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Challenges and drivers for Ukrainian biogas sector development

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Bioenergy Association of Ukraine (UABIO)

UABIO was established in 2013. A leading non-governmental organization dedicated to promoting the bioenergy in Ukraine.
It unites businesses and experts for sustainable bioenergy development in Ukraine.

Key objectives:

accelerate the sustainable development of bioenergy in Ukraine

provide the most favorable business conditions

to create a common platform for cooperation in Ukraine's bioenergy markets

drive the transition to renewable energy through advocacy, research, and collaboration.

UABIO members

We thank the powerful companies and experts who joined the Association!

11 years

8 individuals

55 companies

20+ experts

Partnerships and collaborations

We are proud to be part of the global expert community

World Bioenergy Association

Bioenergy Europe

European Biogas Association

Global 100RE Ukraine

co-founder of the civic union

11 thousand students

58 specialties
24 fields of knowledge

300 partners from 60 countries

Biogas/biomethane development in Ukraine

Biogas/biomethane development in Ukraine (2024/2025)

Parameter	Biogas	Biomethane
Installed capacity, MWe	**140** (33 MW for LFG)	**17 mill m^3/year**
Number of plants	**~ 85** (33 for LFG)	**3**
Natural gas grid (GTS)	33 400 km, 1390 gas distribution stations	
Gas refilling stations for CNG	~ 300 units (90,000 vehicles were running on CNG in 2005)	

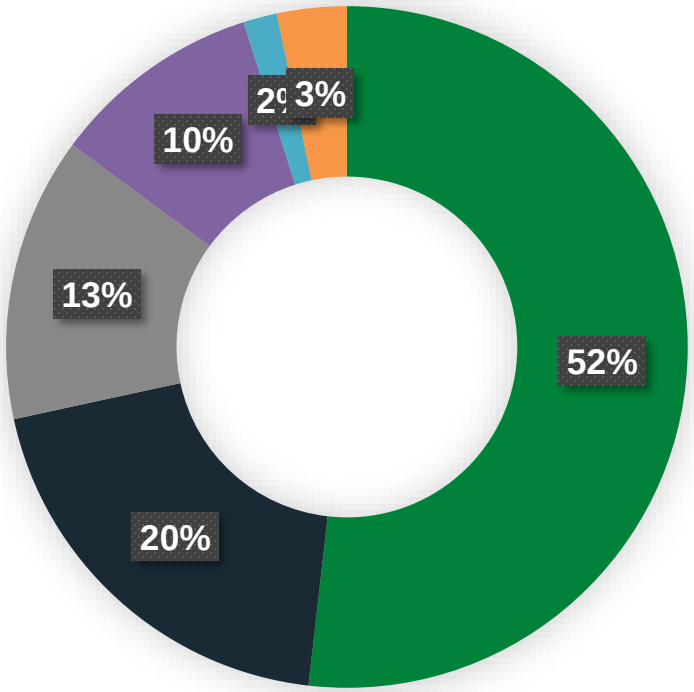
- The individual projects ranged from **125 kW_e** to **26 MW_e** installed capacity.
- **The first biomethane project** was constructed in April 2023 on the basis of an existing biogas plant
- **First biomethane** is imported in EU in February 2025
- **A wide range** of industries and different types **of feedstock**



