

# UABIO

## Prospects of Biomethane Development in Ukraine

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(UABio)

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# UABIO

**Bioenergy Association of Ukraine** – non-profit civic union, that unites business and experts for sustainable bioenergy development in Ukraine.

8

years

31

companies

10

individuals

20+

experts

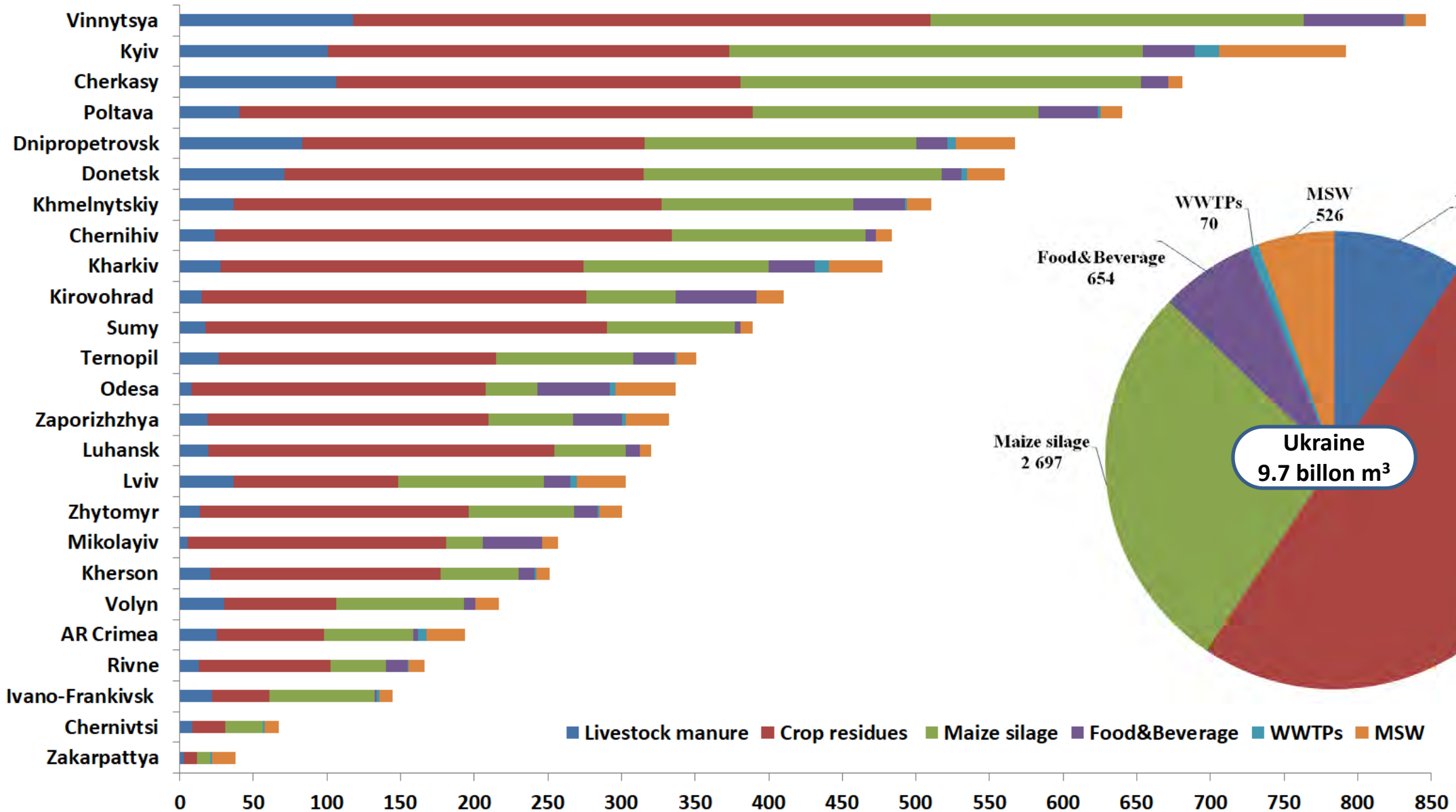


**Individuals:** R. Maraykin, M. Bereznytska, S. Teush, S. Stupak, O. Grais, A. Moroz, M. Hritsyshyna, M. Sysoiev, E. Kharchyna, L. Melezhyk

