be implemented**. This methodology will have to highlight and promote the advantages gained from advancing to a

[32] https://www.biogas.org/edcom/webfvb.nsf/id/DE_Branchenzahlen/$file/22-10-06_Biogas_Branchenzahlen-2021_Prognose-2022.pdf

greener more sustainable way of producing biogas to farmers. At the same time farmers and energy producers need to be **guided on how to implement the proposed changes and create productive energy communities** which will contribute towards the reduction of the dependence and contribute to the adaptation and mitigation of climate change.

Policy Recommendations

EU Level:

- Promote R&D policies to **research and adapt new feedstocks** for biogas production.
- Ensure that the process is **transparent**, and that no energy provider abuses the financial aid or is taking advantage of the supporters of this procedure (i.e. farmers). The procedure should be consistent in its **structure and the investment policy** and at the same time maintain **constant disbursement cycles**.
- Facilitate access to the information necessary for farmers/energy providers to make the **transition from conventional biogas production to biogas production using multi-feeding mode**.
- Include **biogas production and use in the overall political strategies** as one important contributor to stabilize the overall (independent energy supply) and specific (e.g., for stabilizing the power grid) energy system.

Member state Level:

- Provide farmers with **financing aid** for the installation of new biogas plants.
- Encourage smallholders to **create associations/energy communities**, which will **build a common biogas plant or will sell feedstock to a nearby biogas production facility** to take advantage of the waste and residues produced from their farms in the highest possible profit. The biogas profit produced will be divided among the energy community members proportionally (see Policy Brief “Enabling the creation and growth of energy communities in rural areas”).
- Encourage **cooperation between farmers** and provide them with mechanisms for access to equipment and economic support.
- Provide **financing incentives**, such as tax deduction, to farmers who install anaerobic digesters on their farms and incorporate new methodologies.
- Facilitate farmers and agricultural service providers, through **funding and subsidy programmes**, to acquire anaerobic digesters to produce biogas.
- Promote **training activities for farmers and advisors** at national and regional levels, **demonstrating in situ** the benefits of adopting new feedstocks for biogas production in terms of reduction of fossil energy consumption and substitution of fossil natural gas, and in terms of increase in anaerobic digester life-expectancy.
- **Encourage farmers to shift to mixed farms** so that both manure and crop residues can be used for biogas production. By doing this the farmer ensures the **continuous production of biogas** and that no residues and waste are left without being taken advantage of, while the remaining effluent **returns to the open-field land as organic fertiliser**.
- Promote the **direct use of biogas and biomethane** on the farms themselves, especially for their machines.
- EU Member States should prioritize the development of an indigenous biomethane industry, such as included in Ireland's Climate Action Plan, by supporting the construction of modern anaerobic digestion plants, and offering state aid with community ownership options.
- In Italy, on 13 January 2023, the Ministry of the Environment and Energy Security (the "MASE" formerly the Ministry of Ecological Transition) issued the decree approving the application rules drawn up with the support of the GSE (the "Application Rules") as required by previous Ministerial Decree n. 340 of 15 September 2022 published in the Official Gazette of 26 October 2022 and entered into force the following day (the "New Biomethane Decree"). Based on this, (a) newly built plants fed by agricultural matrices and organic waste; and (b) plants to produce electricity from agricultural biogas subject to reconversion (so-called revamping) can get funding. The New Biomethane Decree operates in relation to the type of plant (agricultural or powered by

organic waste), the category of intervention (for new construction or conversion intervention) and intended use of the biomethane produced by the plant (transport sector or other uses).

- In the Netherlands, there are subsidies for stimulation sustainable/renewable energy production that include biogas installations.

Expected Impacts

- **Climate change mitigation** using greener/alternative methodologies to produce biogas and biomethane, which will substitute fossil natural gas.
- Contribute to more **energy independence** at farm and national levels.
- **Increased farm profitability**, as the residues produced on farm are fully utilized and can then be used as a clean energy supply source to the farm/community itself.
- Significant **maintenance cost reductions** of the improved anaerobic digesters that use the multi-feeding mode and at the same time have increased life-expectancy.
- Increase the sense of community and cooperation among farmers and energy providers. This will lead towards the **creation of new synergies** where innovative ideas towards sustainable agriculture will emerge.
- **Local awareness of citizens** in renewable energy and a trend to invest in the technology.
- A **diverse portfolio of energy sources** that can be adapted based on the users' energy demand will enable the right system to be selected for any given usage.
- **Market uptake of the technology will be accelerated** through subsidies, technical support, and favourable financial schemes and will allow for a quicker energy transition.

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