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Policy advice on low-carbon policies for Ukraine

Fueling the Future: The Economic Relevance of Ukraine's Biomethane Sector

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Executive Summary

- **Ukraine boasts a vast biomethane production potential** of 21.8 bcm/year due to its large agricultural sector. Existing production capacities of around 100 million cubic meters (mcm)/year can be quickly utilized for exports to the EU
- Ukrainian biomethane exports to the EU could reach **values between EUR 0.97 bn and EUR 1.24 bn in 2030** and can function as a **tool to stabilize the domestic economy**. Hence, facilitating trade could act as an additional measure of support
- Relevant legislation to facilitate biomethane production and export in Ukraine has been implemented. However, Ukraine still needs to **establish a biomethane registry**. On the German side, **import barriers need to be removed** and long-term consumption and development plans need to be established
- In the **REPowerEU plan, the EU highlights biomethane as an important pillar** to increase the share of renewable energy sources in its energy mix. The plan targets 35 billion cubic meters (bcm) produced by 2030. In the long run, Ukraine's production could account for a significant share of this

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1. Introduction

- Despite the immense challenges posed by Russia's ongoing war of aggression, Ukraine has demonstrated **remarkable economic resilience**. As the country navigates the path toward recovery, it is now focusing on **economic stabilization** and **advancing a green transition** by producing green energy among other things
- Ukraine's capacity for **biomethane** production presents a **unique opportunity** to contribute to the EU's goal of producing 35 billion cubic meters (bcm) of biomethane by 2035 while **enhancing its own economic recovery**
- **Biomethane is obtained by upgrading biogas,** a gas mainly produced through anaerobic digestion of biomass. Its chemical properties equal those of natural gas and allow the immediate usage of existing natural gas pipeline networks
- On May 14th, 2024, President Zelenskiy signed **Law 3613-IX on customs clearance of biomethane transported by pipeline transport across the customs border of Ukraine** which sets the necessary framework to export biomethane
- The policy brief provides an overview of Ukraine's **biomethane production potential,** its **economic role** and strategies for **accelerating this development**. It expands the LCU memo 3/2024 on Ukraine's biomethane production potential and its economic relevance and includes additional economic considerations

2. Status-quo and near future of biomethane in Ukraine

- The production potential until the end of 2024 is foreseen to reach seven plants with a total operational capacity of 1.16 TWh/111 mcm per year. The majority of the plants will be ready to export by September 2024[1]
- With the end-of-2024 capacity and the expected biomethane prices for 2025, annual revenue projections for 2025 would reach between EUR 12 m and EUR 15 m at the minimum. Of course, with the continued expansion of Ukraine's production capacity, these values will grow further as long as price levels do not decrease
- Biomethane prices consist of a natural gas component and a biogas premium. The natural gas future price for Q1 2025 is 41.91 EUR/MWh[2] and the biomethane premium for heating is estimated at 60 EUR/MWh and 125 EUR/MWh for fuel use[3]

[1] Geletukha, G. (2024)
[2] Obtained on 08.08.2024
[3] Landwärme GmbH (2024)

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3. Biomethane production potential (1/2)

- Ukraine's capacity to assume a significant role in the European biomethane market is supported by three pillars
    1. Ukraine boasts significant biogas production potential, which can be readily upgraded to biomethane
    2. Owing to its chemical similarities with natural gas, biomethane can be seamlessly integrated into the existing natural gas pipeline network for efficient transportation. With the foreseen end of the gas transit contract between Russia and Ukraine, gas transportation capacities in the Ukrainian pipeline network might be freed
    3. Ukraine's expansive agricultural sector provides a robust source of organic waste, which can serve as a valuable feedstock for biomethane production