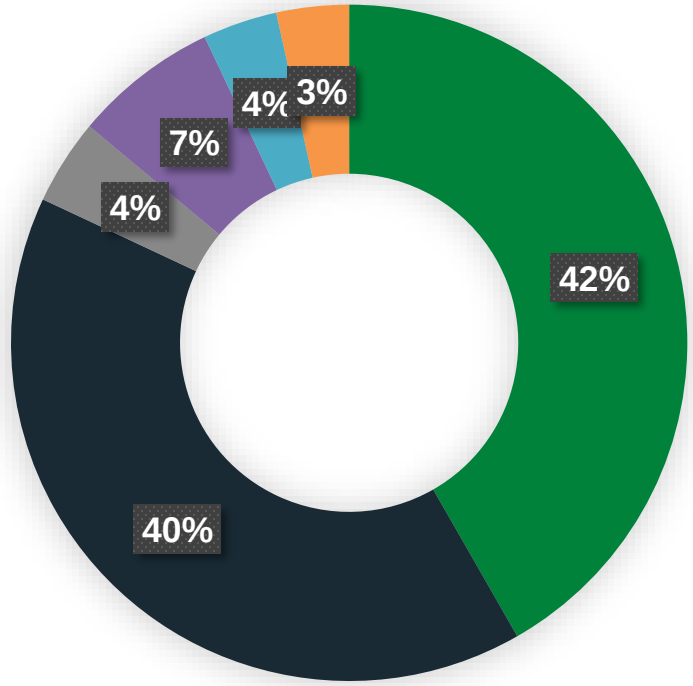



Structure of feedstock for biogas production in Ukraine (2020)

Structure of consumption of substrates for biogas production



The structure of biogas production volumes by types of feedstock



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Biomethane projects planned for launch in Ukraine in 2024/2025

N	Company	Location region	Capacity, Mm^3/year	Connection	Sustainability certificate	Start up, year
1	Hals Agro LLC	Chernihiv	3.0	GDS	ISCC	2023
2	VITAGRO group of companies	Khmelnytskyi	3.0	GDS	ISCC	2024
3	MHP	Dnipropetrovsk	11.0	GDS	ISCC	2025
4	Theofipol Energy Company LLC	Khmelnytskyi	56.0	GTS	ISCC	2025
5	Hals Agro LLC	Kyiv	3.0	GDS		2025
6	"YUM LIQUID GAS" LLC	Vinnytsia	11.0	Bio-LNG		2025
7	MHP	Vinnytsia	24.0	Bio-LNG	ISCC	2025
	TOTAL		111.0			

GDS – Gas Distribution System
GTS – Gas Transmission System

Why biomethane?

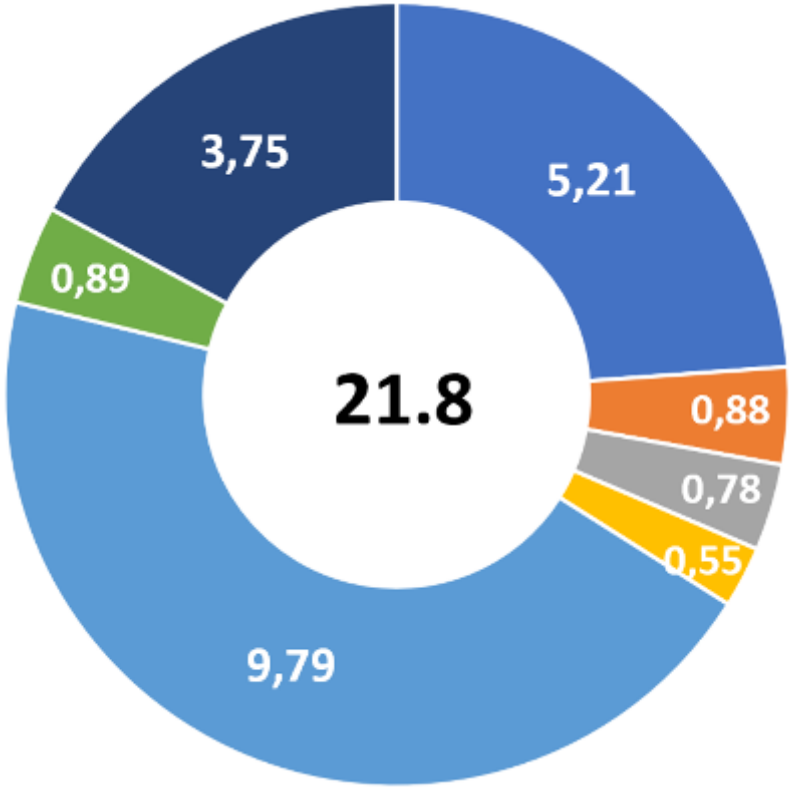
- Biomethane is renewable gas associated with **GHG emission mitigation**
- It is **the cheapest renewable gas today**.
- Biomethane is entirely **ready for injection** into the gas network today.
- There is **no need for investments** in the modernization of gas networks (GTS and GDS) and gas equipment (gas burners, engines, turbines, ...).
- Biomethane plants produce not only biomethane but also **digestate**, which can become the main organic fertilizer necessary for soils revival.

