

**SEMINAR «DEVELOPMENT OF BIOENERGY BUSINESS AND INVESTMENTS IN  
UKRAINE. SHARING OF EXPERIENCE FOR PREPARATION OF PROFITABLE  
PROJECTS»**

**Vinnitsa, 08.04.2019**



**Research on biomass potential in Vinnitsa region**

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**Chairman of the Board of Bioenergy Association of Ukraine**

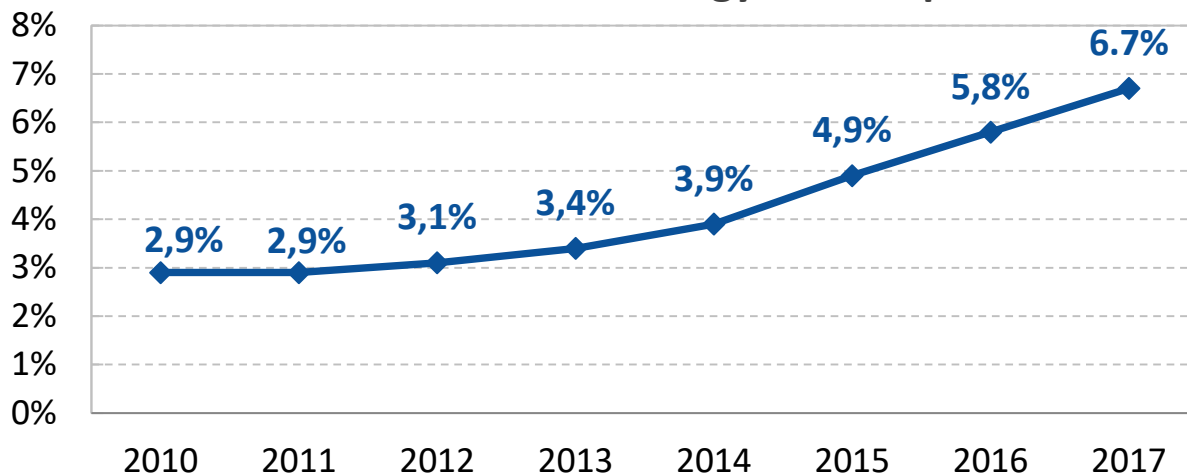
# UABio Members

	Scientific-Engineering Centre "Biomass"		LLC "Boiler factory "Kriger"
	LLC «Salix Energy»		LLC «Kyiv Green Energy»
	NGO "Renewable Energy Agency"		LLC "Volyn Kalvis»
	LLC "Smilaenergopromtrans"		Ukrainian heat generating company "Ukrteplo"
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	LLC «ACCORD-LTD»		Institute of Engineering Thermophysics of NAS of Ukraine
	Private Enterprise «Kramar»		LLC "Ecodevelop"
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	LLC "SynEnergy Consulting"		ENERGY-INDUSTRIAL GROUP «YUGENERGOPROMTRANS»
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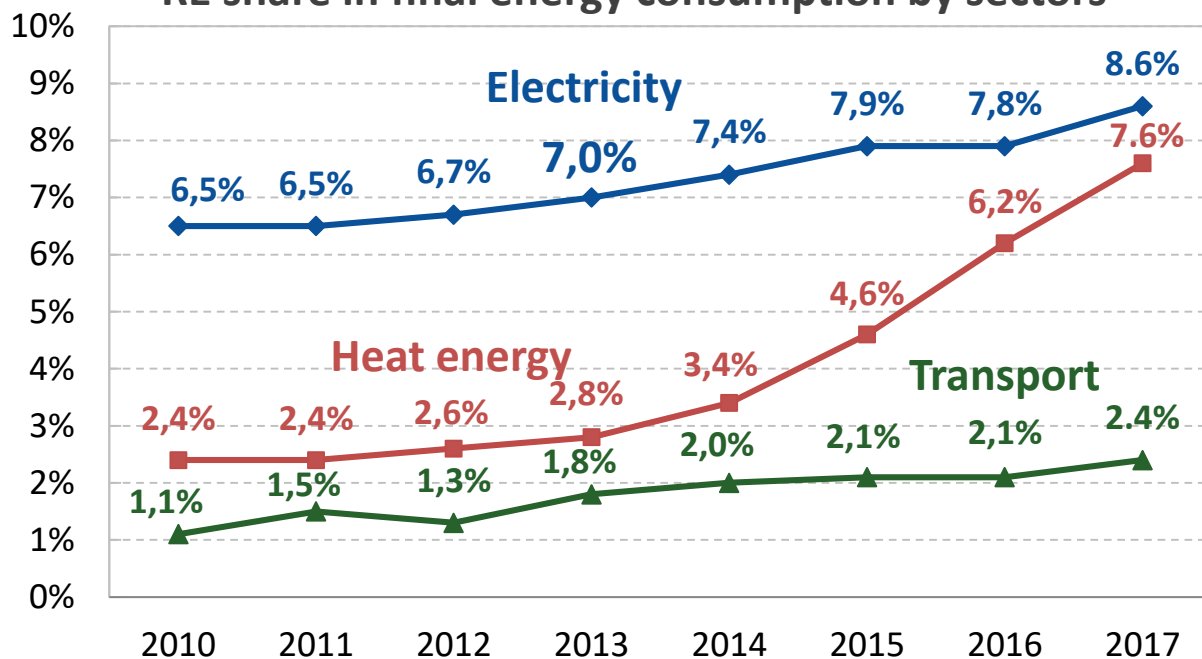
**Physical persons:** Maraykin R., Petrov Ya., Berezhnyska M., Epshtein Yu., Galchynska Yu., Teush S., Gres Romanyuk O., Kotsar O., Moroz O., Hritsyshyna M.

