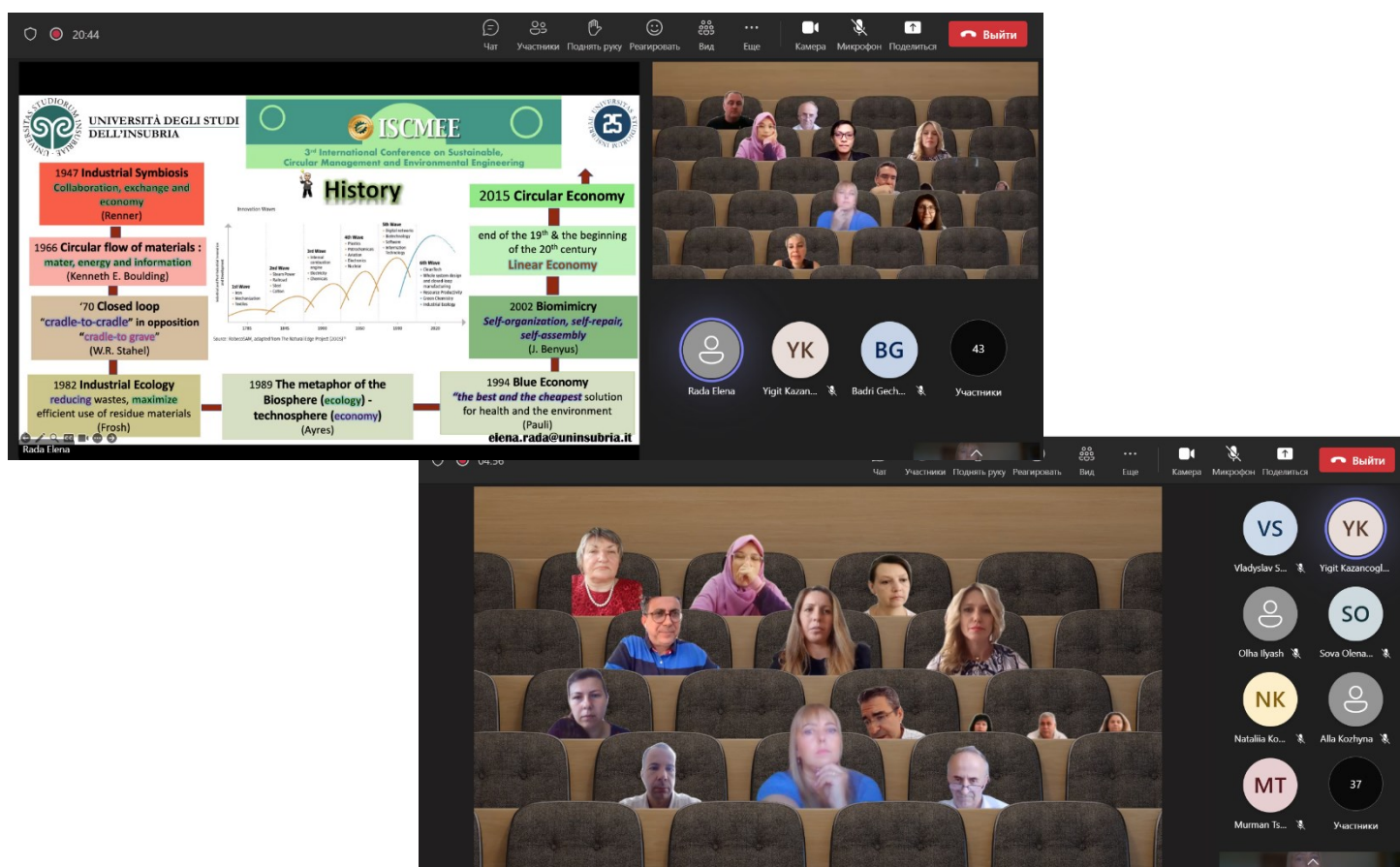




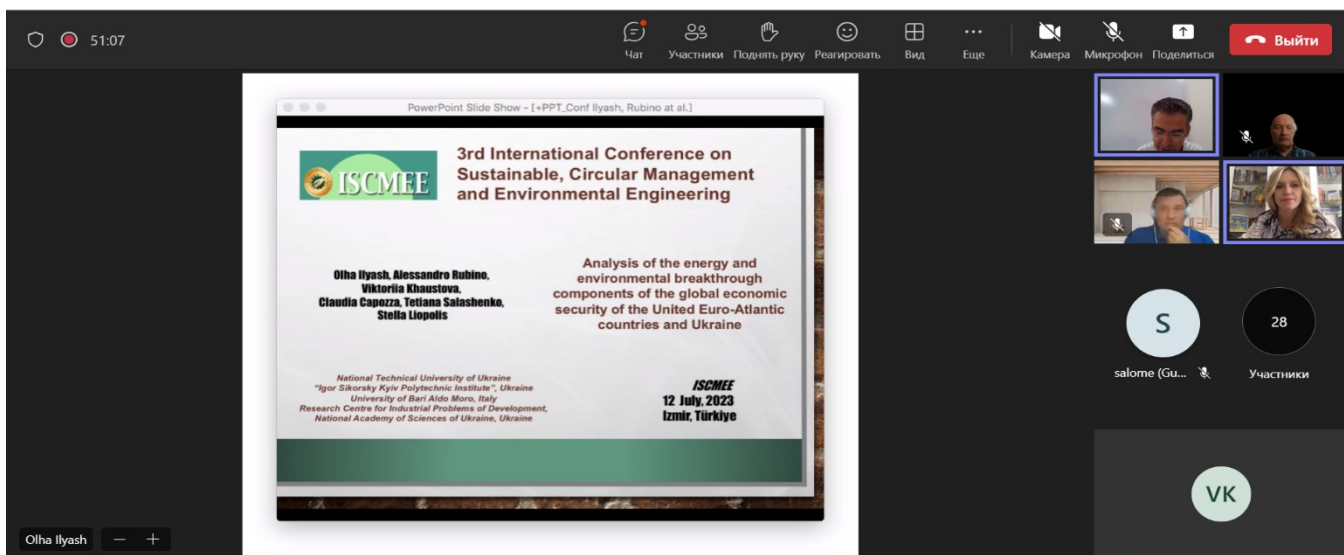
Науковці **Науково-дослідного центру індустріальних проблем розвитку** – директор, докт. екон. наук, професор **Вікторія ХАУСТОВА**, головний наук. співробітник, чл.-кор. НАНУ **Микола КИЗИМ**, старший науковий співробітник, канд. екон. наук **Тетяна САЛАШЕНКО**, завідувач відділом, канд. екон. наук **Володимир ШПІЛЕВСЬКИЙ**, взяли участь у роботі **3rd International Conference on Sustainable, Circular Management and Environmental Engineering (ISCMEE 2023, <https://iscmee.eu-science.com/>)**, що відбулася **12 липня 2023 року** на базі **Yasar University (Izmir, Türkiye)**.



На конференції представили доповіді, присвячені проблемам сталого розвитку, циркулярної економіки, енергетики, навколишнього середовища та ін. актуальних проблем, науковці з Туреччини, Італії, України, Індії, Болгарії, Грузії та інших країн світу.

Науковці **Науково-дослідного центру індустріальних проблем розвитку НАН України** представили разом зі своїми колегами з інших установ дві доповіді:

✦ **Olha Ilyash, Alessandro Rubino, Viktoriia Khaustova, Claudia Capozza, Tetiana Salashenko, and Stella Liopolis. Analysis of the energy and environmental breakthrough components of the global economic security of the United Euro-Atlantic countries and Ukraine;**



✦ *Mykola Kyzym, Viktoriia Khaustova, Volodymyr Shpilevskiy, Tetiana Salashenko, Svitlana Hrynkevych, and Oksana Kruchinina. Consistency of Trends in the Economic and Energy Development of Ukraine: Assessment and Analysis.*



Також Вікторія Хаустова також взяла участь в роботі наукового комітету конференції.