## Why biomethane?

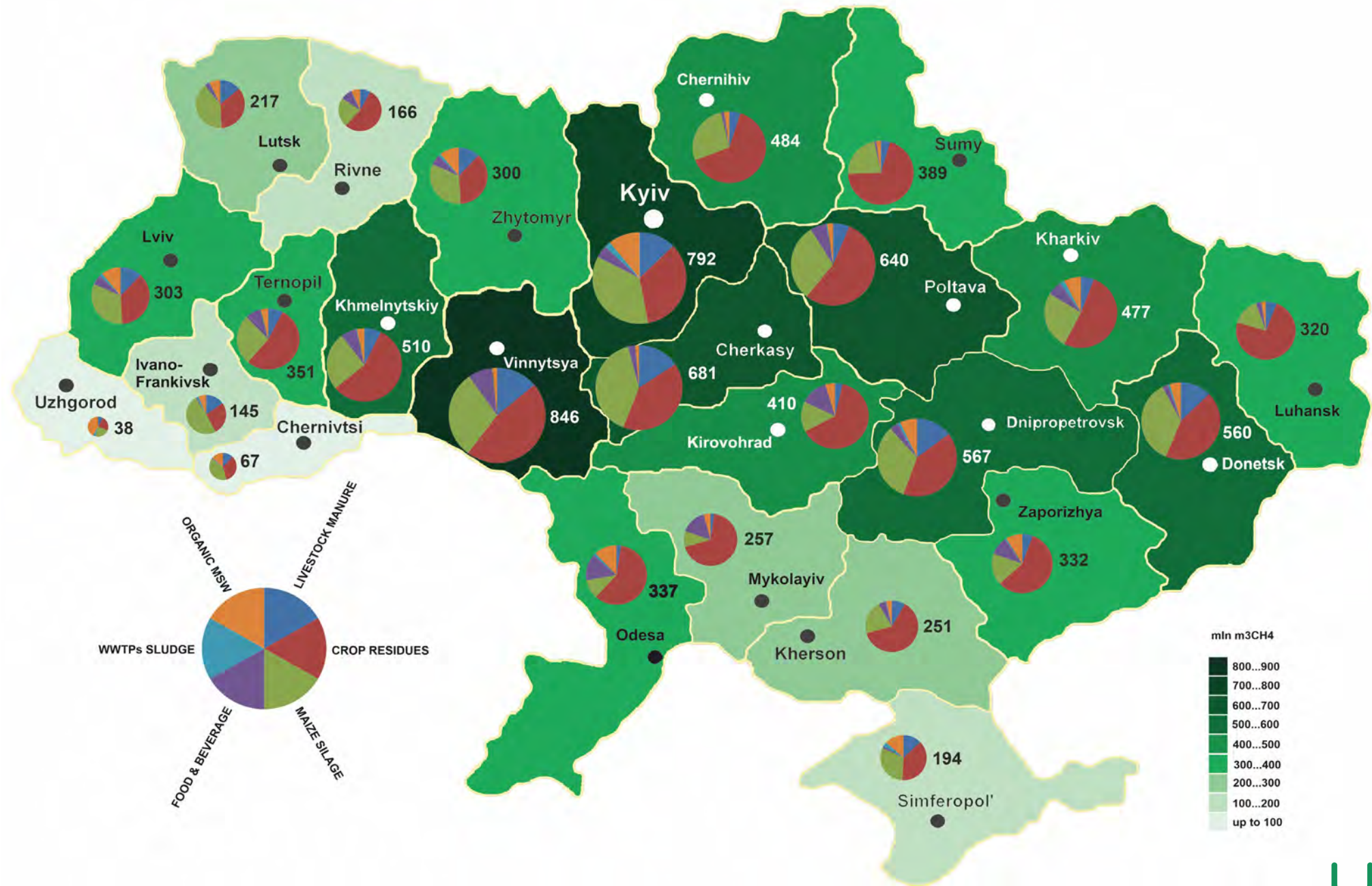
- Today it is **the cheapest of the possible renewable gases**. The cost of green hydrogen is about 6-7 \$ / kg, and if you translate into comparable units, it is more expensive than biomethane at a price of \$ 700/1000 m<sup>3</sup> three times. They are equal in price when the cost of green hydrogen will be \$ 2 / kg. This is projected to be achieved by 2050.
- Ukraine **can really compete with any country in the production of biomethane**. Ukraine can offer the cheapest raw materials for biomethane production. Ukraine has the largest area of agricultural land in Europe, and, accordingly, one of the world's best potentials of agricultural raw materials for biomethane production.
- Biomethane is **absolutely ready for injection into the gas network** today, unlike hydrogen. No investment is required in the modernization of gas networks (GTS and GDS) and gas equipment (gas burners, engines, turbines,...).
- Biomethane plants, in addition to biomethane, generate **digestate, which can become the main organic fertilizer** needed for the revival of Ukrainian soils.
- Investments in biomethane plants are close to investments in biogas plants with electricity generation (approximately 3 thousand Euro / kW el). The approximate calculations are as follows: **a biomethane plant with a capacity of 10 million m<sup>3</sup> / year of biomethane, is an analogue of a biogas plant with a capacity of 5 MW el, and it will cost about 15 million Euros**. Accordingly, to pump 1 billion m<sup>3</sup> of biomethane into the network, we will need 100 plants of 10 million m<sup>3</sup> / year. And, accordingly, they will cost a total of 1,5 billion Euros.