# Production of Renewable Energy in Ukraine, according to official Energy Balances, in 2010-2017

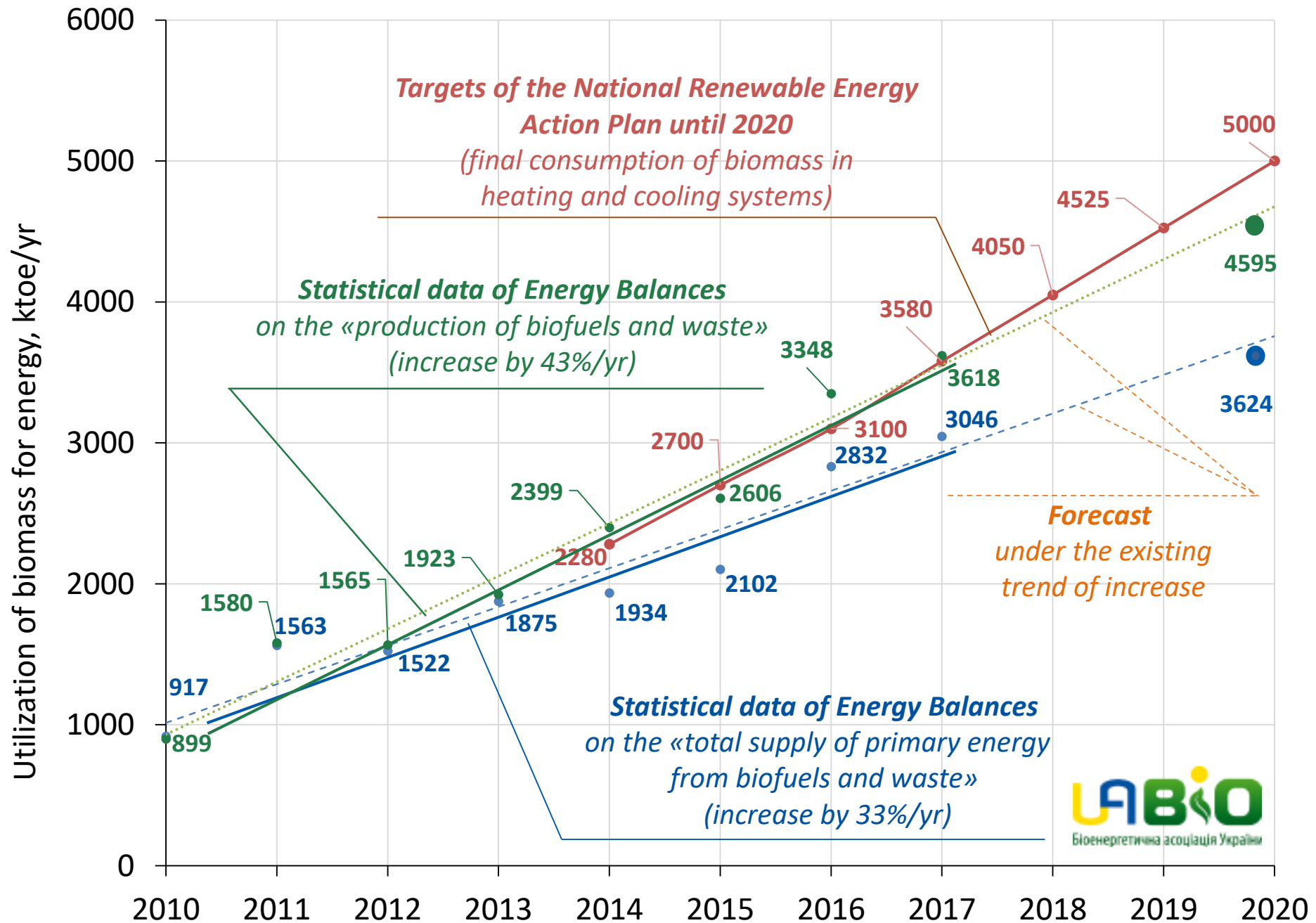
## RES share in total final energy consumption