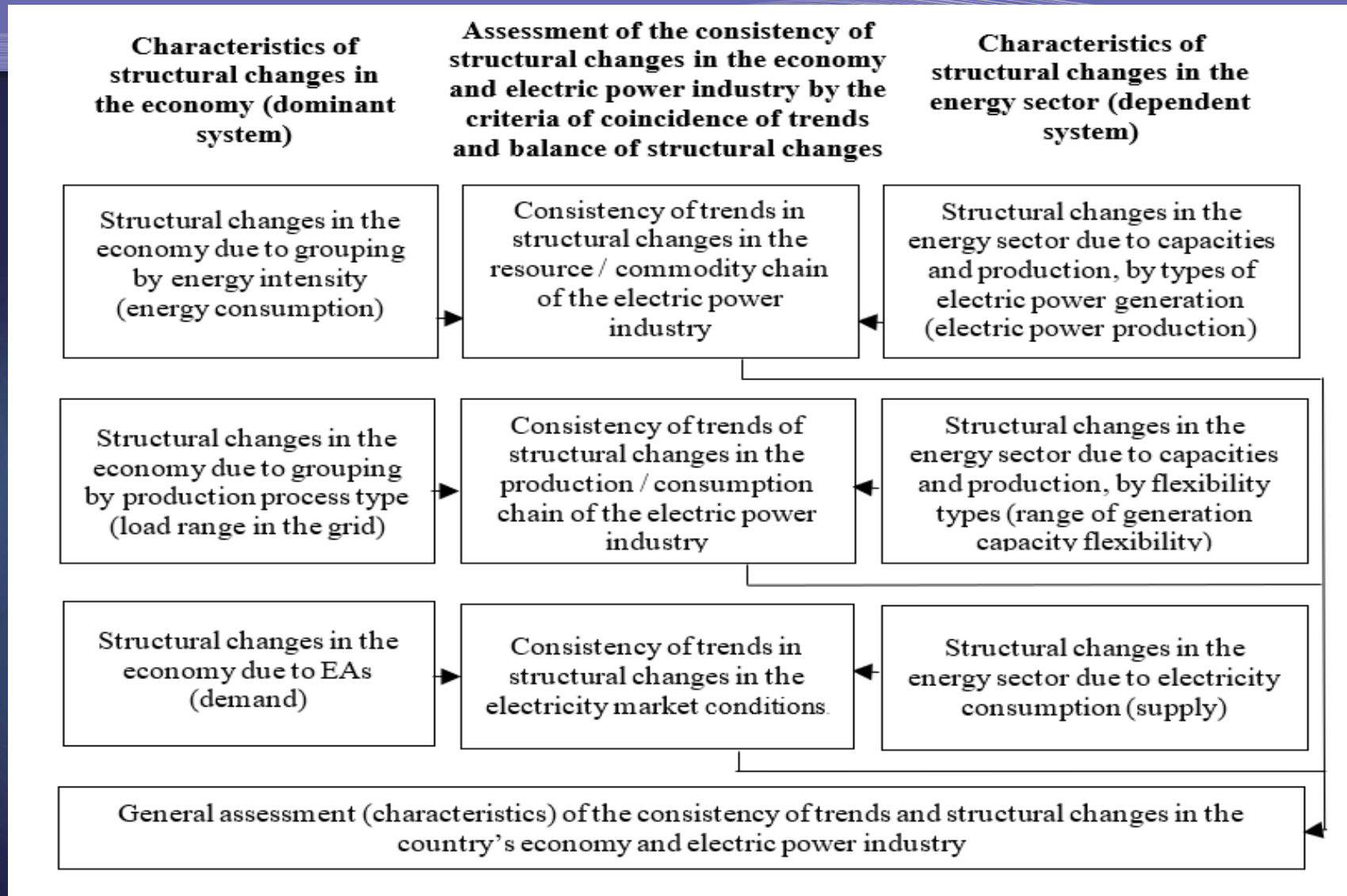


Передбачено, що матеріали Міжнародної конференції будуть опубліковані в серії **IOP: Earth and Environmental Science** (Online ISSN: 1755-1315, Print ISSN: 1755-1307) та подані до **Scopus (Elsevier)** для індексації.

