INTERNATIONAL INNOVATION CENTER

INSTITUTE OF AGRARIAN ECONOMY

The model of agricultural intensification of bioeconomic security of small farms and SMEs within the creating an open rural innovation infrastructure

Vasyl Zalizko (Kyiv, Ukraine)
Myroslav Kozak (Kyiv, Ukraine)

10-12.12.2018
Jochranka, Poland

PURPOSE OF THE PRESENTATION

a) present the scientific approach to determine the bioeconomic security

b) find reasons why a significant part of innovative achievements remains unavailable for small farms and SMEs

c) expediency of formation of an energy cluster and the automation of organic certification

BIAŁA KSIĘGA

BEZPIECZEŃSTWA NARODOWEGO RZECZYPOSPOLITEJ POLSKIEJ

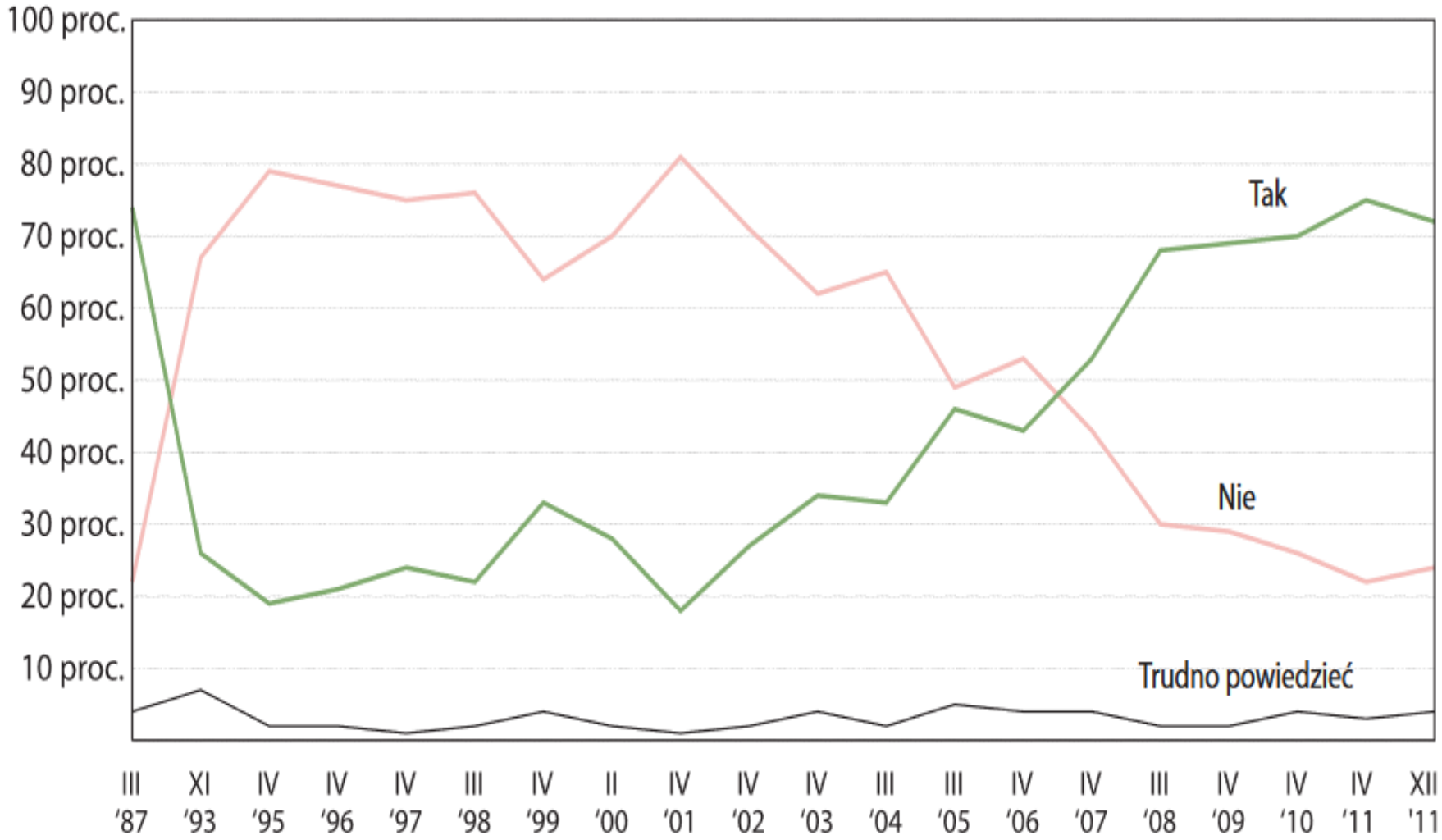
MINISTRY OF DEFENCE OF UKRAINE

WHITE BOOK 2017

THE ARMED FORCES OF UKRAINE

KYIV • 2018

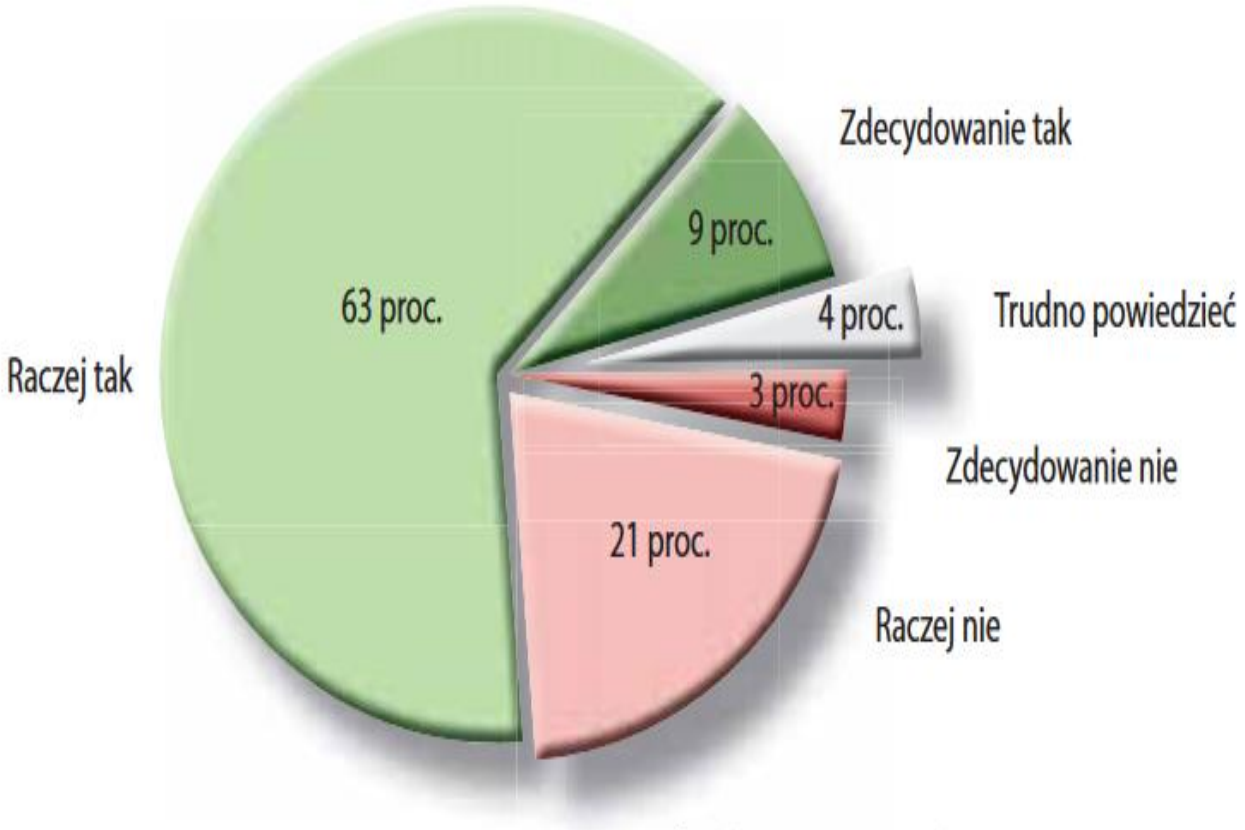
Odpowiedź na pytanie: Czy, Pana(i) zdaniem, Polska jest krajem, w którym żyje się bezpiecznie? (w latach 1987–2011)



Źródło: Ocena stanu bezpieczeństwa państwa..., op.cit.

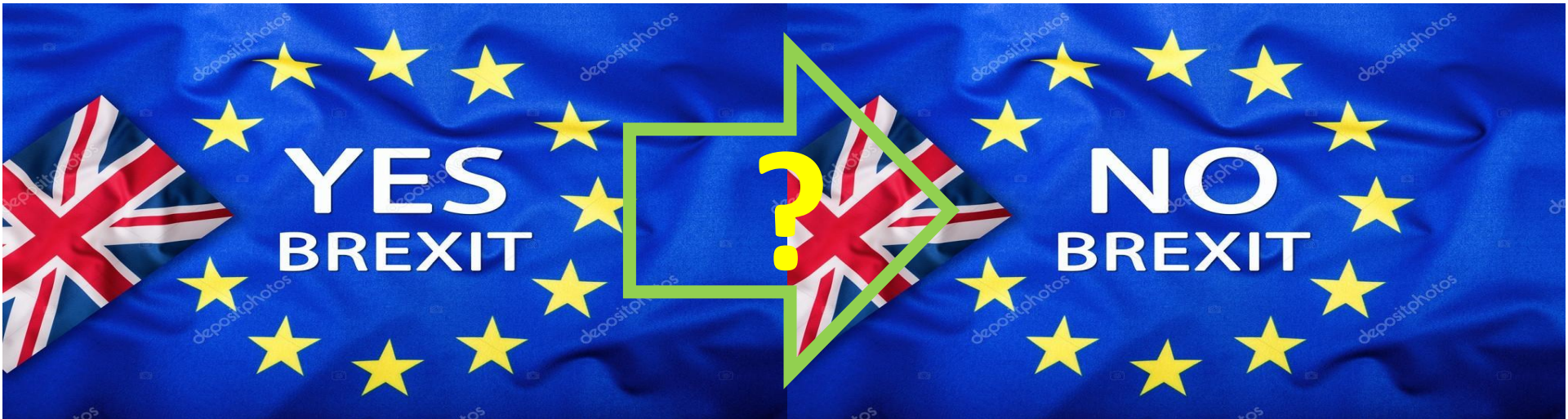
* Badanie BBN

Odpowiedź na pytanie: Czy, Pana(i) zdaniem, Polska jest krajem, w którym żyje się bezpiecznie?



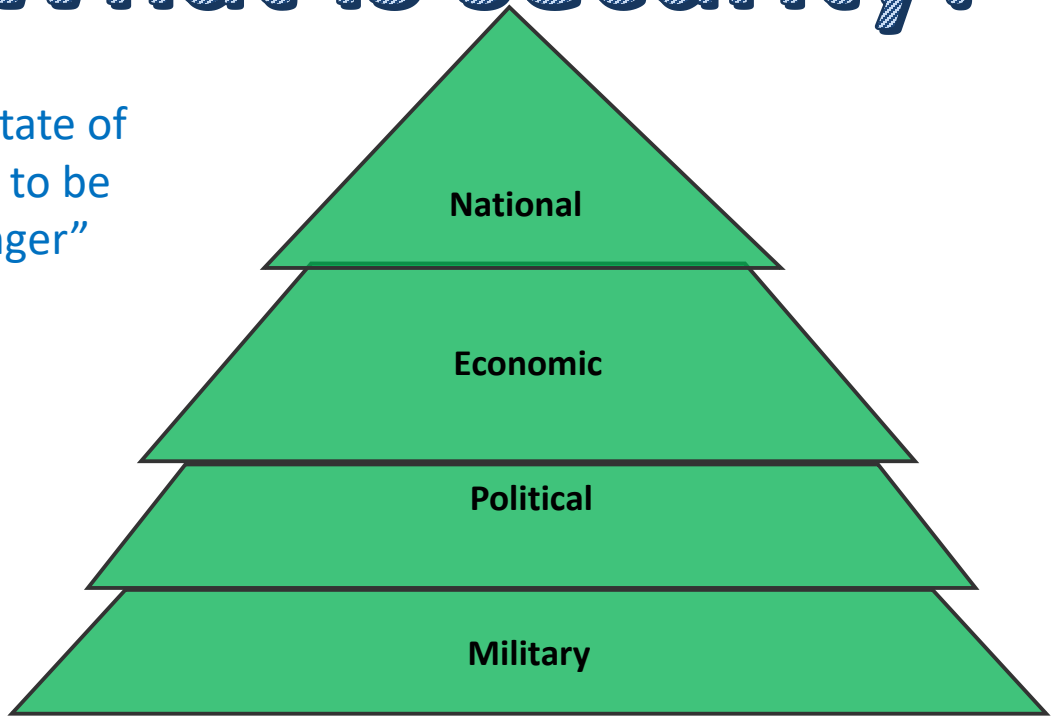
Źródło: Ocena stanu bezpieczeństwa państwa..., op.cit.