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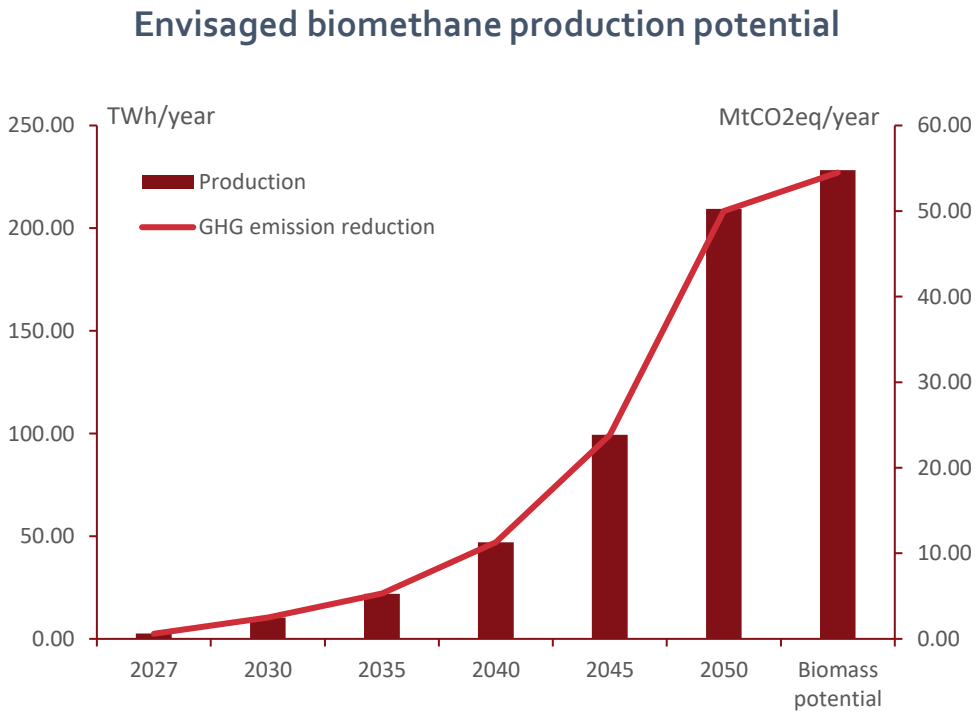
3. Biomethane production potential (2/2)

- The theoretical production potential due to biomass availabilities in Ukraine is 228.2 TWh/21.8 bcm per year[4]
- By 2030, a biomethane production of 1 bcm, equal to 10.47 TWh, is envisaged with a GHG emission reduction potential of with a GHG emission reduction potential of 2.5 $MtCO_2eq$/year
- The production potential equals around 3% of EU's[5] production potential for 2030.[6] The estimations are based on pre-war assessments



Source: Geletukha, G. (2024). Prospects of biomethane in Ukraine

[4] Geletukha, G. (2024). Prospects of biomethane in Ukraine
[5] EU 27 and UK.
[6] EBA (2022). Biomethane production potentials in the EU

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4. Revenue projections

- To reach the envisioned 50 biomethane production facilities by 2027 and 200 by 2030 investments of EUR 0.5 bn until 2027 and EUR 2.0 bn until 2030 are necessary[7]

- Based on the projected production capacity for 2030 and an estimated price of 92.43 EUR/MWh for heating and 127.43 EUR/MWh[8] for fuel, the export revenue from biomethane production could reach EUR 0.97 bn for heating and EUR 1.24 bn annually for the mixed-use case if all biomethane is exported.

Biomethane export revenue projections 2030

	Production potential	Natural gas price 2030 (in 2030 prices)[9]	Biomethane premium (heating)[10]	Biomethane premium (biofuel)[11]	Revenue (heating only)	Revenue (60% heating, 40% biofuel)
2030	10.47 TWh	32.43 EUR/MWh	60 EUR/MWh	125 EUR/MWh	EUR 0.97 bn	EUR 1.24 bn

Source: Geletukha, G. (2024), Deloitte (2023). Sustainability & Climate Natural gas demand outlook to 2050, *Landwärme GmbH (2024), author's calculations*