CONSISTENCY OF TRENDS IN THE ECONOMIC AND ENERGY DEVELOPMENT OF UKRAINE: ASSESSMENT AND ANALYSIS

*MYKOLA KYZYM, VIKTORIIA KHAUSTOVA,
VOLODYMYR SHPILEVSKIY, TETIANA SALASHENKO,
SVITLANA HRYNKEVYCH AND OKSANA KRUCHININA*

Methodological approach to assessing the consistency of trends and structural changes in the economy and electric power industry of Ukraine



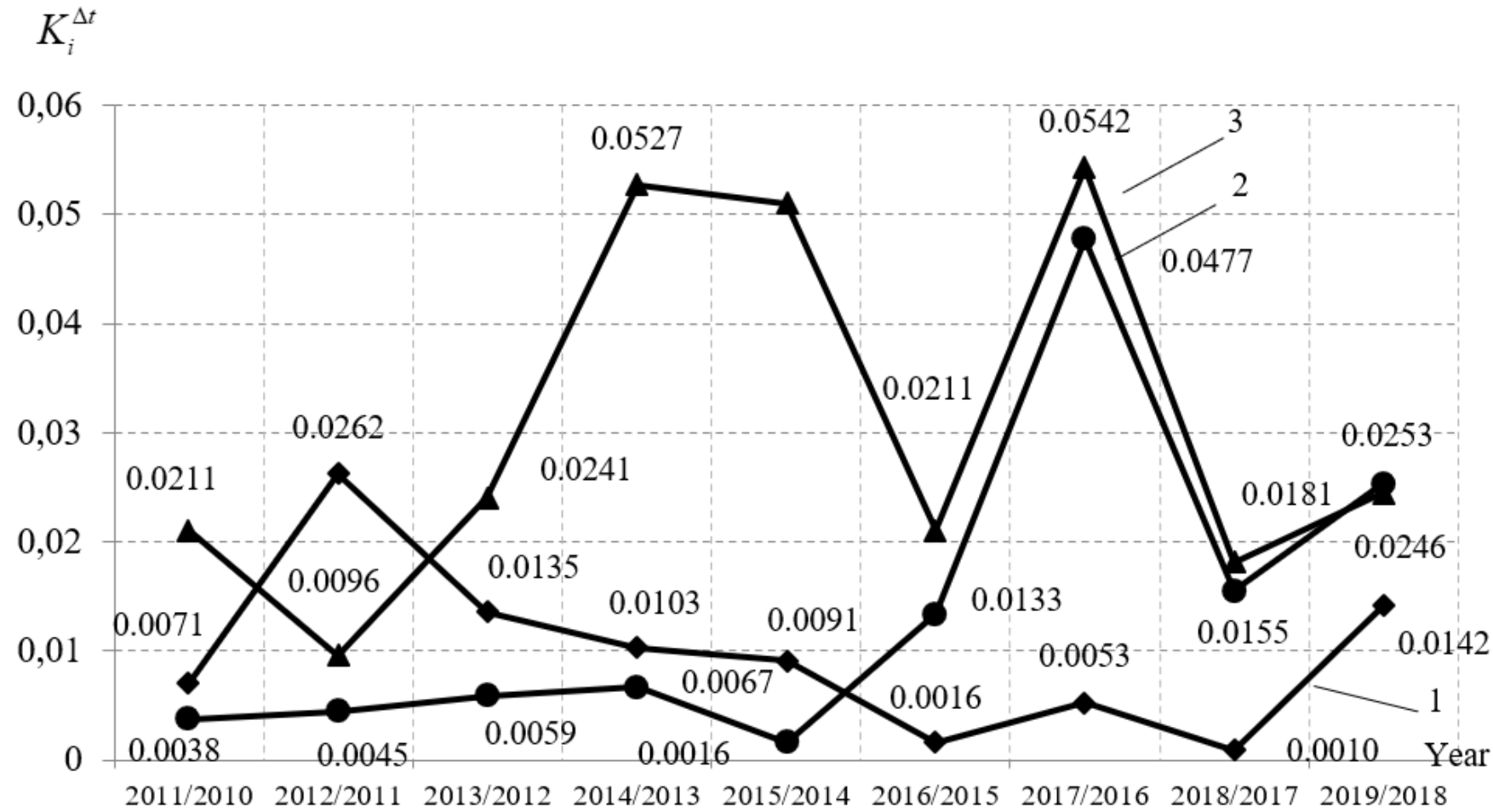
Assessment of structural change by energy intensity level of EA in the economy of Ukraine

Magnitude and direction of the structural change of the i th group in terms of level of energy intensity of EAs in Ukraine's economy for the Δ -th period ($I_i^{\Delta t}$): $I_i^{\Delta t} = \frac{d_i^{t2} - d_i^{t1}}{d_i^{t1}}$, where d_i^{t1} i d_i^{t2} are the share of the i -th EA group in terms of energy intensity in the country's economy in the base ($t1$) and reporting ($t2$) periods, respectively.

