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## **ON THE ISSUE OF GENERAL ANALYSIS PROSPECTS FOR BIOMETHANE PRODUCTION IN UKRAINE**

One of the promising areas for ensuring Ukraine's energy independence is the development and development of alternative fuel sources, which certainly includes the production of biogas/biomethane.

This involves a detailed consideration of a number of issues on the situation regarding the development of biogas/biomethane production in Ukraine and the world. Assessments of the potential of biomethane in the world, the EU and Ukraine. Consideration of existing mechanisms for supporting biomethane in EU countries. Structuring the raw material base for the production of biogas/biomethane, which is typical for Ukraine. Describe the raw material, design and product concepts of biomethane projects. Analyze potential markets for biomethane consumption and technical and economic indicators of biomethane projects. Describe the current legislative regulation of the biomethane market in Ukraine, as well as the forecast and vision of UABIO on the action plan for the development of biomethane production in Ukraine until 2050 (Figure 1) [1].

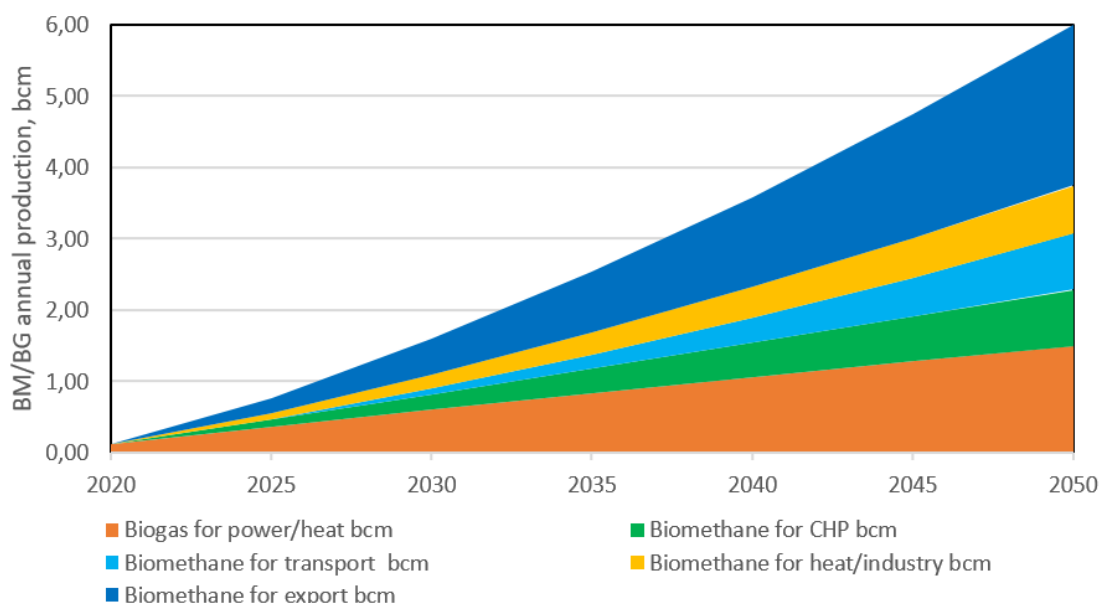


Figure 1 – Annual production of biomethane and biogas, billion m<sup>3</sup> of CH<sub>4</sub> (UABIO forecast)

In 2020, 15 billion m<sup>3</sup> of biogas and 3 billion m<sup>3</sup> of biomethane were produced in the EU. In 2021, the European Commission developed the REPowerEU plan [1, 2], which envisages the diversification of natural gas supplies through greater imports of liquefied natural gas (LNG) and pipeline imports of natural gas (NG) from non-Russian suppliers, as well as greater production and import of biomethane and renewable hydrogen. According to the plan, the

European biomethane sector plans to produce 7 billion m<sup>3</sup> of biogas and 35 billion m<sup>3</sup> of biomethane in 2030. Thus, it is planned that the production of biomethane will exceed the production of biogas.

By the end of 2021, at least 77 biogas plants were built and had operating experience in Ukraine, of which 31 are biogas collection and utilization systems at landfills, the rest are classic biogas plants operating on agricultural and industrial waste.

In total, during 2021, about 260 million m<sup>3</sup> of biogas was obtained. Almost all biogas was used for electricity production. As of August 2022, there was no biomethane production. The Hals-Agro company announced plans to produce the first biomethane in Ukraine by the end of 2022. The first phase of construction involves the production of up to 330 m<sup>3</sup>/h of biomethane.

Later, Hals-Agro plans to increase biomethane production to 1100 m<sup>3</sup>/h [1, 3]. There are known plans of other biogas producers to switch to biomethane production.

Biomethane, as a close analogue of natural gas, can be used for the production of thermal and electrical energy, as transport motor fuel, as well as in everyday life and as a raw material for the chemical industry. Biomethane production is in line with the idea of a circular economy, as it converts streams of agricultural by-products or industrial and domestic waste into energy, while ensuring the recycling of nutrients to agricultural land. The generally accepted opinion of experts is that "biomethane is the future of biogas."

Biomethane can be produced both for domestic consumption (feeding into the gas network with subsequent use for the production of electricity and/or thermal energy, or as motor fuel for vehicles), and potentially for export to European countries. Ukraine has a powerful transit gas system, which is connected to the European gas network.

The main structural elements of the gas transportation system of Ukraine are main and gas distribution pipelines, gas pumping and gas distribution stations, as well as underground natural gas storage facilities. Europe also has an extensive gas network with a total area of 2.2 million kilometers, to which at least two-thirds of the existing European biomethane plants are currently connected [1, 4]. A unified European gas infrastructure and a functioning international gas market model potentially allow biomethane to be traded physically or virtually.

Natural gas is one of the main sources of energy for industry and households in Ukraine. About 65% of natural gas consumed in Ukraine is provided by its own resources (20.2 out of 30.9 billion m<sup>3</sup> in 2020), the remaining 35% is imported [1, 5]. The total amount of natural gas consumption has been constantly decreasing over the past 15 years. Replacing the consumption of natural gas with alternatives is a matter of national security, especially in the context of a military conflict and a possible complete cessation of transit gas. One of the possibilities of replacing imported natural gas is the production and use of biomethane.

## References

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