# Biomethane production potential in Ukraine (2020)

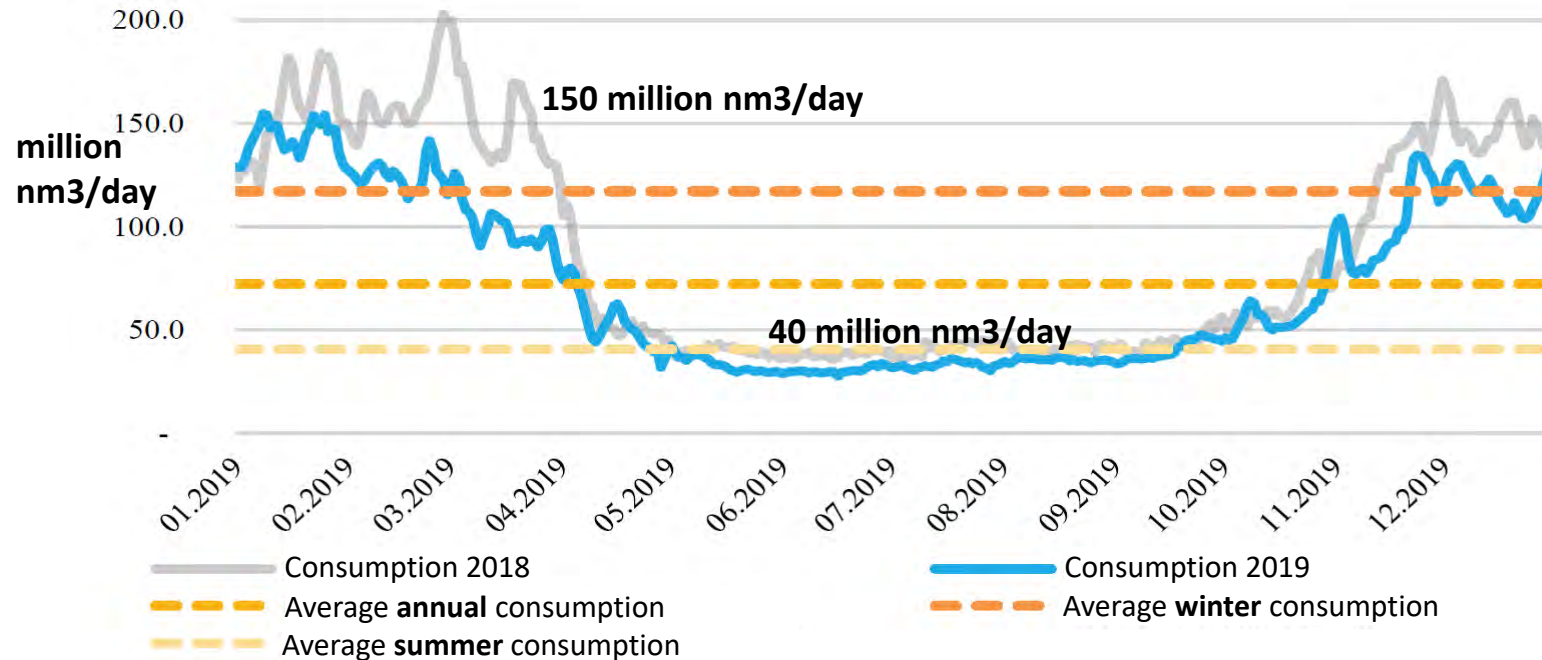
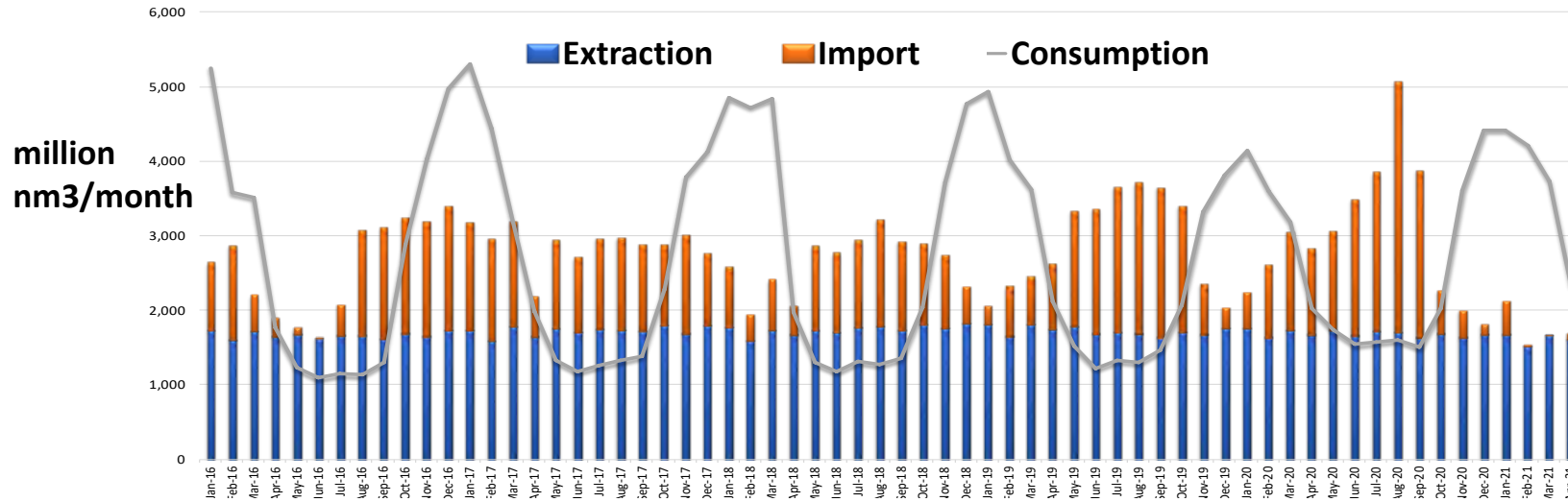


Biomethane potential, mln m<sup>3</sup> per year

# Regional structure of biomethane potential in Ukraine



# Seasonal fluctuations of gas consumption



$40 \text{ million nm}^3/\text{day} * 365 = 14.6 \text{ billion nm}^3/\text{year}$

80% from 14.6 billion = **11.6 billion nm<sup>3</sup>/year**

Sources: Plan of Development of GTS developed by Transmission System Operator LLC for 2021-2030