General characteristics of the direction of trends in the development of Ukraine's economy and electric power industry, 2010-2020 (NPP – nuclear power plant, TPP – thermal power plant, HPP – hydropower plant, RES – renewable energy sources)

Generation source	Share, %				Average absolute increase / decrease, %	
	d_{2010}	Rank	d_{2020}	Rank	For 2010 – 2020	Rank
Energy intensity level						
High energy intensive	26.75	2	21.98	2	-0.38	3
Average energy intensive	14.08	3	13.81	3	-0.03	2
Low energy intensive	59.17	1	64.21	1	0.41	1
Capacities (by generation types)						
NPP	25.27	2	26.89	2	0.18	3
TPP	64.47	1	54.66	1	-1.09	4
HPP	10.07	3	12.30	3	0.25	2
RES	0.19	4	6.15	4	0.66	1
Production (by generation types)						
NPP	47.20	1	55.20	1	0.89	1
TPP	45.77	2	36.57	2	-1.02	4
HPP	6.98	3	5.46	3	-0.17	3
RES	0.05	4	2.77	4	0.30	2

Behavior of composite indices of structural changes in Ukraine's economy and electric power industry due to EA energy intensity



1 – energy intensity; 2 – capacities (by generation type); 3 – production (by generation type)

Calculation of linear correlation coefficients for composite indices of structural changes in Ukraine's economy and electric power industry, 2010-2020

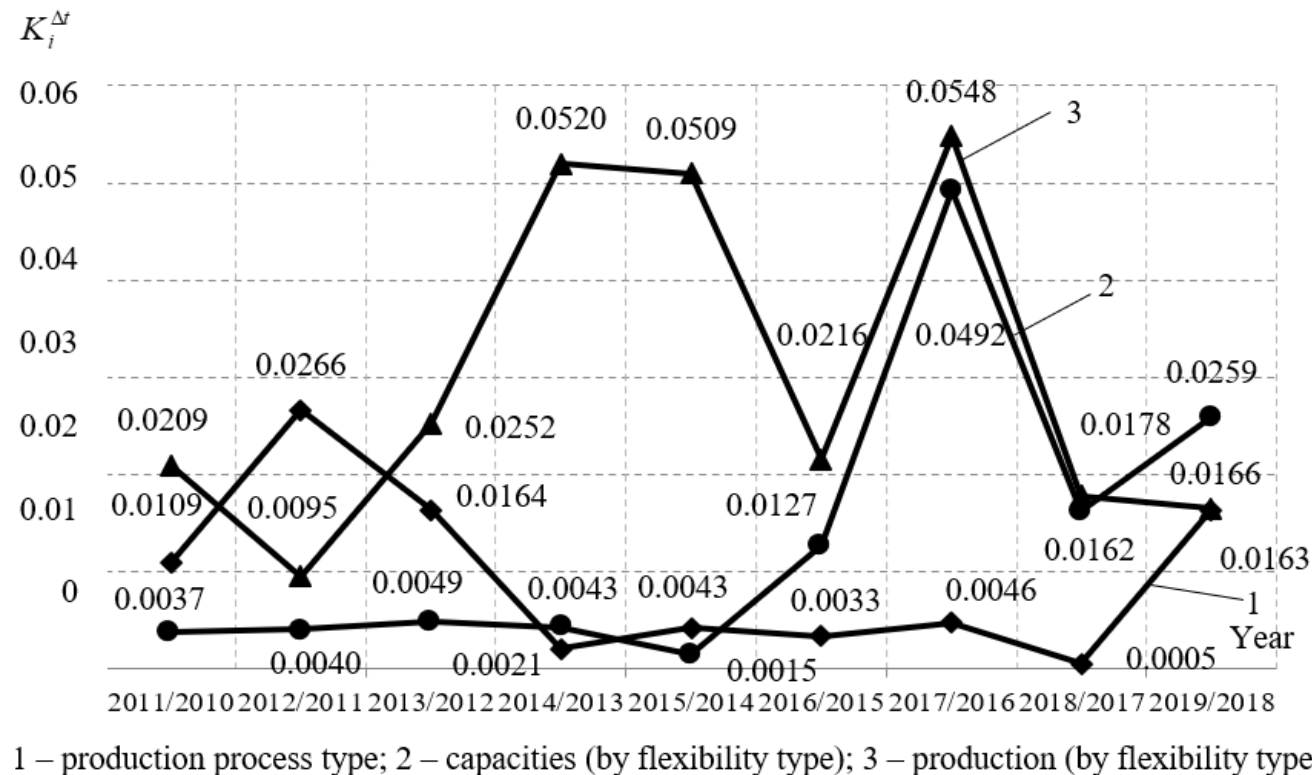
Indicators		Economy			Electric power industry				
		Energy intensity	Type of production process	Economic activities	Capacities (flexibility type)	Production (flexibility type)	Capacities (generation type)	Production (generation type)	Final consumption
Economy	Energy intensity	1.0000	0.8951	0.9233	-0.2958	-0.3000	-0.2911	-0.2751	0.4688
	Type of production process	0.8951	1.0000	0.6866	-0.1952	-0.5849	-0.2024	-0.5642	0.2882
	Economic activities	0.9233	0.6866	1.0000	-0.4007	-0.0397	-0.3961	-0.0108	0.5829
Electric power industry	Capacities (flexibility type)	-0.2958	-0.1952	-0.4007	1.0000	0.2585	0.9986	0.3026	-0.2827
	Production (flexibility type)	-0.3000	-0.5849	-0.0397	0.2585	1.0000	0.2790	0.9877	0.3158
	Capacities (generation type)	-0.2911	-0.2024	-0.3961	0.9986	0.2790	1.0000	0.3233	-0.2865
	Production (generation type)	-0.2751	-0.5642	-0.0108	0.3026	0.9877	0.3233	1.0000	0.2806
	Final consumption	0.4688	0.2882	0.5829	-0.2827	0.3158	-0.2865	0.2806	1.0000