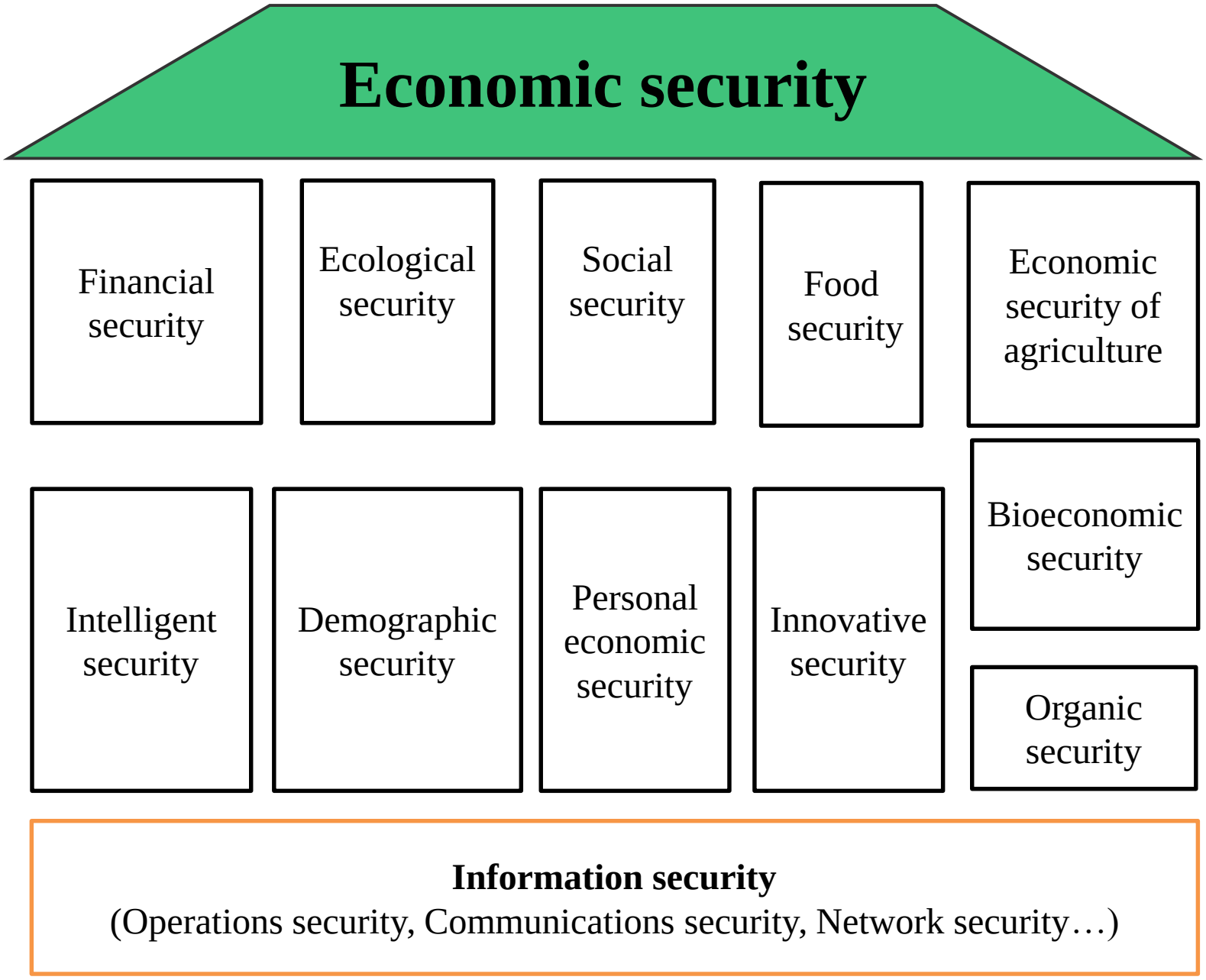
Economy & Security



What is security?

The quality or state of being secure – to be free from danger”




Economic security
Financial security
Ecological security
Social security
Food security
Economic security of agriculture
Intelligent security
Demographic security
Personal economic security
Innovative security
Bioeconomic security
Organic security
Information security
(Operations security, Communications security, Network security…)

The author of the term "bioeconomy" – **Dr. Christian Patermann**

(2011)