Why in Ukraine?

- Ukraine has **the largest area of agricultural land** in Europe and, accordingly, one of the best agricultural feedstock potential for biomethane production
- Ukraine can offer **the cheapest raw materials** for biomethane production and compete with any country in the biomethane market.
- Ukraine has a **developed system of gas networks** (GTS and GDS).
- The **structure of agricultural enterprises** is favorable for producing biomethane (big share of large and medium-sized enterprises).
- The possibility of exporting biomethane to the premium EU market, which has adopted ambitious plans for producing biomethane (REPowerEU): **35 bcm/year in 2030**.
- Potentially, in mid-term prospect, Ukraine can **provide up to 20%** of this need.

Biogas/biomethane production potential in Ukraine

BIOGAS/BIOMETHANE, billion m^3 CH_4/year20	
Biogas from animal waste	0,9
Biogas from harvest residues of agricultural crops	5,2
Biogas from by-products of the food processing industry	0,7
Biogas from municipal solid waste (MSW)	0,5
Biogas from municipal waste water treatment plants	0,1
Energy crops: biogas from corn silage (from 1 million hectares)	3,8
Biogas from cover crops (20% of arable land)	9,8
Biogas from biomass obtained by thermal gasification (10%)	1,0
TOTAL BIOGAS/BIOMETHANE, billion m3 CH4/year	21,8