[7] Geletukha, G. (2024)
[8] Deloitte natural gas price projection inflated to 2030, Landwärme GmbH biomethane premia.
[9] Deloitte (2023). Sustainability & Climate Natural gas demand outlook to 2050
[10] Landwärme GmbH (2024)
[11] Landwärme GmbH (2024)

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5. Possible export from Ukraine to Germany (1/2)

- With expected revenues between EUR 0.97 bn and EUR 1.24 bn by 2030 and assuming that the entire biomethane production in 2030 is exported to Germany, Ukraine's biomethane exports would account for 19.6% and 25.1% of Ukraine's total projected 2030 export value to Germany, as shown in the table
- This would render biomethane a significant export good of Ukraine's trade with Germany

Economic relevance of biomethane export

Biomethane export value EUR bn[12]		Total export value Ukraine to Germany (2030)[13]	Share Ukraine biomethane of total exports to Germany, EU and Total (%)	
Heating only	**60% heating, 40% fuel**		**Heating only**	**60% heating, 40% fuel**
EUR 0.97 bn	EUR 1.24 bn	EUR 4.9 bn	Germany: 19.6% EU: 2.5% Total: 1.7%	Germany: 25.1% EU: 3.2% Total: 2%

Source: Geletukha, G. (2024). Prospects of biomethane in Ukraine, IMF (2023). Ukraine Country Report, Deloitte (2023). Sustainability & Climate Natural gas demand outlook to 2050, authors' calculation

[12] Assuming all biomethane to be exported
[13] Assuming the continuation of export shares from Ukraine to Germany

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5. Possible export from Ukraine to Germany (2/2)

- On the German side, these imports would mean a mere 1.6% of projected German natural gas demand by 2030
- Hence, with Germany importing biomethane from Ukraine, the Ukrainian economy can be boosted while having little impact on German natural gas and biogas consumption
- The biggest economic risk for Ukraine is the EU not consuming Ukrainian biomethane. If biomethane cannot be exported it may be used domestically by feeding it into the natural gas grid, or by using as vehicle fuel or for combined heat and electricity generation. However, natural gas might remain the preferred energy carrier choice in Ukraine due to biomethane's significantly higher price

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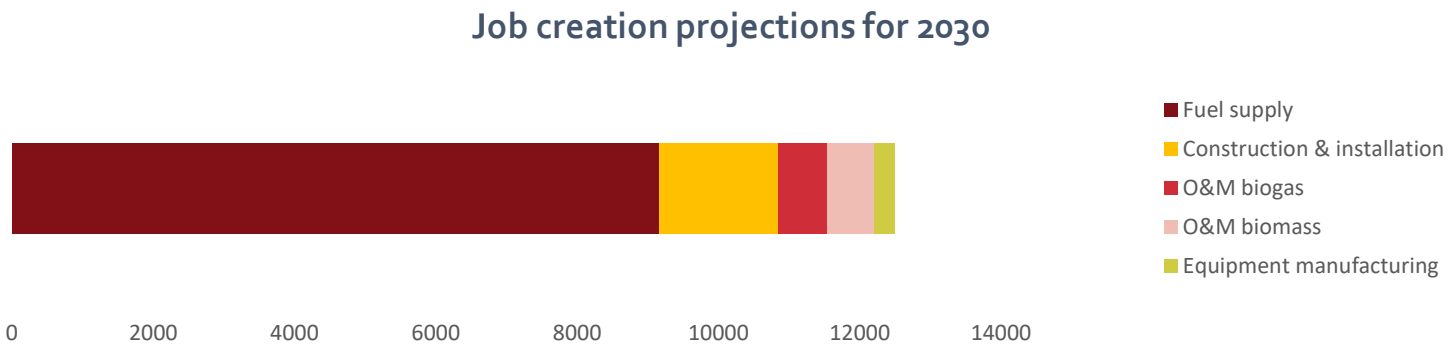
6. Further economic considerations for Ukraine (1/3)