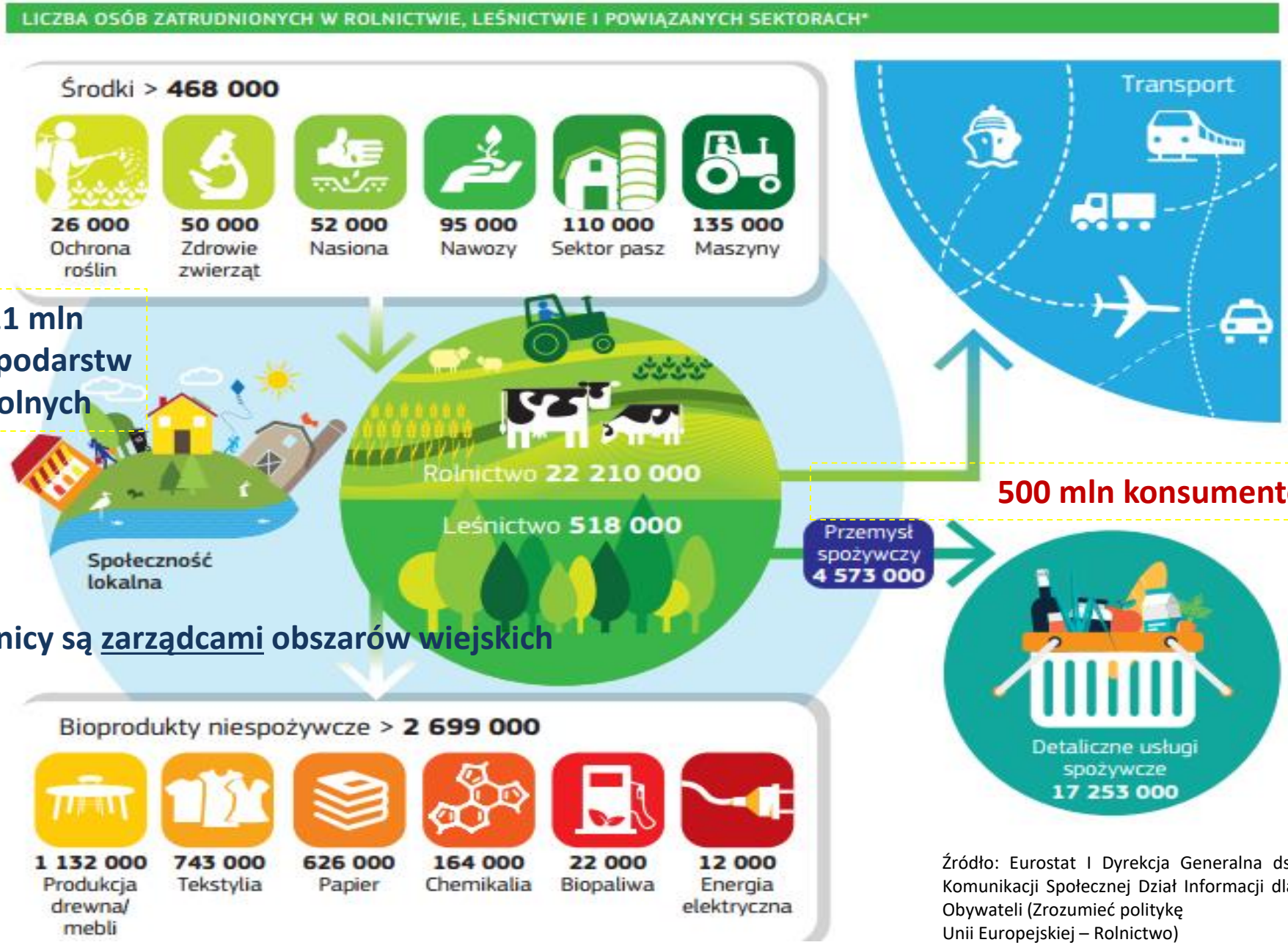
The term "bioeconomy" includes all industries and economic s produce, manage and otherwise exploit biological resources

(e.g. agriculture, food, forestry, fisheries and other bio-based industries)

The Bioeconomy: *Includes all industries and economic sectors that produce, manage or otherwise make use of biological resources including bio-waste*

The **bioeconomic security** is a set of conditions (tangible and intangible) at which it is possible to meet the needs of rural and urban population, while the bioeconomic system of the country is efficient and competitive and able to resist possible internal and external threats.

28 PAŃSTW (44 mln miejsc pracy)



Źródło: Eurostat I Dyrekcja Generalna ds. Komunikacji Społecznej Dział Informacji dla Obywateli (Zrozumieć politykę Unii Europejskiej – Rolnictwo)

MATRIX OF INDICATORS OF BIOECONOMIC SECURITY

№	Indicators	Year	Azerbaijan	Ukraine	Poland	Netherlands	Europe& Central Asia
1.	CO_2 emissions (metric tons per capita)	2014	3,93	6,26	7,50	9,90	**7,54**
	CO_2 intensity (kg per kg oil equivalent energy use)	2014	1,9	2,20	3,00	2,30	**2,31**
	Energy use (kg of oil equivalent) per $1,000 GDP (constant 2011 PPP)	2014	89, 86	306	98,40	91,00	**116**
	Share of renewable energy in gross final energy consumption (%)	2015	2,31	4,14	11,91	5,89	**11,30**
	Artificial fertilizer consumption (kilograms per hectare of arable land)	2015	24,2	43,5	175,5	258,10	**76,90**
	Index of aquaculture development	2015	0,4	0,4	0,6	0,9	**-**
	Index water productivity	2015	0,7	0,4	0,7	0,8	**0,75**
2.	Researchers in R&D (per million people)	2015	1	1,006	2,139	4,548	**2,92**
	Scientific and technical journal articles (per thousand capita)	2016	-	7,375	32,978	29,949	**758,303**
	Total public expenditure on education, all levels (% of GDP)	2013	2,44	6,5	4,94	5,95	**5,34 EU 28**
3.	**Global Innovation Index**	**2017**	**30,6**	**37,62**	**41,99**	**63,36**	**-**

№	Indicators	Year	Azerbaijan	Ukraine	Poland	Netherlands	Europe& Central Asia
4.	**Renewable internal freshwater resources (m^3 per inhabitant)**	**2014**	**851,7**	**1,217**	**1,41**	**652**	**7,85**
	Share of agricultural land cover (% of total land area)	2015	23,4	71,3	46,9	54,5	**44,2**
	Share of forest land cover (% of total land area)	2015	13,7	16,7	30,8	11,2	**38**
	Terrestrial and marine protected areas (% of total territorial area)	2017	5,5	3,93	38,1	21,2	**9,4**
	Total natural resources (oil, gas, coal, mineral, forest) rents (% of GDP)	2016	20,47	3,8	0,8	0,4	**1,3**
5.	PM2.5 air pollution, population exposed to levels exceeding WHO guideline value (% of total)	2016	100	100	100	100	**93,3**
	People using safely managed drinking water services (% of population)	2015	87	92	94	100	**91**
6.	GDP per capita, PPP (constant 2011 current international $)	2016	16,001	7,894	27,216	48,473	**20,562**
	GINI coefficient of equivalised disposable income (0-100)	2017	33,7	28,5	29,2	27,3	**24,6**
	Urban population (%)	2016	54,8	69,7	61,0	92,0	**70,9**
	Employment rate (% of age 20-64)	2017	-	64,7	70,9	78,0	**69,2**
	Value added from agricultural sector (% of GDP)	2017	6	14	1,7	1,9	**2,2**
	Share of total organic crop area (% of total agricultural area)	**2017**	**-**	**0,9**	**3,72**	**2,91**	**6,2**

The mentioned here **index bioeconomic security** would be calculated on the basis of the algorithm:

1. To form an open dynamic system of indicators which, for the convenience purposes, can be written down by means of the matrix method, for example:

$$\Psi_k = \begin{pmatrix} \varphi_{11} & \varphi_{12} & \dots & \varphi_{1j} \\ \varphi_{21} & \varphi_{21} & \dots & \varphi_{2j} \\ \dots & \dots & \dots & \dots \\ \varphi_{k1} & \varphi_{k2} & \dots & \varphi_{kj} \end{pmatrix}, \quad k, j \in N.$$

Quantity of elements in such a system can be different and depends on the availability of statistics data and specifics of each stage in evaluation.