The relationship between structural changes in the economy, regarding EA energy intensity, and in the capacities and production of electric power, regarding types of electric power generation: economy – electric power industry capacities (-0.2911) – weak and negative (inconsistency); economy – electric power production (-0.2751) – weak negative (inconsistency); electric power industry capacities – electric power production (0.3233) – moderate positive (inconsistency).

General characteristics of trends in the development of Ukraine's economy and electric power industry in 2010-2020

Characteristics	Share, %				Average absolute increase / decrease, %	
	d ₂₀₁₀	Rank	d ₂₀₂₀	Rank	For 2010 – 2020	Rank
Type of production process						
Continuous	32.26	2	27.17	2	-0.55	2
Discrete	67.84	1	72.83	1	0.55	1
Capacities (flexibility type)						
Non-flexible	25.27	2	26.89	2	0.18	2
Semi-flexible	64.47	1	54.66	1	-1.09	3
Flexible	10.26	3	18.45	3	0.91	1
Production (flexibility type)						
Non-flexible	47.20	1	55.20	1	0.89	1
Semi-flexible	45.77	2	36.57	2	-1.02	3
Flexible	7.04	3	8.23	3	0.13	2

Behavior of composite indices of structural changes in Ukraine's economy and electric power industry due to types of EA production process



The relationship between the structural changes in the economy, in terms of type of EA production process, and in the capacities and production of the electric power industry, in terms of power generation, by flexibility type, can be characterized as follows: economy – electric power industry capacities (-0.1952) – weak negative (inconsistency); economy – electric power production (-0.5849) – significant negative (consistency); electric power industry capacities – electric power production (0.2585) – weak positive (inconsistency).