## RE share in final energy consumption by sectors



# Trends of bioenergy development in Ukraine (2010-2017)



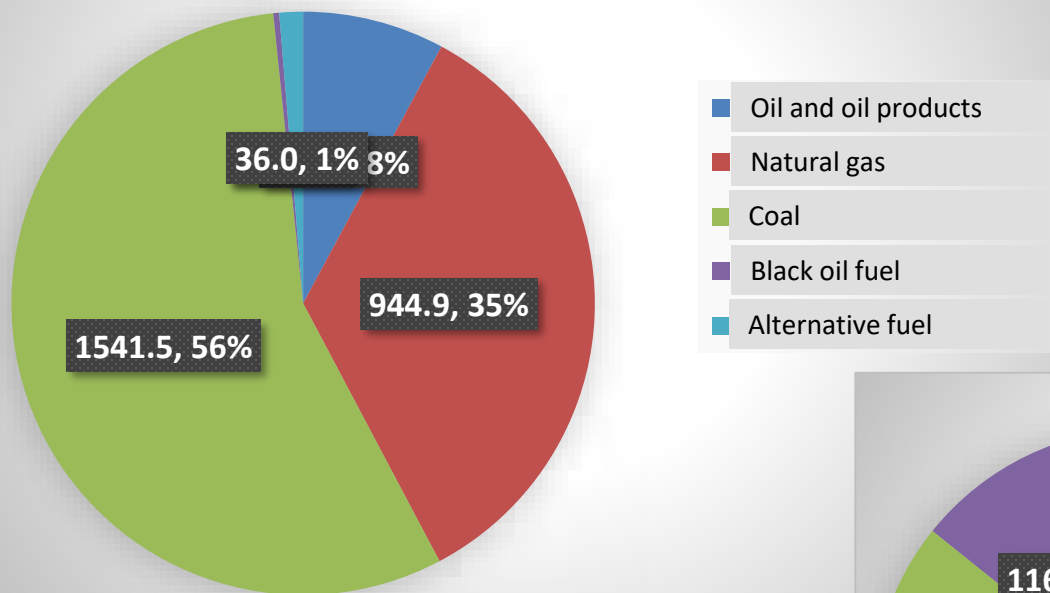
## Structure of Total primary energy supply according New Energy Strategy of Ukraine till 2035

Type of energy source	2015 (fact)	2020 (forecast)	2025 (forecast)	2030 (forecast)	2035 (forecast)
Coal	27,3	18	14	13	12
Natural Gas	26,1	24,3	27	28	29
Oil Products	10,5	9,5	8	7,5	7
Nuclear Energy	23	24	28	27	24
<b>Biomass, Biofuels and Wastes</b>	<b>2,1</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>11</b>
Solar and Wind Energy	0,1	1	2	5	10
Hydro Energy	0,5	1	1	1	1
Thermal energy	0,5	0,5	1	1,5	2
<b>TOTAL, Mtoe</b>	<b>90,1</b>	<b>82,3</b>	<b>87</b>	<b>91</b>	<b>96</b>

[http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art\\_id=245234085&cat\\_id=35109](http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art_id=245234085&cat_id=35109)

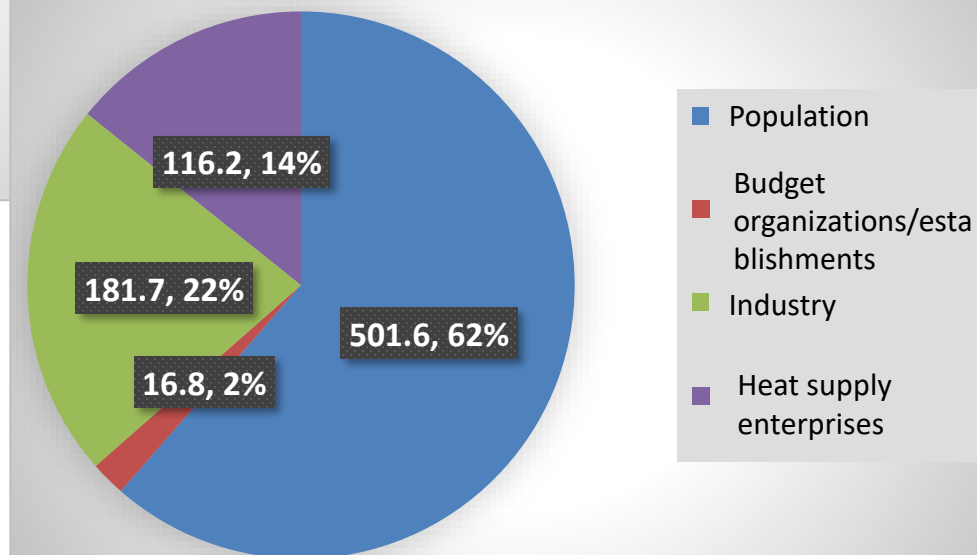
# Structure of fuel consumption in Vinnitsa region, 2017