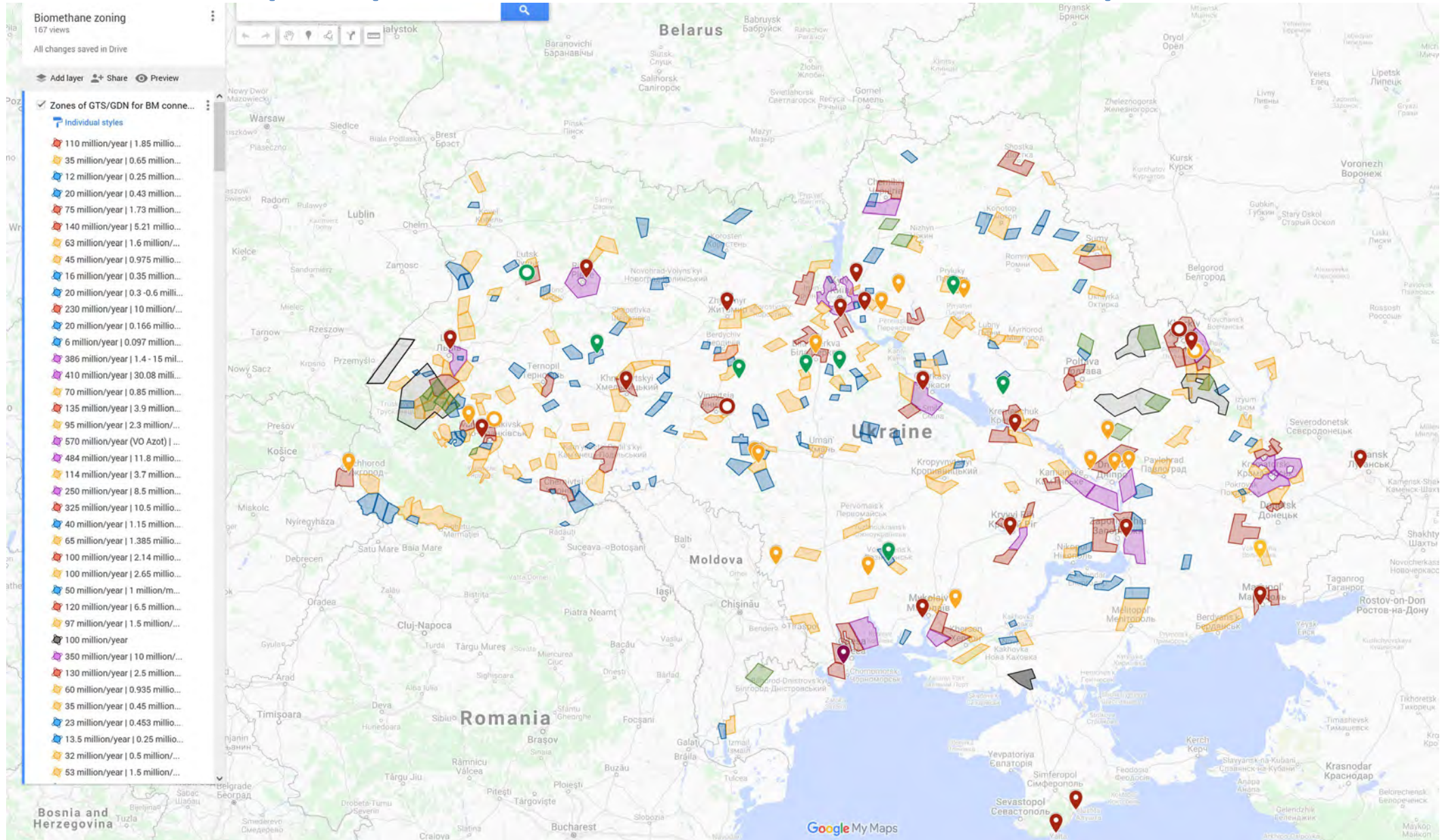
План розвитку газотранспортної системи ТОВ «Оператор ГТС України» на 2021–2030 рр. <https://tsoua.com/gts-infrastruktura/rozvytok-gts/10-richnyi-plan-rozvytku/>

Balance of Ukrainian gas market: <https://docs.google.com/presentation/d/1q0UKFYH4OQBXXDq-sI27xslGy9Qsadb/edit#slide=id.p1>