- Biomethane production has a significant job-creation potential for Ukraine. Assuming that job-shares in the biomethane production will be similar to those shares in biogas production the supply of fuel will account for most jobs, followed by construction and installation, and operation and maintenance. The jobs created in manufacturing of equipment will play the smallest role[14]

- For 2030 it is assumed that the biomethane industry will account for 12,500 newly created jobs with the projection of reaching 250,000 by 2050



Source: Geletukha, G. (2024). Prospects of biomethane in Ukraine, Trypolska, G. (2023). Policies to stimulate the output and employment effects of bioenergy resources in Poland and Ukraine, author's calculations

[14] Trypolska, G. (2023). Policies to stimulate the output and employment effects of bioenergy resources in Poland and Ukraine

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6. Further economic considerations for Ukraine (2/3)

- With the assumption that 10% of feedstock is obtained from own agricultural activity for free, 90% needs to be bought at a current price of EUR 40 per ton and minimum operational costs of EUR 191 per thousand cubic meters the 2030 gross value added is assumed to reach EUR 0.57 bn

- To attain the 2030 gross value added projections from biomethane production, investments of EUR 2 bn and a total number of 200 biomethane plants with a capacity of 1 bcm/year needs to be reached

- For further expansions of the biomethane sector by 2040, cumulative investments of EUR 9 bn are necessary to obtain a production potential of 4.5 bcm/year. This would entail a cumulative job creation potential of 56,200 jobs

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6. Further economic considerations for Ukraine (3/3)

	2027	2030	2035	2040	2045	2050
Number of biomethane plants, units	50	200	420	900	1900	4000
Necessary investments, EUR billion	EUR 0.5 bn	EUR 2 bn	EUR 4.2 bn	EUR 9 bn	EUR 19 bn	EUR 40 bn
Created new jobs, in biomethane prod.	3,100	12,500	26,200	56,200	118,700	250,000
Revenue (100% heat)	EUR 0.26 bn	EUR 0.97 bn	-	-	-	-
Gross value added (90% feedstock bought)	-	EUR 0.57 bn	-	-	-	-
Share of total Gross-value added (pre-war, 2021)	-	0.4%	-	-	-	-

Source: Geletukha, G. et al. (2022). Prospects and Potential for Biomethane Production in Ukraine. Ecological Engineering and Environmental Technology, 23 (4), 67-80, Geletukha, G. (2024). Prospects of biomethane in Ukraine, author's calculations

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7. Recommendations: Germany

- Removing import barrier of missing crediting of Ukrainian biomethane toward the greenhouse gas reduction quota. This can be achieved by including biomethane produced in countries outside the EU into the service regulation of the Main Customs Office of Frankfurt (Oder)[15]

- Establishing consumption and development plans that signal the importance of biomethane production. Additionally, these plans provide security to businesses and investors in the sector. At the EU-level, this is done by REPowerEU which states the goal of 35 bcm biomethane production by 2035. The German Government could do something similar and set consumption goals, e. g. within the framework of the German Biomassestrategie

- Establishing long-term procurement contracts to increase financial security for Ukrainian producers

[15] Center for Liberal Modernity (2023). Structuring German-Ukrainian Cooperation in the Biomethane Sector

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8. Recommendations: Ukraine

- In the past months, Ukraine overcame important domestic obstacles for biomethane exports. One important remaining one is the establishment of the Ukrainian biomethane registry. The Ukrainian registry shall then be synchronized with the EU Union Database for Biofuels (UDB). Speeding up this process if important to increase clarity in the market

- To reach the ambitious future production potential, Ukraine needs to attract foreign private investments and establish necessary conditions for FDI like a good and predictable investment climate.