General characteristics of the trends in the development of Ukraine's economy and electric power industry in 2010-2020

Economic activity / final consumption	Share, %				Average absolute increase / decrease, %	
	d ₂₀₁₀	Rank	d ₂₀₂₀	Rank	For 2010 – 2020	Rank
Economic activity						
Agriculture, forestry and fishing	8.17	4	10.35	2	0.242	3
Mining of coal and lignite	1.81	19	1.13	22	-0.075	26
Extraction of crude petroleum and natural gas	0.73	27	1.53	20	0.090	6
Mining of metal ores; other mining and quarrying; mining support service activities	2.39	16	2.51	15	0.012	14
Manufacture of food products, beverages and tobacco products	8.27	3	7.91	3	-0.040	22
Manufacture of textiles, wearing apparel, leather and related products	0.75	26	0.53	29	-0.024	19
Manufacture of wood and of products of wood and cork except furniture; manufacture of paper and paper products; publishing activities	1.76	20	2.12	18	0.040	9
Manufacture of coke and coke products	1.20	22	0.61	27	-0.065	24
Manufacture of refined petroleum products	2.13	17	0.61	28	-0.169	28

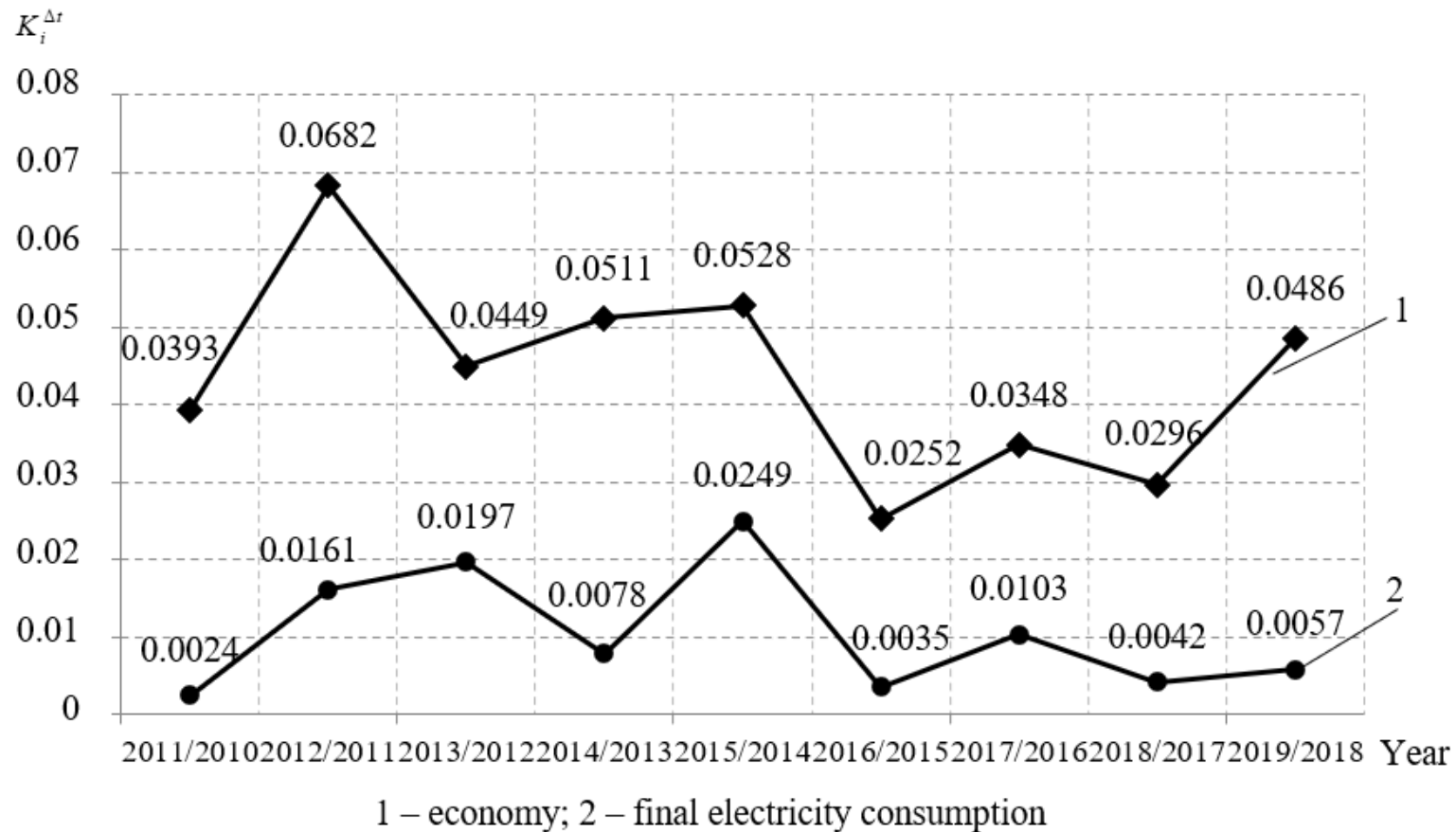
General characteristics of the trends in the development of Ukraine's economy and electric power industry in 2010-2020