## Criteria of identification of priority zones for biomethane plants with respect to gas consumption

- 1) “Local bushes” of consumption on gas distribution networks (GRP/SHRP) with **annual consumption** at least **5-10** million nm<sup>3</sup>/year and consumption of **minimal month** at least **200-400** ths. nm<sup>3</sup>/month;
- 2) Industrial facilities with individual large and stable annual gas consumption, which could be potentially covered by CBAM (steel/aluminium, cement, chemical industries);
- 3) Encircled zones of gas transmission pipelines (Rivne circle, Kyiv circle, Khmelnytsk circle) and “root-based” points of transmission branches;
- 4) Zones of 15 km from transmission main pipelines and transmission branches;
- 5) Zones of gas distribution networks redesign which increase the consumption of local bushes;
- 6) Zones/points with available infrastructure on main transmission pipelines (compressor stations, gas distribution stations, underground storages), “debet gas installations” (gas extraction / production / preparation);
- 7) Zones of high concentration of gas filling stations;

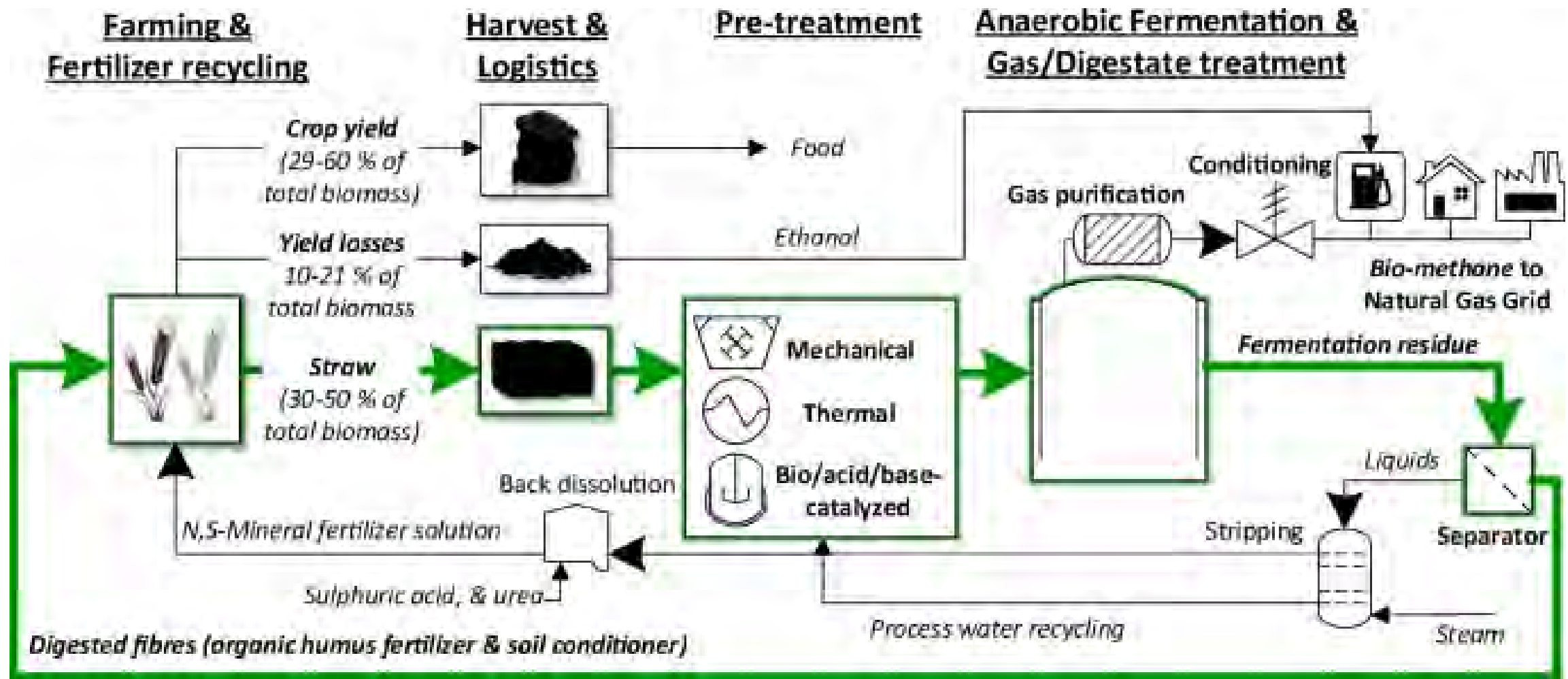
# Map of optimal zones for location of biomethane plants in Ukraine