## General structure of fuel consumption, thousands tons



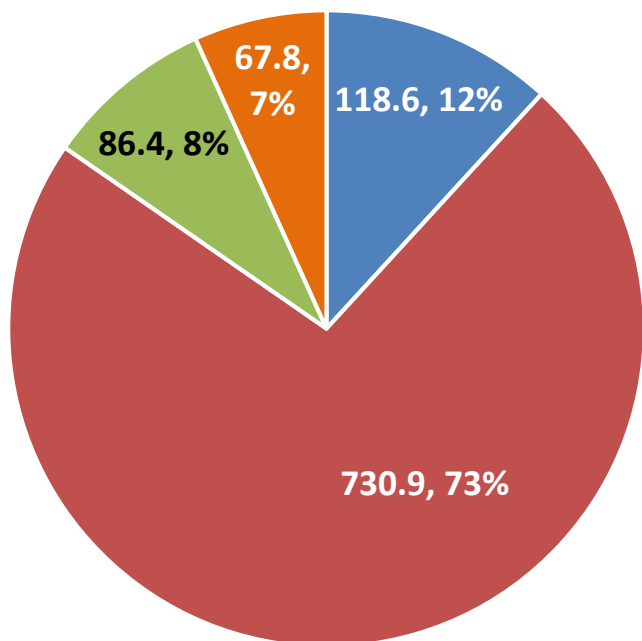
99,2% of coal volume is used for conversion of energy (Ladyzhynska CHP plant)

## Structure of natural gas consumption by sectors, mln m<sup>3</sup>

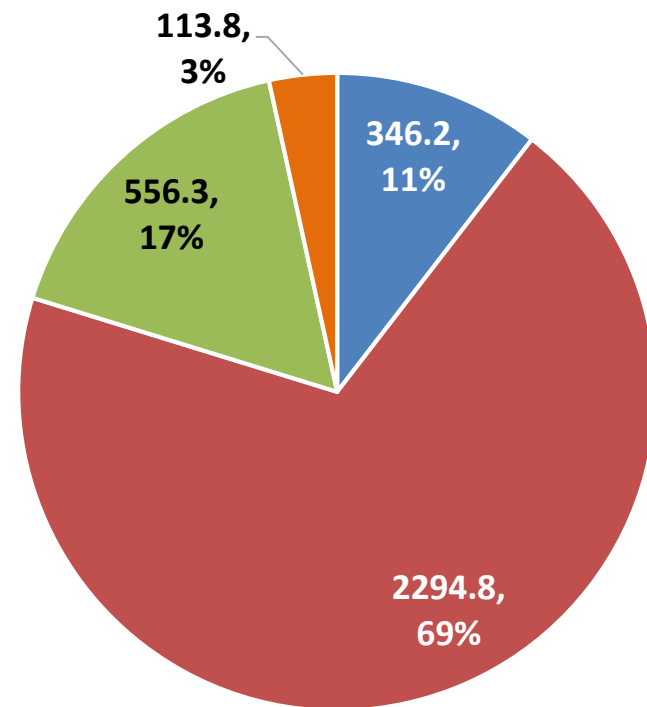
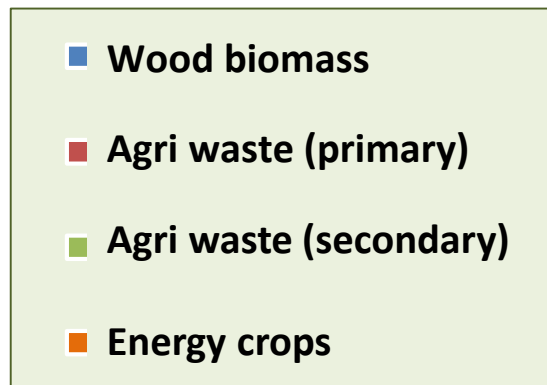


**Source:** Data of Vinnitsa Regional State Administration, results in tons calculated by authors from natural units. Data on coal use -- HUSV