Ukraine has the highest biomethane potential among the EU countries

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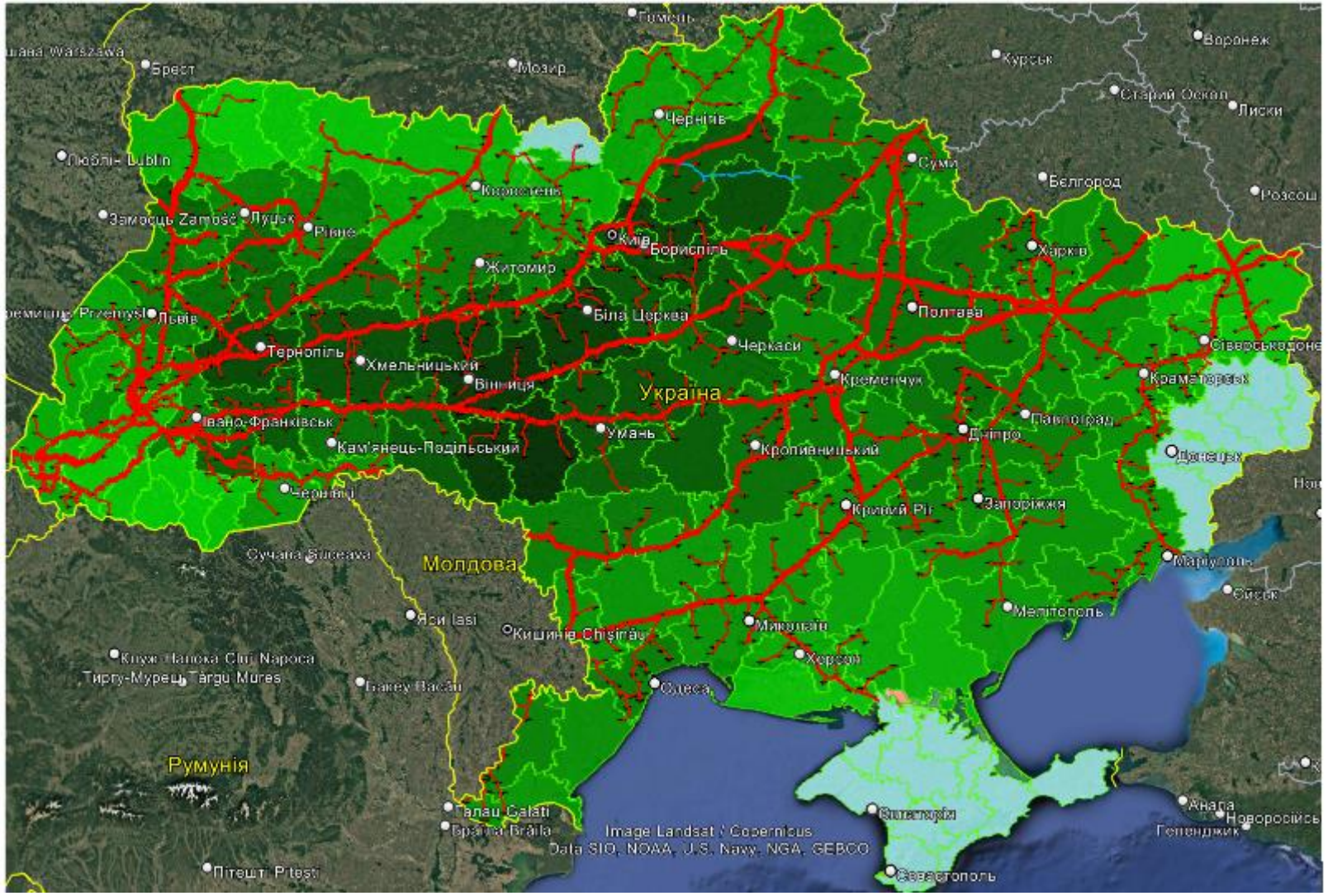
Structure of Ukrainian GTS and biomethane potential



136 reorganized districts of Ukraine

- District's biomethane potential is up to 707 mcm CH4/year
- Average district's biomethane potential equals 182 mcm CH4/year
- Almost half of the potential concentrated in western and central regions as Vinnytsya, Kyivska, Dnipropetrovska, Poltavska, Kirovohradska
- All regions of Ukraine with the greatest potential for biomethane production are quite well covered by GTS infrastructure

Challenges/prospects

Challenges of biogas/biomethane sector during the war

Nowadays, main Ukrainian challenge is russian invasion

17 GW of Ukrainian power generation remained occupied, of which **6 GW** belong to the Zaporizhzhya nuclear power plant (NPP)

Another **9 GW** were damaged or completely destroyed on the controlled territory of Ukraine (data on August 2024)