Link to the map: [https://www.google.com/maps/d/u/0/edit?mid=1ttZ12uWjd2NxxH-xc3Lin61fN\\_4JrE1D&usp=sharing](https://www.google.com/maps/d/u/0/edit?mid=1ttZ12uWjd2NxxH-xc3Lin61fN_4JrE1D&usp=sharing)



# Feasibility study of biomethane production from maize stalks/wheat straw (1)



\* Source: <https://link.springer.com/article/10.1007/s13399-020-00740-y#citeas>

## Feasibility study of biomethane production from maize stalks/wheat straw (2)

Indicator		Project scenario 1: pellets consumption	Project scenario 2: straw/stalks in-situ processing via bio- extruders
Straw/Stalks price	€/tDM	<b>70</b>	<b>40</b>
Biomethane price	€/1000 m <sup>3</sup>	<b>900</b>	<b>900</b>
CAPEX	млн €	14,52	16,31
NPV	€	18 367 734	28 273 046
<b>IRR</b>	<b>%</b>	<b>23,1%</b>	<b>28,3%</b>
Simple payback period	years	4,4	3,6
Discounted payback period	years	5,4	4,3
LCOE (biomethane)	€/1000 m <sup>3</sup>	658	524
	€/MW*h	62,4	49,7

# Draft Law of Ukraine "On Amendments to the Law of Ukraine "On alternative fuels" regarding the development of biomethane production" N 5464 from 05.05.2021 p.

([http://w1.c1.rada.gov.ua/pls/zweb2/webproc4\\_1?pf3511=71839](http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=71839))

## Amendments to the Law of Ukraine "On alternative fuels":

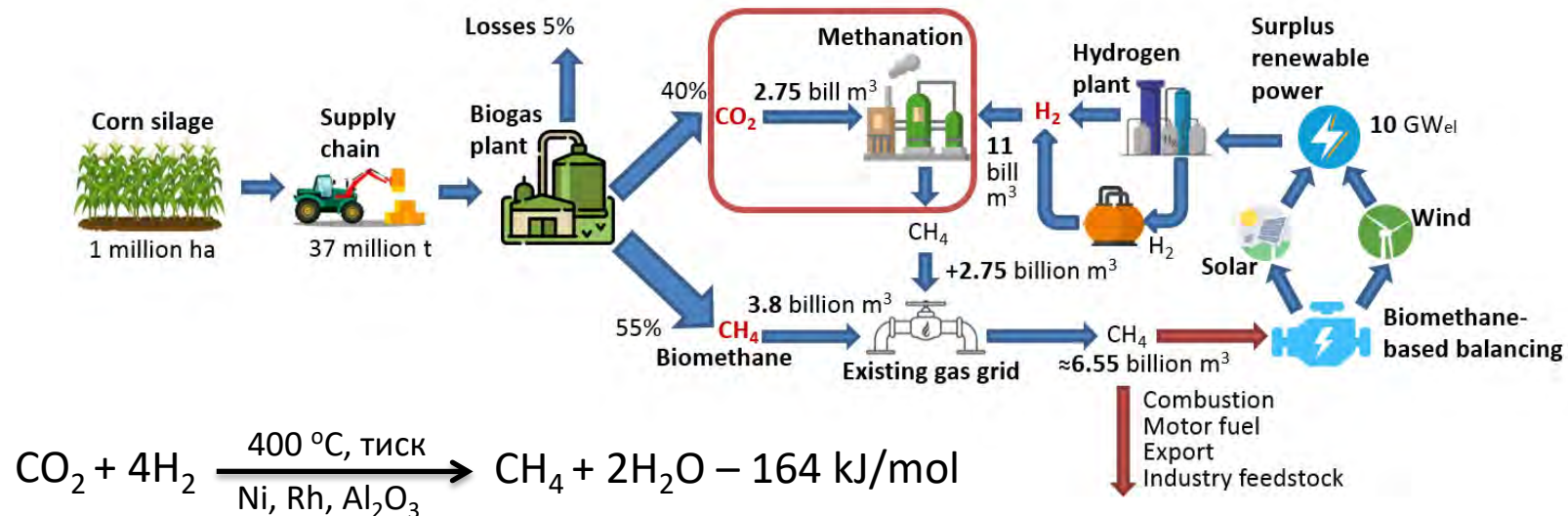
- 1) Definition of the term "biomethane"** – biogas with physical and technical characteristics that meet the requirements as for natural gas for supply to the gas transmission and gas distribution system or as for the motor fuel.
- 2) Establishment of the biomethane register** – to record biomethane submitted to or taken from the gas transmission or gas distribution system.
- 3) Development of issuance system for guarantees of biomethane origin** - documents generated by the biomethane register that confirms that biomethane **is produced from biomass** and contains information **about the amount** of biomethane submitted to the gas transmission or gas distribution system.