# Structure of consolidated technically achievable biomass potential in Vinnitsa region (2017)

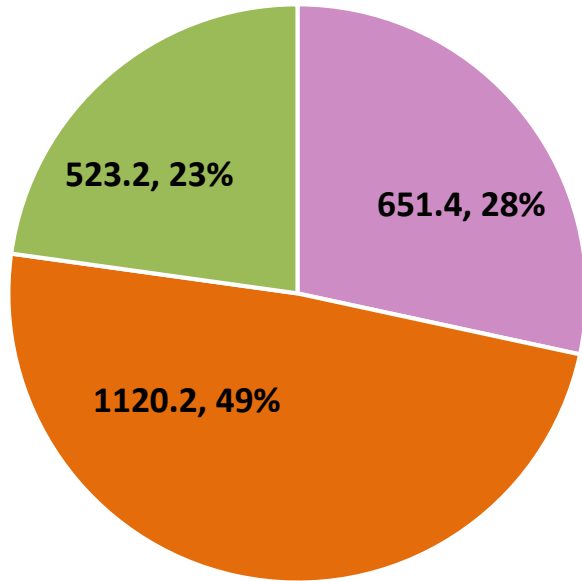


**Total:**  
**1004 thousand**  
**tons**



**Total:**  
**3311 thousand tons**

# Technically achievable biomass potential in Vinnitsa region (2017): estimation according to statistics as sum of districts in the region



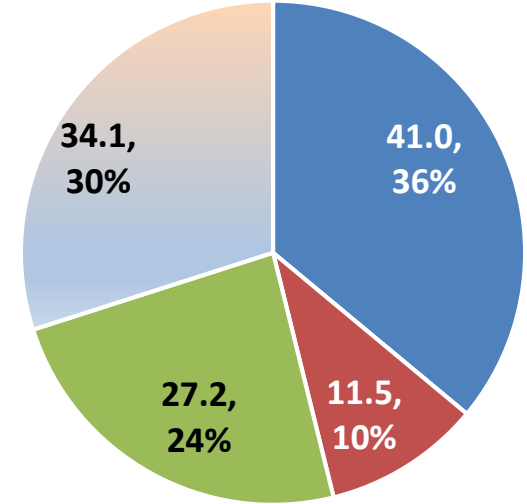
## Primary agri waste 2295 thousand tons

- Straw from grain crops (excl. corn) and rape
- Waste of production corn to grain
- Waste of production sunflower

## Secondary agri waste 556 thousand tons

Sugar-beet pulp:  
448 thousand tons (81%)  
Sunflower husk:  
108 thousand tons (19%)