Manufacture of refined petroleum products	2.13	17	0.61	28	-0.169	28
Manufacture of chemicals and chemical products	2.87	13	2.52	14	-0.039	21
Manufacture of other non-metallic mineral products	1.34	21	1.67	19	0.037	12
Manufacture of basic metals and manufacture of fabricated metal products	9.36	2	5.92	6	-0.382	31
Mechanical engineering	5.49	6	2.93	12	-0.285	30
Other manufacturing	0.85	24	1.31	21	0.051	8
Electricity, gas, steam and air conditioning supply	4.07	8	4.83	7	0.084	7
Water supply; sewerage, waste management and remediation activities	0.65	28	0.64	26	-0.001	15
Construction	4.14	7	6.82	5	0.298	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	12.29	1	12.63	1	0.038	10
Transportation and storage	6.95	5	6.87	4	-0.009	17
Postal activities and telecommunications	1.82	18	1.00	23	-0.091	27
Accommodation and food service activities	0.95	23	0.84	24	-0.011	18
Financial and insurance activities	3.99	9	2.19	17	-0.200	29
Real estate activities	3.82	10	4.06	10	0.027	13

General characteristics of the trends in the development of Ukraine's economy and electric power industry in 2010-2020

Renting and leasing of machinery and equipment; renting and leasing of personal and household goods; legal and accounting activities, engineering, business services	2.72	14	4.51	8	0.199	4
Computer programming, consultancy and related activities	0.61	29	3.04	11	0.270	2
Scientific research and development	0.47	30	0.41	31	-0.007	16
Public administration and defence; compulsory social security	3.05	12	4.22	9	0.130	5
Education	3.51	11	2.90	13	-0.069	25
Human health and social work activities	2.69	15	2.21	16	-0.054	23
Arts, sports, entertainment and recreation	0.78	25	0.47	30	-0.034	20
Other service activities	0.38	31	0.72	25	0.038	11
Final consumption						
Economy (except the utilities sector)	57.9	1	51.9	1	-0.66	4
Utilities sector	12.4	3	12.5	3	0.01	3
Population	25.5	2	29.3	2	0.42	1
Other household consumers	4.2	4	6.2	4	0.22	2

Behavior of composite indices of structural changes in Ukraine's economy and final electricity consumption



The relationship between structural changes in the economy, regarding changes in the structure of EAs, and in the final consumption of electricity, by consumer groups: economy – final consumption of electricity (0.5829) – significant positive (consistency)

General assessment (characteristics) of the consistency of trends and structural changes in Ukraine's economy and electric power industry, 2010-2020

Features of the economic and energy systems			Direction of trend changes in the economy	Electric power industry									
				Baseload power structure				Flexible generation structure				Final electricity consumption	
				installed capacities		electric power generation		installed capacities		electric power generation			
				trend	change	trend	change	trend	change	trend	change	trend	change
Direction of trend changes in the energy sector				NSC		DC		NSC		DC		DC	
Economy	Energy intensity level of EAs		trend	DC	INC		C		INC		C		
			change			INC		INC					
	Structure of consumption by type (mode of energy consumption) of the EA production process		trend	DC	INC		C		INC		INC		C
			change						INC			C	
	Structure of the economy by EAs		trend	DC	INC		C		INC		C		C
			change										

Note: INC – inconsistency, C – consistency, NSC – no significant changes, DC – decrease

The background features a light blue gradient with several thin, white, wavy lines that create a sense of motion and depth. There are three solid color blocks: a dark blue rectangle in the top right corner, a red rectangle in the bottom left corner, and a white rectangle in the bottom right corner.

THANK YOU FOR YOUR ATTENTION