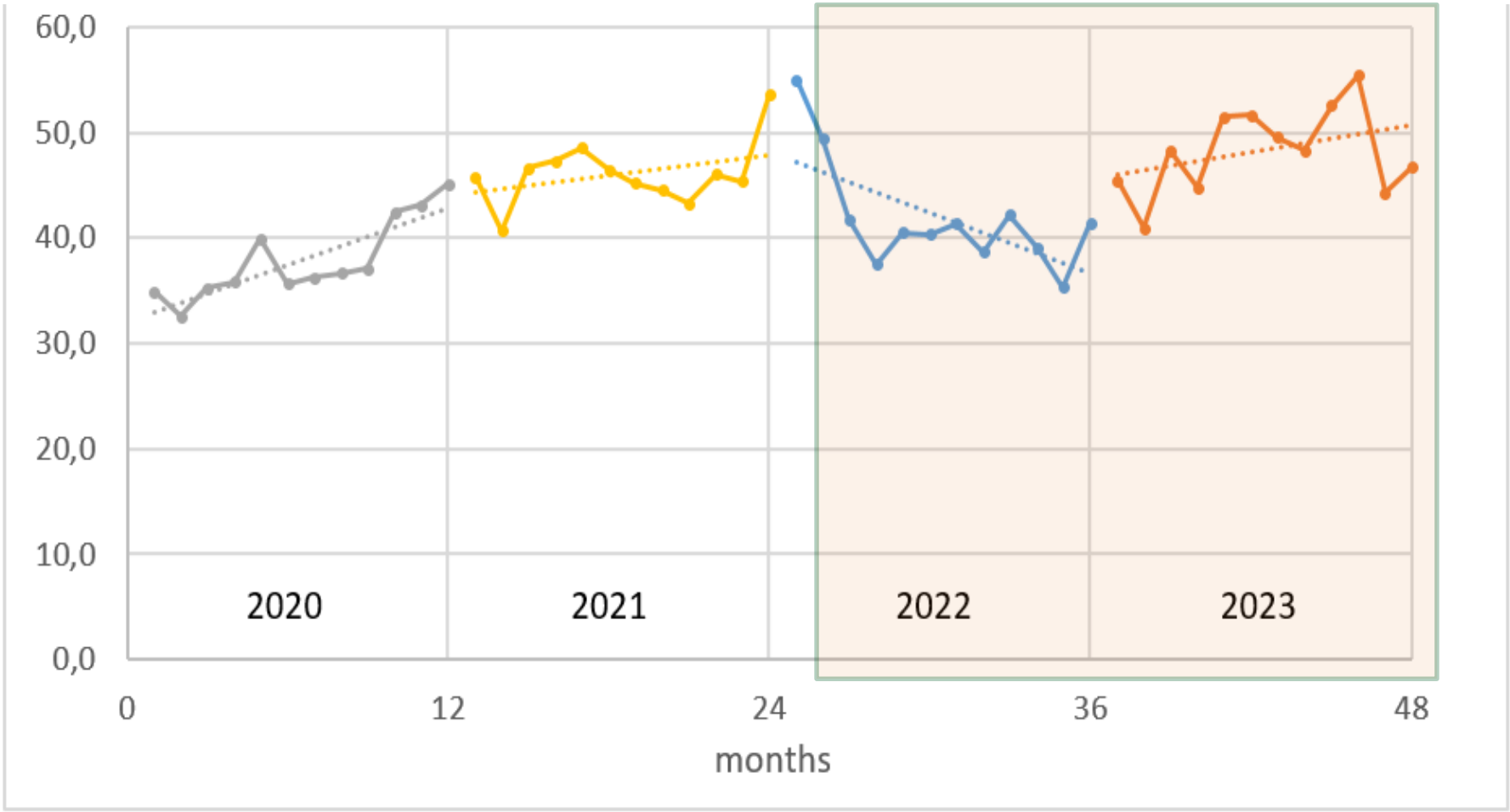
Deficit of power generating capacities in Ukraine is about **9 GW**

The destroyed or occupied facilities include:

- 90% of coal and NG capacities,
- 70% of wind farms,
- 50% of hydropower plants,
- 30% of solar PV plants,
- 5% of biogas and biomass plants.

Bioenergy has demonstrated the highest resistance to military invasion compared to other types of conventional and renewable energy facilities due to its fundamental *decentralization* and *relatively uniform distribution* across the country

Power production from biogas in Ukraine in 2020-2023, GWh/month



Power production from biogas is growing even during the war!