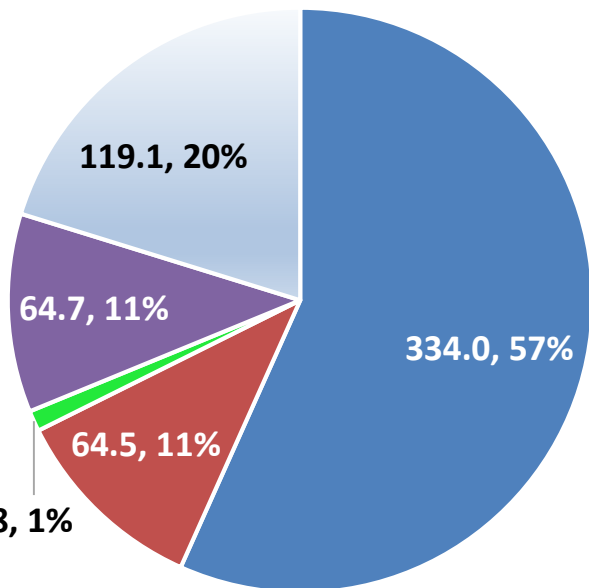
## Energy crops: 114 thousand tons



- Miscanthus
- Poplar
- Thatch grass
- Palm tree

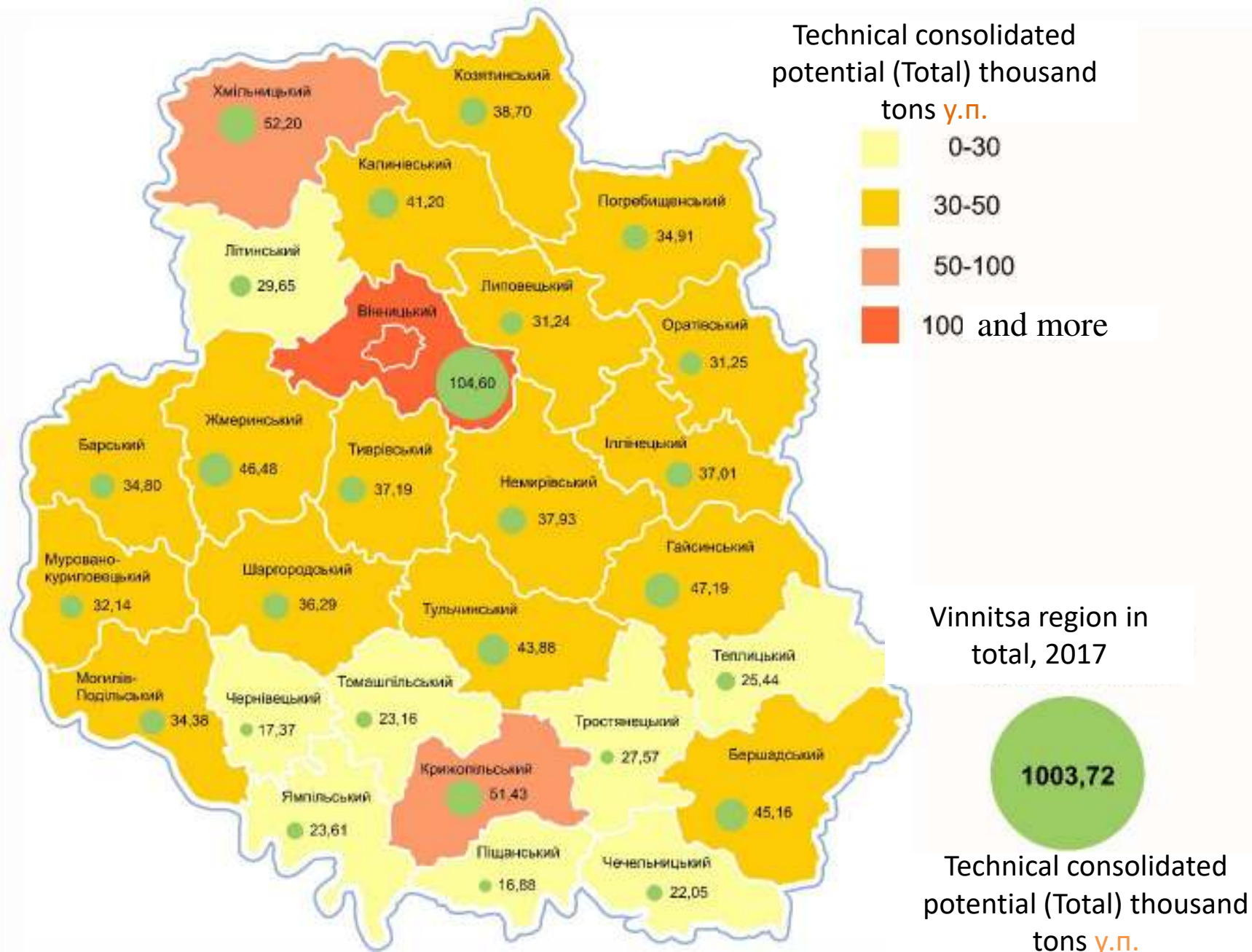
## Wood biomass 589 thousand m<sup>3</sup> density

- Fire wood for heating
- Residues from logging
- Wood production waste
- Biomass from trimming and uprooting of perennial agri plants (enterprises of all categories)
- Biomass from clearing up of afforestation belts, etc.





# Consolidated biomass potential of districts of Vinnitsa region 2017



# Potential of replacing of fossil fuels with biomass in Vinnitsa region

Technically achievable  
biomass potential:  
**1004 thousand tons**  
y.p./year  
(2017)

Replacing of  
approximately **37%** of  
annual consumption  
of **fossil fuels** in  
region

or

Replacing of **total**  
volume of annual  
consumption of  
**natural gas** in region

821,5 mln. m<sup>3</sup>  
(945 thousand  
tons) of  
natural gas



# Development of GIS-maps of energy biomass potential (1)

## Application:

- ❖ To assist in justification and determination of technical capability for use of biomass energy potential in Vinnitsa region;
- ❖ to further activate the work towards replacing fossil fuels with local biofuels.