2. Using the method of comparison with the reference value, all statistical values are normalized to be further used in the dynamic series of integral indices, applying formula

$$z_i = \begin{cases} \dfrac{x_i}{x_{i,\max}}, & if \quad x_i \ is \ the \ stimulator, \ i \in N, \ x_{i,\max} \neq 0; \\ \dfrac{x_{i,\min}}{x_i}, & if \quad x_i \ is \ the \ destimulator, \ i \in N, \ x_i \neq 0; \end{cases}$$

3. Then we can find the vector matrix of dispersions D_i and the matrices of the absolute values of the factor load A_i, using the axis rotation and quartimax normalization, so that to set simple correlations between the related variables and factors, separately for each group of indicators (depending on the level of a particular research).

For this matrices A_i and D_i are to be determined by means of the following formulae:

$$A_i = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1j} \\ a_{21} & a_{21} & \dots & a_{2j} \\ \dots & \dots & \dots & \dots \\ a_{j1} & a_{j2} & \dots & a_{jj} \end{pmatrix}, \quad D_i = \begin{pmatrix} d_1 \\ d_2 \\ .... \\ d_j \end{pmatrix} \; i, \; j \in N,$$

where a_{jj} – the absolute values of elements in the matrix after the axis rotation and quartimax normalization; d_j – the values of dispersion (i, j – quantity of groups and indicators, respectively).

4. Then we find the weight of influence for each factor for further estimation of prospects and challenges related to the bioeconomic security. For this, we form the following matrix Ω_i :

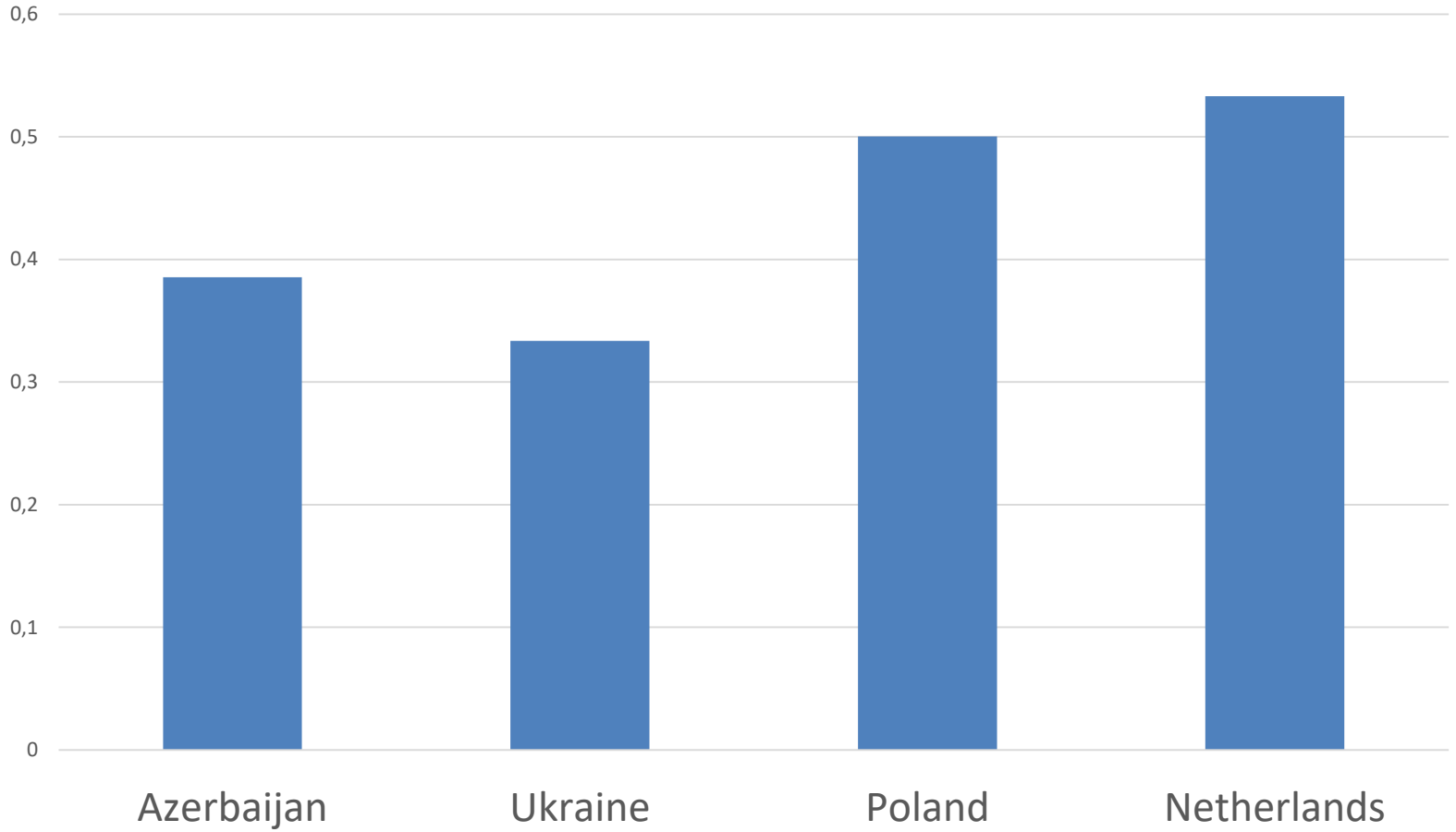
$$\Omega_i = A_i \times D_i = \begin{pmatrix} d_1 a_{11} + d_2 a_{12} + \ldots + d_j a_{1j} \\ d_1 a_{21} + d_2 a_{22} + \ldots + d_j a_{2j} \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ d_1 a_{j1} + d_2 a_{j2} + \ldots + d_j a_{jj} \end{pmatrix}.$$

Then we can form the matrix of weights for each of the factors:

$$\mathrm{Y}_i^{(1)} := k\mathrm{Y}_i, \;\; k = \left(\sum_j \alpha_j \right)^{-1}.$$

This enables the final estimation of scalar values of the estimated integral index and the related subindices in the multiplicative form (1) which fully describes socioeconomic and administrative processes:

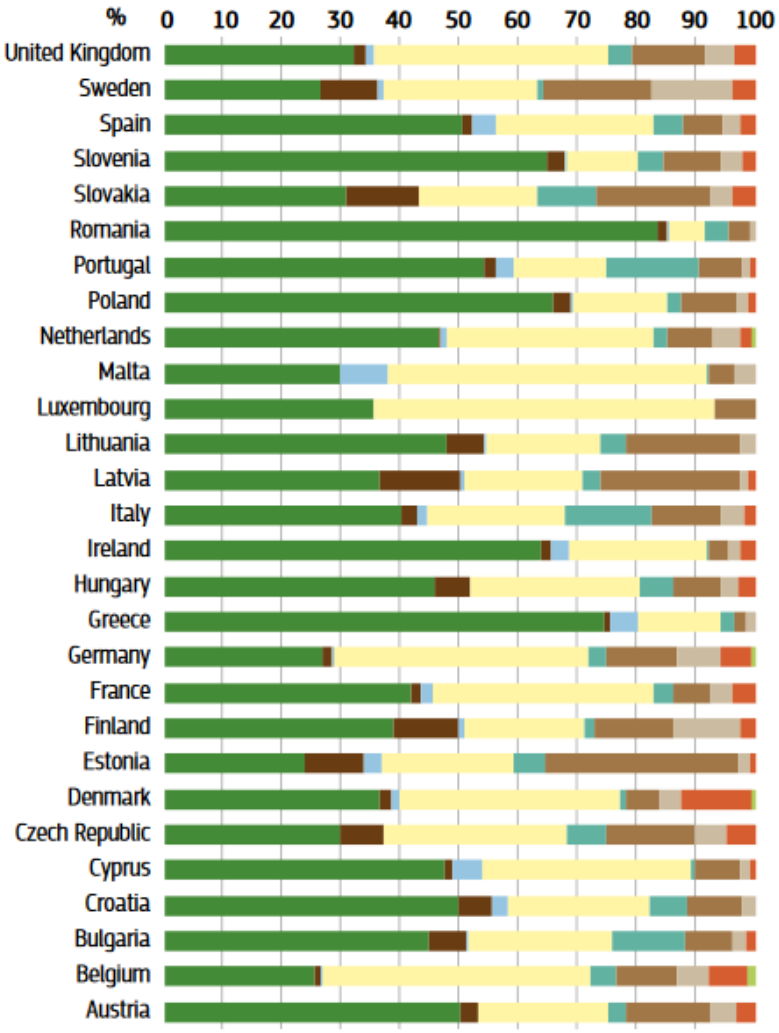
$$I = \prod_{j=1}^{n} z_j^{\alpha_j}, \quad \sum_j \alpha_j = 1, \;\; \alpha_j > 0, \;\; n \in N. \qquad (1)$$



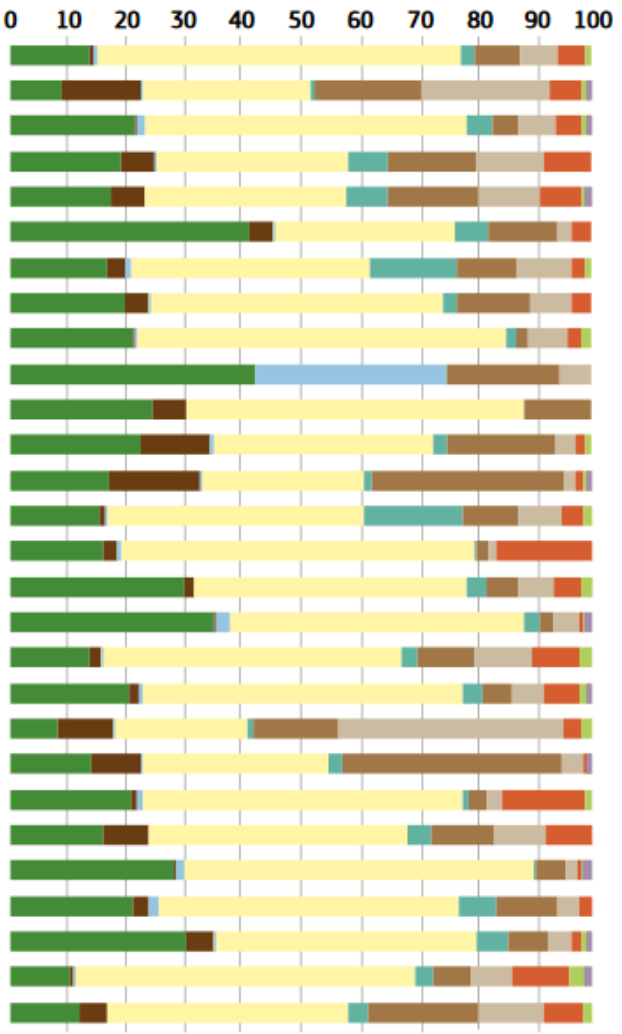
Index of bioeconomic security (2015/2016)

As we see, the calculated index for Ukraine and Azerbaijan has a rather low value, but if we hypothetically write that these countries will create a bioenergy cluster, the corresponding index **of bioeconomic security of the cluster will be in the interval (0,55-0.78)!!!**, which is necessary and sufficient condition for the sustainable development of each country.

Bioeconomy Policies around the World



Employment in the bioeconomy sectors of activity in the 28 EU Member States, in percentage



Turnover in the bioeconomy sectors of activity in the 28 EU Member States, in percentage

- Agriculture
- Forestry
- Fishing and aquaculture
- Manufacture of food, beverages and tobacco
- Manufacture of bio-based textiles
- Manufacture of wood products and wooden furniture
- Manufacture of paper and paper products
- Manufacture of bio-based chemicals, pharmaceuticals, plastics and rubber (excl. biofuels)
- Manufacture of liquid biofuels
- Production of bio-based electricity