Challenges in Biogas/ Biomethane Sector (general)

- High Initial Investment and Capital Costs
  Setting up biogas/biomethane plants requires significant upfront funding for the installation of digesters, upgrading systems, and related infrastructure.
- Financing and Investment Risks:
  Due to the perceived risks and long payback periods associated with biogas projects, securing financing and attracting investors can be difficult.
- Market Competition and Energy Prices
  Biogases must compete with other renewable energy sources as well as fossil fuels. Fluctuating energy prices can affect the economic attractiveness of biogas projects.
- Policy and Regulatory Challenges:
  Inconsistent or inadequate government policies, subsidies, and incentives may hinder investment. Uncertainty in regulatory frameworks can make it difficult to plan long-term projects.
- Infrastructure for Grid Injection and Distribution:
  Limited infrastructure for injecting biogas into existing gas grids or for its distribution as a transportation fuel can restrict market opportunities.
- Logistical and Supply Chain Issues:
  Efficiently collecting, transporting, and storing feedstock, as well as managing digestate by-products, can pose significant logistical challenges.
- Public Perception and Social Acceptance:
  Concerns about odors, potential environmental impacts, or land use conflicts may lead to local opposition, affecting the implementation of new projects.

Challenges in the Biomethane Sector (specific)

- **Long terms for signing a technical agreement** on the terms of acceptance and transfer of biomethane by the gas distribution system
- **Synchronization with the UDB** of the Ukrainian biomethane register and ensuring access of Ukrainian biomethane producers to the UDB before synchronization
- Requirements for **higher calorific value** of biomethane
- Limited technical capabilities of biomethane supply to **GDS** (especially in summer)
- **Lack of state targets** for the share of biomethane use in transport and regulation for it
- Inability of **traders** from Ukraine to export biomethane (till end of 2024)
- Export duty on biomethane for export to countries outside the Energy Community

Key regulations and policies

- Law of Ukraine "On Amendments of some Laws of Ukraine regarding the development of biomethane production“ № 1820-IX as of 21.10.2021. It envisages the definition of the term "biomethane, “ and establishes the **biomethane register** and the GoO system for biomethane in Ukraine.
- Law of Ukraine “On state support of investment projects with significant investments in Ukraine” No. 3311-IX, August 9, 2023. It establishes for projects on the production of **bioethanol, biogas, and biomethane** with total investments of more than 12 million Euro:
    1) exemption from payment of certain taxes and fees;
    2) exemption from import duty taxation of new equipment and accessories for it;
    3) the predominant right to land use of state or communal property;
    4) provision at the expense of budget funds for the construction of engineering and transport infrastructure or compensation for such construction;
    5) compensation of costs for connection to engineering transport networks;
    6) exemption from compensation for forestry production losses.

Key regulations and policies

- NEURC (the Regulator) amendments as of 8 June 2023 to a number of its resolutions aimed at supporting the development of the biomethane sector in Ukraine. **The concept of Reverse Flow Compressors has been introduced.**
- Law of Ukraine "On amendments to the Customs Code of Ukraine and other laws of Ukraine regarding the peculiarities of customs control and customs clearance of certain categories of goods", 3613-IX as of 20.03.2024. **It enables biomethane export from Ukraine.**
- ORDER of the Ministry of Finance of Ukraine on changes to some regulatory legal acts of the Ministry of Finance of Ukraine on customs matters. N 1250/42595 dated August 15, 2024. **Custom clearance details for biomethane have been established.**

Next steps/ drivers formation

Homework for Ukraine - development of the local market

- Mobility – bio-CNG and bio-LNG as motor fuel for road transport, infrastructure strengthening
- Power decentralization, flexible electricity (biogas)
- Industry use (metallurgy, chemistry)

Development of the state support instruments

- Investment support
- GHG emission mandates/quota, goals for renewable energy and advance biofuel
- Carbon tax/price, other tax incentives (reduction or exemption) - excise duty, VAT, depreciation
- Regulatory and financial support

Development of Ukrainian Biomethane Road Map including:

- mandatory biogases production target for 2035
- and long-term national package up to 2050

Next steps/ potential use

Ensuring the most efficient use of existing potential of biogas/biomethane production

