НАЦІОНАЛЬНА АКАДЕМІЯ
НАУК УКРАЇНИ

**ІНСТИТУТ ПРОБЛЕМ
МОДЕЛЮВАННЯ
В ЕНЕРГЕТИЦІ ім. Г.Є. ПУХОВА**

THE NATIONAL ACADEMY OF
SCIENCES OF UKRAINE

**G.E. PUKHOV INSTITUTE FOR
MODELLING IN ENERGY
ENGINEERING**

MAIN RESULTS OF ACTIVITY

G.E. Pukhov Institute for modeling in energy engineering National Academy of Sciences of Ukraine for 2025

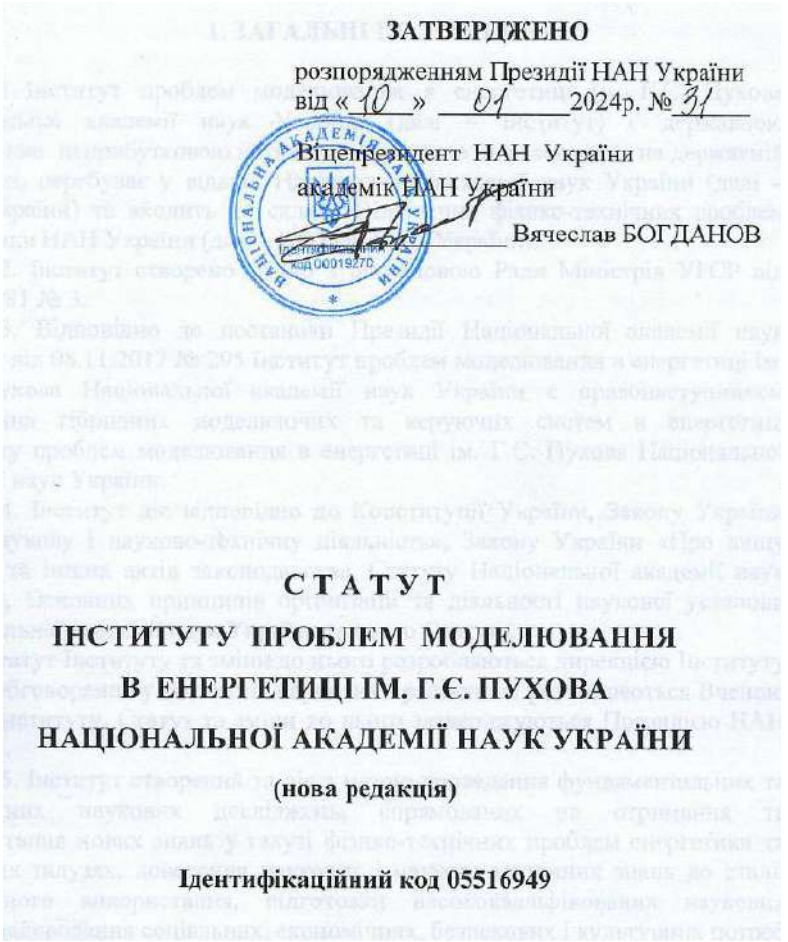
presenter :
Volodymyr Volodymyrovych Mohor
director G.E. Pukhov Institute for modeling in energy engineering NAS of Ukraine

1. General information about the Institute

ОСНОВНІ НАУКОВІ НАПРЯМИ

The main scientific areas of activity of the Institute according to the Statute are:

1. fundamental problems of theoretical electrical engineering, mathematical and electronic modeling of processes and systems in energy;
2. problems of management and ensuring reliable functioning complex technical systems in energy and other branches of the people farms based on computer equipment;
3. problems of creating modeling systems for scientific research and practical use.



ЗАТВЕРДЖЕНО
розпорядженням Президії НАН України
від « 10 » 01 2024р. № 31
Віцепрезидент НАН України
академік НАН України
Вячеслав БОГДАНОВ

СТАТУТ
ІНСТИТУТУ ПРОБЛЕМ МОДЕЛЮВАННЯ
В ЕНЕРГЕТИЦІ ІМ. Г.Є. ПУХОВА
НАЦІОНАЛЬНОЇ АКАДЕМІЇ НАУК УКРАЇНИ
(нова редакція)
Ідентифікаційний код 05516949

INSTITUTE STRUCTURE

The structure of the Institute was approved by the Decision of the DEET Bureau of the NAS of Ukraine, protocol dated 01.21.2025 № 1 § 4 and consists of :

MANAGEMENT

RESEARCH DEPARTMENTS

1) Department of mathematical and computer modeling
2) Department of mathematical and econometric modeling (as part of the department: Laboratory of mathematical modeling of energy markets)
3) Department of modeling of energy processes and systems
4) Department of hybrid modeling and control systems in energy

SCIENTIFIC, TECHNICAL AND SCIENTIFIC AND ORGANIZATIONAL UNITS

1) Scientific and organizational department
2) Sector "Scientific and educational center of cyberphysical systems
3) Post-graduate study
4) Information protection service
5) Editorial office of the scientific journal "Electronic modeling

AUXILIARY DEPARTMENTS

Accounting and Financial Reporting Division; Planning and Economic Division; Logistics Supply Division; Technical Division; Human Resources Division; Office; Archives Service; Scientific and Technical Library; Civil Protection, Technogenic and Fire Safety Service; Occupational Safety and Health Service