Draft Law is accepted in first reading by Verkhovna Rada in September 2021 and in second reading on 21 October 2021. Then Cabinet of Ministers of Ukraine has 6 months for development and approval of Governmental Resolution on Biomethane Register.

## Basic physical properties of biomethane and hydrogen

Parameter	Hydrogen H <sub>2</sub>	Biomethane CH <sub>4</sub>	Ratio CH <sub>4</sub> /H <sub>2</sub>
Density, kg/m <sup>3</sup> *	0,087	0,716	<b>8,2</b>
Lower calorific value, MJ/m <sup>3</sup> for normal conditions (0 °C, 1 bar)	10,8	35,8	<b>3,3</b>
Lower calorific value of compressed gases, MJ/m <sup>3</sup> in the conditions of main gas pipeline (0 °C, 60 bar)	604	2484	<b>4,1</b>

## Possible concept of conversion of green hydrogen to biomethane



# Project REGATRACE «REnewable GAs TRAdE Centre in Europe»



*Funded through EU Program Horizon 2020  
Duration: 36 months (June 2019 – May 2022)*

**Consortium:** 15 partners in 10 countries: ISINNOVA, CIB (IT), EBA, AIB, ERGaR, Fluxys (BE), RFGI (IE), DENA, DBFZ (DE), AGCS (AT), Elering (EE), UPEBI (PL), ARBIO (RO), NEDGIA (ES), Amber (LT).

12 EBA (European Bioenergy Association) Linked Third Parties + 5 ERGaR (European Renewable Gas Registry) Linked Third Parties

**Bioenergy Association of Ukraine** (UABio) is linked to EBA and involved in the task «Support for biomethane market uptake»

REGATRACE project aims creating an efficient trade system based on issuing and trading biomethane/renewable gases Guarantees of Origin (GoO). This objective will be achieved through the founding pillars: - European biomethane/renewable gases GoO system - Set-up of national GoO issuing bodies - Integration of GoO from different renewable gas technologies with electric and hydrogen GoO systems - Integrated assessment and sustainable feedstock mobilisation strategies and technology synergies - Support for biomethane market uptake - Transferability of results beyond the project's countries.

# Biomethane zoning and assessment of the possibility and conditions for connecting of biomethane producers to the gas transmission and distribution systems of Ukraine

*Funded through EBRD*

*Duration: 7 months (April 2021 – October 2021)*

**Consortium:** SEC “Biomass”, Dentons, UABio

1. Assessment of the biomethane production potential at the level of individual regions (oblasts) of Ukraine
  - Potential for biomethane production from waste and secondary products of agriculture and municipalities origin by implementation of AD technology
  - Potential for biomethane production using green hydrogen
2. Analysis of Ukrainian main and distribution gas pipelines structure taking into account the geographical distribution of BM production potential
3. Analysis of the technical capabilities of transition and distribution gas pipelines to receive biomethane
4. Description of economic conditions and technical aspects of biomethane supply to gas networks pipelines
5. Legal analysis of conditions and requirements for injection of biomethane to distribution gas system network or transportation gas system network and its further transportation as commodity from Ukraine to EU countries under Ukrainian laws

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**Welcome to Ukraine  
and to UABIO!**

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[uabio.org](http://uabio.org)

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