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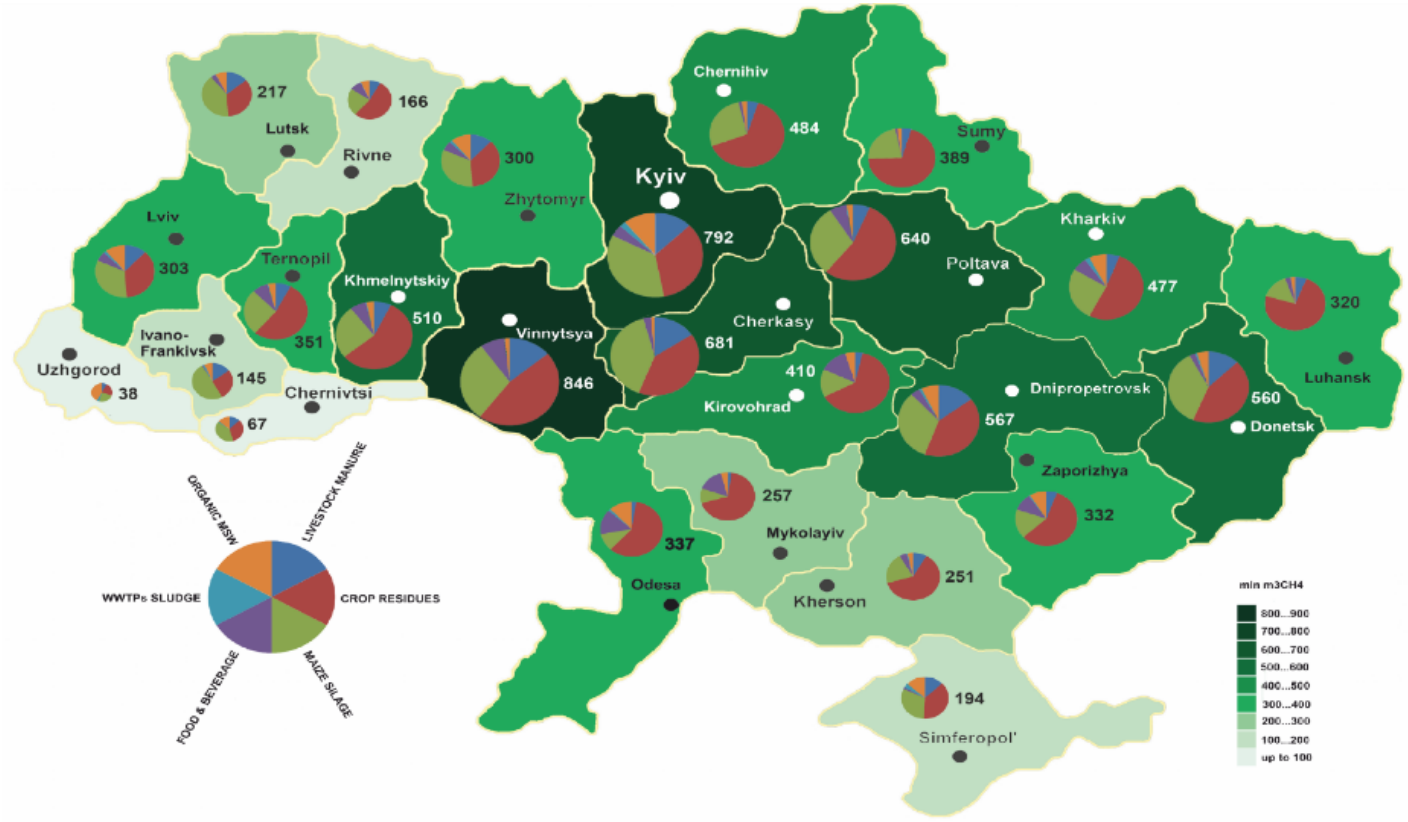
Annex: Regional structure of biomethane potential (bcm)



Source: Geletukha, G. et al. (2022). Prospects and Potential for Biomethane Production in Ukraine. Ecological Engineering and Environmental Technology, 23 (4), 67-80. https://doi.org/10.12912/27197050/149995
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