- Development of technology for preferential use of lignocellulosic raw materials (cereal straw etc.)
- Adaptation of agricultural practices for growing cover crops for biogas production in suitable regions of the country
- Transition from landfill gas recovery at municipal solid waste landfills to mechanical and biological treatment of separately collected organic fraction of MSW
- Mandatory anaerobic treatment of municipal wastewater in large cities
- Development of the thermal gasification of woody biomass and forestry waste
- As mid-term prospect, the production of synthetic methane using biological methanation

UABIO's optimistic scenario of Ukrainian biomethane market (under removal of all barriers)

	2027	2030	2035	2040	2045	2050
Production of biomethane, bcm/y	0,25	1,00	2,1	4,5	9,5	20
Export of biomethane, bcm/y	0,13	0,50	1,05	2,25	4,8	10
Consumption in Ukraine, bcm/y	0,13	0,50	1,05	2,25	4,8	10
Number of biomethane plants, units	50	200	420	900	1900	4000
Necessary investments, billion €	0,5	2,0	4,2	9,0	19,0	40
Reduction of GHG emissions, mill t of CO2-eq./y	0,6	2,5	5,3	11,3	23,8	50
Created new jobs, thousand units	3,1	12,5	26,2	56,2	118,7	250

Examples of Ukrainian biogas/biomethane plants

First Ukrainian Biomethane Plant (Hals Agro)

Location: biogas plant of Hals Agro company (Chernihiv reg.) Start of operation: **April 2023**

Production of **3 mill m^3 of CH_4/year** (eq. 1,3 MWel) on the base of existing biogas plant of **6,9 MWel**.

Feedstock: manure, sugar beet pulp, corn silage

Upgrading: membrane technology

Biomethane plant VITAGRO (1 stage)

Biomethane plant with a capacity of **3 mill m^3 CH_4/year**

The first stage of the complex is commissioned in **2024**

Location: Khmelnytskyi region

Maine parameters:

- Feedstock: pig manure, cattle manure, straw, corn silage
- Investments – 6 mill. Euro
- Upgrading: membrane technology
- Biomethane use: export

MHP biogas plants (poultry farms)

Poultry farm "Oril-Lider", Dnepropetrovsk region Production in 2017 – 42 mill heads (105,000 t/a)	**Poultry farm "Vinnitska",** Vinnytsya region Production in 2017 – 280,000 tons of chicken meat
Start of operation -2013 Installed power capacity – **5.7 MW** Digesters – 10x3500 m^3 Feedstock – chicken dung, wastewater Investment - 15 mill EUR Biomethane production – **11 Mm^3/year**	Start of operation -2017 Installed power capacity (1^{st} stage) – **12 MW** Digesters – 12x8200 m^3 Feedstock – chicken dung, wastewater, corn silage Investment (1^{st} stage) - 25 mill EUR Biomethane production is planned (with biomethanation)

Theofipol Energy Company

Project capacity: total installed capacity of **26.1 MW** (four stages)

1st stage of 5.1 MW was launched in 2017
2nd stage of 10.5 MW – in 2018.

Location: Khmelnitsky region (on the territory of Teofipol Sugar Plant)

Feedstock: sugar beet pulp, manure, corn silage, straw

Product: electricity production (sold to the power grid at the "green" tariff);

Space heating (greenhouses, administrative buildings and hostels)

Investments (2 stages): 40 mill EUR

Connection: **GTS**, production of bio-LNG is considered

Yuzefo-Mykolayivska Biogas Company LLC

Project: Biogas/biomethane plant
1st stage - 3.2 MW el.
2nd stage - 2.0 MW el., totally **5.2 MW el**.

Location: Vinnytsia region, Mykhaylyn village (next to the local sugar plant)

Digestors: 2 industrial type units (8,000 m^3) and agricultural type secondary digester (4,000 m^3)

Feedstock: sugar beet pulp and tails, chicken litter, apple pulp, hydrolysed straw

3rd stage - upgrading to biomethane

Technology: amine scrubber, **bio-LNG** production

Investments – 11 mill Euro (without biogas upgrading station).

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