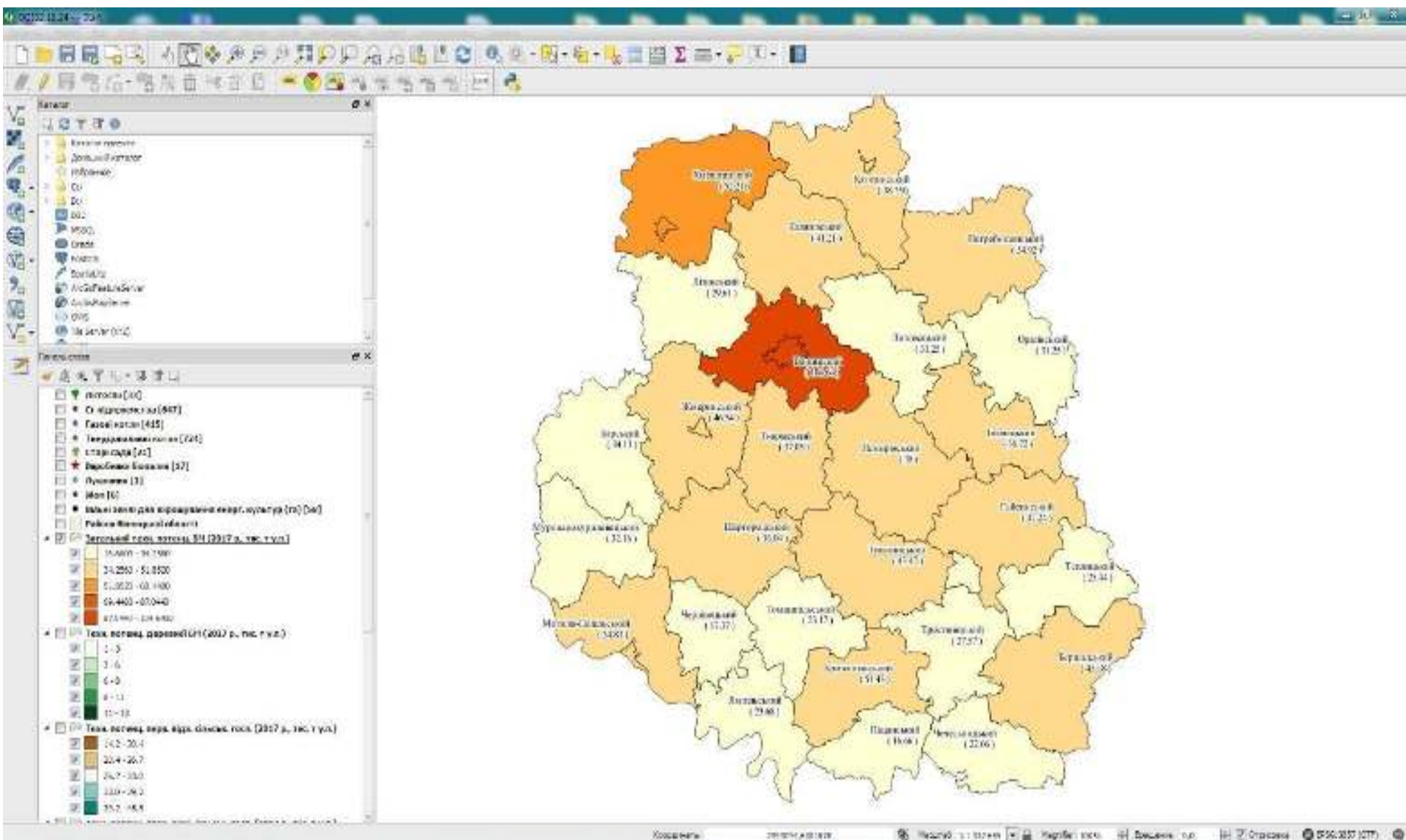
In accordance with the data obtained within the research there were created following

### layers of maps:

- 1) Biomass potential in terms of districts of Vinnitsa region: consolidated, wood biomass, primary and secondary agricultural waste as well as energy plantations;
- 2) Agricultural enterprises of the region (number of records – 647);
- 3) Old and low-productivity gardens, which are subject to immersion (number of records – 21);
- 4) forestry enterprises of the Vinnitsa region (number of records – 33);
- 5) Free lands of Vinnitsa region where cultivation of energy crops is possible (number of records – 58);
- 6) boilers on solid fuels (number of records – 724);
- 7) boiler equipment on natural gas (number of records – 415);
- 8) Biofuel producers (number of records – 17) and others.

# Development of GIS-maps of energy biomass potential (2)

## General view of GIS QGIS



# Options for business for energy production from agricultural biomass

<b>Collection, treatment, sale of agro-biomass</b>	<b>1) Collection, baling, sale of wheat straw / maize stalks</b>		<b>2) Production and sale of pellets on Ukrainian market</b>		
<b>Investments</b>	581 th. EUR (productivity: 20-35 t/h)		2.6 million EUR (productivity: 5 t/h)		
<b>IRR</b>	<b>24.1%</b>		maize stalks: <b>6%</b> ; sunflower husk: <b>36%</b>		
<b>Simple payback period</b>	<b>4.1 years</b>		maize stalks: <b>9.6 years</b> sunflower husk: <b>2.8 years</b>		
<b>Production of energy from agro-biomass</b>	<b>3) Boiler plant on straw bales</b>	<b>4) CHP plant on straw bales</b>	<b>5) Boiler plant on maize stalks</b>	<b>6) CHP plant on maize stalks</b>	<b>7) Thermal power plant on maize stalks</b>
<b>Investments*</b>	2.5 mill EUR	23.1 mill EUR	2.2 mill EUR	16.2 mill EUR	15.9 mill EUR
<b>IRR</b>	<b>28%</b>	<b>17%</b>	<b>32%</b>	<b>26%</b>	<b>16%</b>
<b>Simple payback period</b>	<b>3.4 years</b>	<b>5.1 years</b>	<b>3.1 years</b>	<b>3.7 years</b>	<b>5.3 years</b>
	<b>8) Boiler plant on sunflower husk pellets</b>	<b>9) CHP plant on sunflower husk pellets</b>	<b>10) Biogas plant on sugar beet pulp</b>	<b>11) Biogas plant on maize silage (80%) and manure (20%)</b>	<b>12) Production of 2nd generation bioethanol from straw/stalks</b>
<b>Investments*</b>	1.4 mill EUR	16.2 mill EUR	11.2 mill EUR	25.9 mill EUR	101 mill EUR
<b>IRR</b>	<b>53%</b>	<b>26%</b>	<b>18.8%</b>	<b>21.8%</b>	<b>23%</b> (sale on European market)
<b>Simple payback period</b>	<b>1.9 years</b>	<b>3.6 years</b>	<b>5.2 years</b>	<b>4.5 years</b>	<b>4.5 years</b> (sale on European market)