JRC Science for Policy Report
Bioeco no my Report 2016

Digital Innovation Hubs

AURIA CLINICAL INFORMATICS (ACI)	Auria Clinical Informatics P.O. Box 52, FI-20521 Turku, Finland, FI-20521, Turku	Finland	Arho Virkki
Barça Innovation Hub (BIHUB)	Arístides Maillol s/n, 8028, Barcelona	Spain	Aitor Jiménez Villar
Barcelona Activa SA SPM	Marie Curie, 8-12 08042 Barcelona, 08018, Barcelona	Spain	Claudia Garcia
Basque Digital Innovation Hub (BDIH)	Alameda Urquijo 36, 48011, Bilbao	Spain	Cristina Oyón
BIBA- Bremer Institut für Produktion und Logistik GmbH	Hochschulring 20, 28359, Bremen	Germany	Prof. Dr.-Ing Klaus-Dieter Thoben
BIC EURONOVA S.A.	Parque Tecnológico de Andalucía, Avda. Juan López Peñalver, 21 29590 - MÁLAGA - ESPAÑA, 29590, Málaga	Spain	Álvaro Simón de Blas
Big Data Centre of Excellence Barcelona (BigData CoE)	Eurecat Barcelona Edifici Cornerstone Camí, 8005, Barcelona	Spain	Marc Torrent
Bioindustry Park Silvano Fumero SpA - bioPmed innovation cluster	Via Ribes, 5, 10010, Colleretto Giacosa	Italy	Fabrizio Conicella
BioNanoNet ForschungsGmbH, BNN	Steyrergasse 17, 8010, Graz	Austria	Andreas FALK
CYBERSEC HUB	Feldmana, 4/9-1, 31-130, Kraków	Poland	Robert Siudak
Cybersecurity Innovation HUB	Avenida Jóse Aguado, 41., 24001, León	Spain	Beatriz Casado
Cyprus Digital Innovation Hub	28th Octovriou Avenue, Engomi, 72, 2414, Nicosia	Cyprus	Panayiotis Philimis
Danish Technological Institute, Robot Technology	Forskerparken 10F, 5230, Odense	Denmark	Kurt Nielser
Demola-Budapest	Egry Jozsef utca 18, 1111, Budapest	Hungary	Laszlo Bacs
DIEX - Digital Experience	Via Casabianca, 3, 33078, San Vito al Tagliamento	Italy	Andrea Fornasier
DIGIHALL	Centre d'Intégration Nano Innov, 8 Avenue de la Vauve, 91127 Palaiseau Cedex, 91120, Palaiseau	France	Gregorio Ameyugo

- promoting Digital Innovation Hubs in Agriculture
- At least 50% of the budget should directly benefit SMEs. The action may involve financial support to third parties.

Digital Innovation Hubs Smart Specialisation Platform

http://s3platform.jrc.ec.europa.eu

Ukrainian potential

Comparative characteristics of land use in European countries and in Ukraine

Name	Ukraine	The countries of Europe	Countries of the European Union
Land area, million hectares	60,4	1015,6	437,4
Chernozem area, million hectares	28	84	18
Area of agricultural land, million hectares	42,7	474,8	177,7
Area of arable land, million hectares	32,5	277,8	115,7
The share of leased farmland, percentages	97	62	53
Area of agricultural land certified as organic, million hectares	0,3	11,6	5,3
Area of irrigated land, million hectares	0,5	20,8	11,1
Investment price, thousands of dollars per 1 hectare	1	4	5,5
Grain exports, million tons	34,8	130	38,5
Area of agricultural land per inhabitant, hectares per person	0,7	0,6	0,4
Price per one hectare of agricultural land, thousand dollars		3,7	7,2

1, 4 million hectares land plots that are not used

1 million people do not use or rent land

Land shares (units) with a total area of **4.8 million hectares**, or about **12 %** of the total area of agricultural land, are not used

Source: Resolution of the Cabinet of Ministers of Ukraine. Strategy for improving the management mechanism in the field of use and protection of agricultural land of state ownership and their disposal from June 7, 2017, No. 413

We invite you to our consortium

- **Our project proposal**

LC-SC3-RES-16-2019: Microsimulation model for the formation and management of a low-carbon cluster

Part of the work program: Safe, clean and efficient energy

Topic: H2020-LC-SC3-2018-2019-2020

Topic identifier: LC-SC3-RES-16-2019

Deadline: 27 August 2019 17:00:00

The result of the project will be the created micro simulation model that automates the formation of innovative energy clusters, which will ensure the optimal placement and combination of bioenergy and hydropower sources of renewable energy, taking into account geographic, natural climatic and other features to maximize the economic and environmental effect.

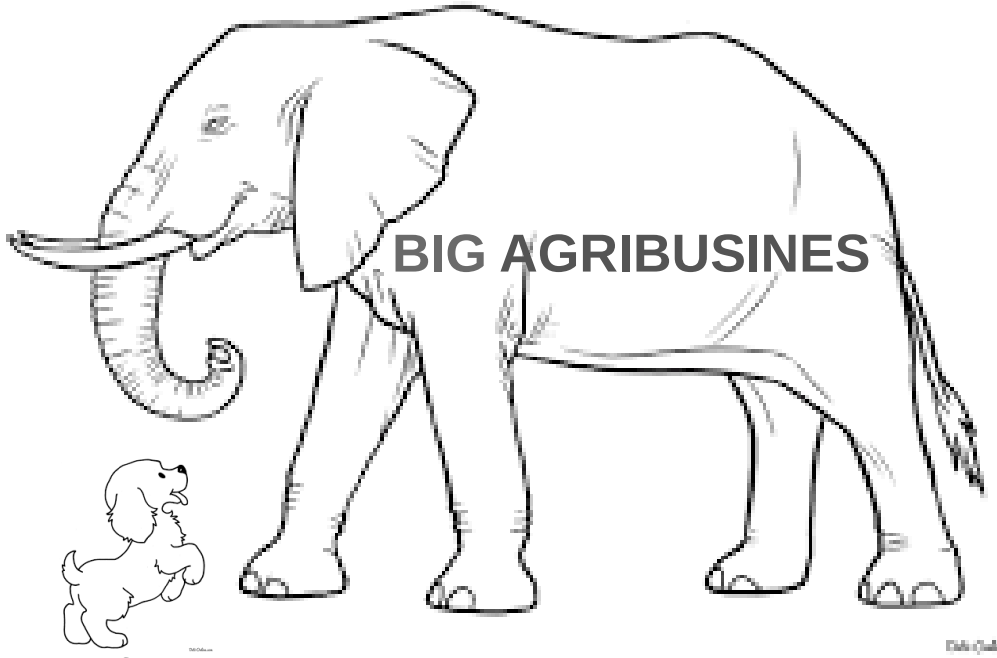
Conclusions and directions of further researches

1. To strengthen the economic security of the European countries, it is necessary to organize promoting Digital Innovation Hubs in Agriculture and comprehensive monitoring of all necessary indicators (using the integrated index) and begin to form bioenergetic clusters. For this, it is necessary that National innovation system of Ukraine requires certain changes, namely: the shift to innovative advanced resource-saving technologies, production of high-tech goods; comprehensive support and promotion of creation of technology parks, technopolises, agri-biotechnology clusters; the introduction of resource and energy conservation policies at all levels, the transition to renewable energy sources, including biomass, support for biomass producers and processors, creation of the necessary infrastructure.