- Boiler plant: 10 MW, CHP plant: 6 MW<sub>e</sub>+18 MW<sub>th</sub>, TPP: 6 MW<sub>e</sub>, biogas plant: 3 MW<sub>e</sub> (pulp), 10 MW<sub>e</sub> (silage + manure), bioethanol production: 55 kt/yr

# Conclusions

- Complete application of technically achievable biomass potential of Vinnitsa region (more than **1 mln tons per year**, 2017) can replace approximately **37%** of annual consumption of fossil fuels or total **volume** of annual consumption of natural gas.
- The results of **feasibility study** on options for use of biomass/biofuel (boiler house, bale, wood chips, fire woods, pellets, briquette, straw, wood, energy crops) demonstrate in majority of cases the economic viability of projects.
- Development of biomass energy production will have a **positive impact on the environmental situation** in Vinnitsa region.

**Developed online-map using GIS-technologies** – tool for in-depth analysis of local conditions by planning of bioenergy projects.

The map is only a **basis** and contains general information on the region, whereas United Territorial Communities or interested private enterprises will have the opportunity to further ***fine-tune, work out in detail and update it for their own needs***, while map is ***open and free to public***:

<http://www.vin.gov.ua/dep-zhkh/enerhoefektyvnist/424-oblasni-prohramy-z-enerhozberezhennia/15535-karta-potentsialu-biomasy-u-vinnytskii-oblasti-stanom-na-21122018>

[https://drive.google.com/drive/folders/1NHT8iVmb\\_a77JnshxiYs2kD5V5CHj39h](https://drive.google.com/drive/folders/1NHT8iVmb_a77JnshxiYs2kD5V5CHj39h)

# Project «Promoting the penetration of agri biomass heating in European rural areas»



*Funded through EU Program Horizon 2020  
Duration: January 2019 – December 2021*

**Consortium:** 13 partners from 9 European countries (Greece, Spain, Austria, Denmark, Belgium, Croatia, Romania, **Ukraine**, France).

**Coordinator:** Centre for Research and Technology Hellas (CERTH, Greece).

**Bioenergy Association of Ukraine** (UABio) is a project partner from Ukraine.

In AgroBioHeat, among others, UABio is Leader of Task 5.2 «National Strategic Plan», Task 5.3 «National policy workshops & Advocacy actions», and is primarily responsible for the preparation of a booklet on «**Maize Residues-to-Energy**».

Through its activities, AgroBioHeat aims **to raise confidence on agri biomass**, empower local stakeholders to unblock the market and influence the development of the European and national framework in a way that is favourable to **agri biomass heating solutions** market uptake. Actions will be mainly located in **6 European countries**: Greece, Spain, France, Romania, Croatia and **Ukraine**.

# Project “Promoting Sustainable Use of Underutilised Lands for Bioenergy Production through a Web-Based Platform for Europe – BIOPLAT-EU”



**Duration:** 1 Nov 2018 – 31 Oct 2021

**Consortium:** 12 partners from 10 European countries (Germany, Italy, Hungary, Austria, **Ukraine**, Spain, Romania, Belgium, Netherlands, Finland).

**Coordinator:** WIP-Renewable Energies (WIP) Wirtschaft & Infrastruktur GmbH & Co Planungs KG

**BIOPLAT-EU** will produce a comprehensive online web-based platform for supporting the decision-making process for new bioenergy investment projects that rely on biomass from marginal, underutilized and contaminated lands in Europe and Ukraine.



## PLATFORM BIOPLAT-EU

Project web-site <a href="https://bioplat.eu/">https://bioplat.eu/</a>		WebGIS tool		
		GIS maps		STEN Tool
Information about project	Help Desk	Data from other projects	Own data	

Contact person in Ukraine: **Oleksandra Tryboi**  
[tryboi@biomass.kiev.ua](mailto:tryboi@biomass.kiev.ua)



This project is financed by European Union's H2020-LCE research and innovation programme under grant agreement No 818083.



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The initiative of energy transformation of Ukraine to  
100% renewable energy is announced  
**GLOBAL 100% RE Ukraine**



**Thank you for attention!**

**Welcome to UABio!**

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

***We are greening the energy!***