2. Thus, it can be argued that bioeconomic security on the European continent is possible only if all European innovation systems are integrated into one complex, which will ensure a high probability of energy independence. The calculated index index has a high level of measurement uncertainty, since the indicators included in it need to be significantly expanded. But this index bioeconomic security clearly shows that four completely different countries that have individual advantages will be able to create a positive synergetic effect if they join into a single bioenergetic cluster.

Hypothesis Kowalski:

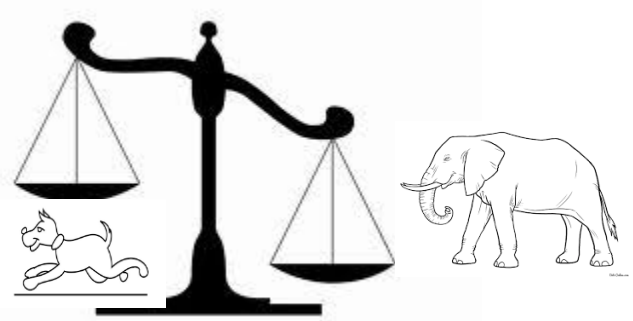
«Small farms can not partner with big agribusinesses»



small farms

small farms

ORGANIC AGRICULTURE	CONVENTIONAL AGRICULTURE




UKR
45 000


PL
15000 000


depositphotos

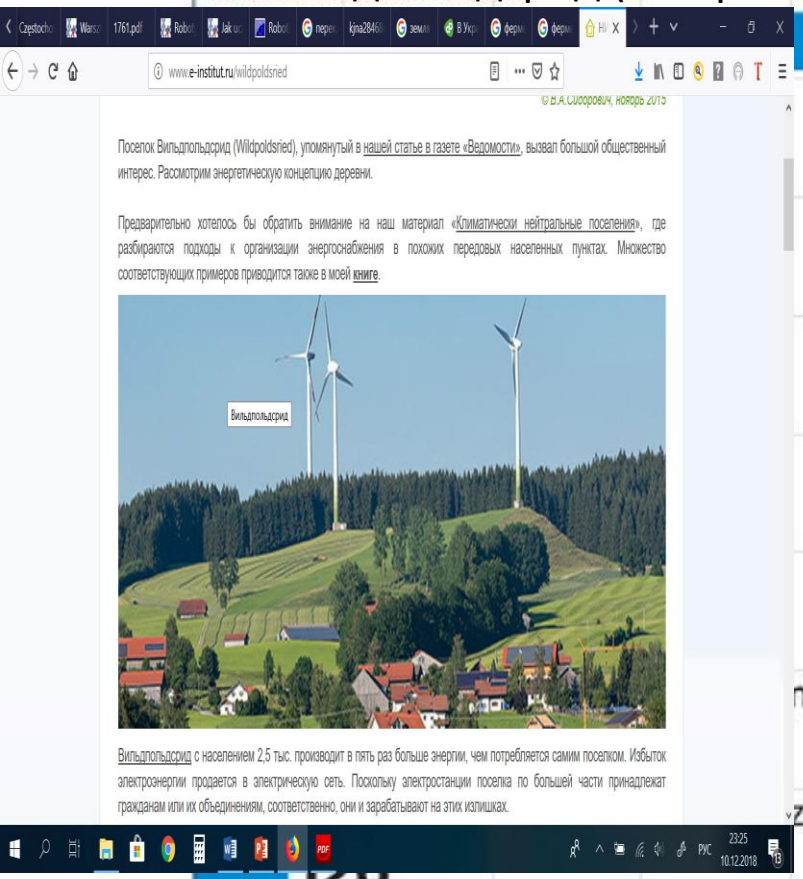

THANK YOU FOR YOUR ATTENTION
THE PRESENTATION IS OVER

Contact:
zwd@ukr.net

We are pleased to invite you to the Conference (May 2019) International Innovation Center, Institute of Agrarian Economics (Kyiv, Ukraine)

MOTHERLAND
Kyiv, Ukraine

Поселок Вильдпольдсрид (Wildpoldsried)



CORRUPTION PERCEPTIONS INDEX 2016

Search

2016 Rank	Country	2016 Score	2015 Score	2014 Score	2013 Score	2012 Score	Region
10	United Kingdom	81	81	78	76	74	Europe and Central Asia
14	Iceland	78	79	79	78	82	Europe and Central Asia
15	Belgium	77	77	76	75	75	Europe and Central Asia
17	Austria	75	76	72	69	69	Europe and Central Asia
19	Ireland	73	75	74	72	69	Europe and Central Asia
22	Estonia	70	70	69	68	64	Europe and Central Asia
23	France	69	70	69	71	71	Europe and Central Asia
29	Poland	62	63	61	60	58	Europe and Central Asia
90	The FYR of Macedonia	37	42	45	44	43	Europe and Central Asia
95	Kosovo	36	33	33	33	34	Europe and Central Asia
113	Armenia	33	35	37	36	34	Europe and Central Asia
123	Azerbaijan	30	29	29	28	27	Europe and Central Asia
123	Moldova	30	33	35	35	36	Europe and Central Asia
131	Kazakhstan	29	28	29	26	28	Europe and Central Asia
131	Russia	29	29	27	28	28	Europe and Central Asia
131	Ukraine	29	27	26	25	26	Europe and Central Asia
174	Korea (North)	12	8	8	8	8	Asia Pacific
1	Denmark	90	91	92	91	90	Europe and Central Asia
3	Finland	89	90	89	89	90	Europe and Central Asia
4	Sweden	88	89	87	89	88	Europe and Central Asia
5	Switzerland	86	86	86	85	86	Europe and Central Asia
6	Norway	85	88	86	86	85	Europe and Central Asia
8	Netherlands	83	84	83	83	84	Europe and Central Asia
10	Germany	81	81	79	78	79	Europe and Central Asia
10	Luxembourg	81	85	82	80	80	Europe and Central Asia