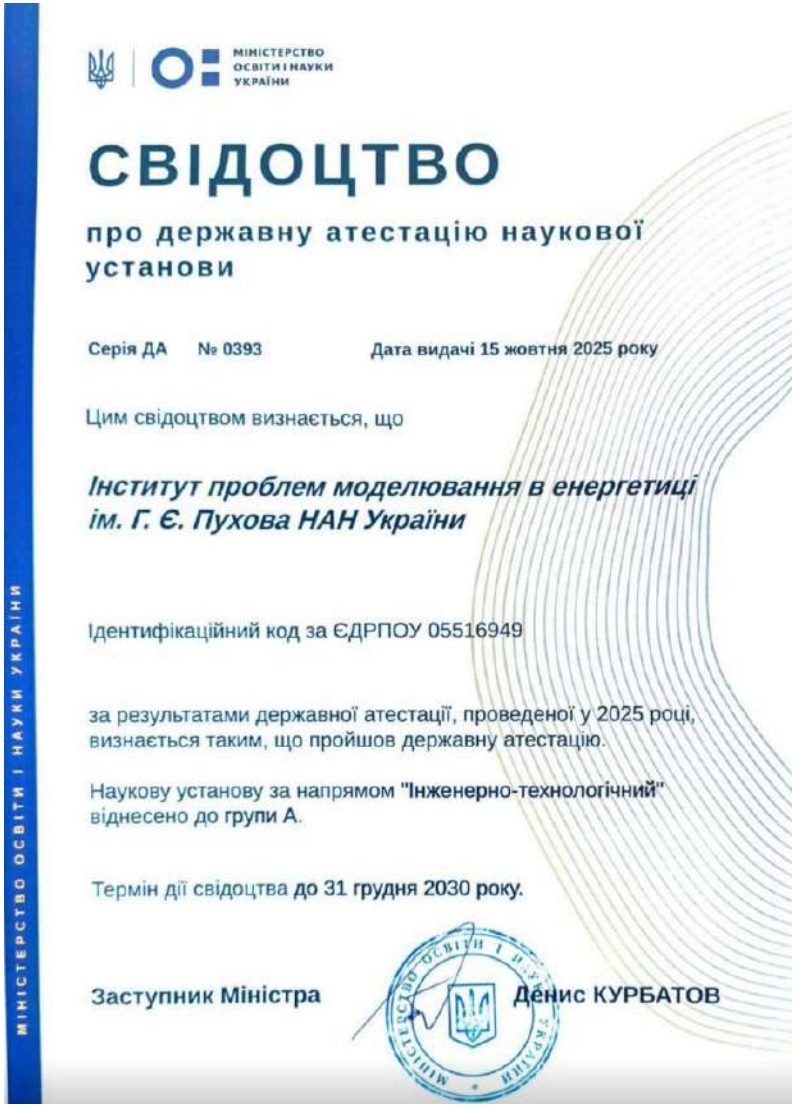
AVAILABILITY OF NATIONAL PROPERTY and CENTERS FOR COLLECTIVE USE

1) there are no scientific objects that have the official status of national property;

2) There are no centers for collective use of scientific equipment.

INFORMATION ON STATE CERTIFICATION OF THE MINISTRY OF EDUCATION AND CULTURE AND EVALUATION OF THE ACTIVITIES OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE

1) According to the results of the state certification of scientific institutions (order of the Ministry of Education and Science of Ukraine dated 15.10.2025 № 1360), carried out in 2025, the Institute of Modeling Problems in Energy named after. G.E. Pukhova of the National Academy of Sciences of Ukraine was recognized as having passed the state certification and assigned to group A in the direction of "Engineering and Technological", receiving an attestation score of 88, a classification score of 33.5955, an expert score of 8.0667 (Certificate of state certification of a scientific institution dated 15.10.2025 Series DA № 0393).
2) In 2020, the Institute underwent an evaluation, based on the results of which, in accordance with the Resolution of the Presidium of the National Academy of Sciences of Ukraine № 244 dated November 27, 2020, the Institute of Modeling Problems in Energy named after. G.E. Pukhova of the National Academy of Sciences of Ukraine is classified as "A".



МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

СВІДОЦТВО

про державну атестацію наукової установи

Серія ДА № 0393 Дата видачі 15 жовтня 2025 року

Цим свідоцтвом визнається, що

Інститут проблем моделювання в енергетиці ім. Г. Є. Пухова НАН України

Ідентифікаційний код за ЄДРПОУ 05516949

за результатами державної атестації, проведеної у 2025 році, визнається таким, що пройшов державну атестацію.

Наукову установу за напрямом "Інженерно-технологічний" віднесено до групи А.

Термін дії свідоцтва до 31 грудня 2030 року.

Заступник Міністра Денис КУРБАТОВ

TRAINING OF SCIENTIFIC PERSONNEL

The Institute has two specialized academic councils with the right to accept for consideration and conduct the defense of dissertations for obtaining the scientific degree of doctor (candidate) of technical sciences :

1) specialized Academic Council D 26.185.01 with a term of office of 3 (three) years in specialties 01.05.02 - "Mathematical modeling and computational methods" (technical sciences) and 05.13.05 - "Computer systems and components" (technical sciences), formed by the Order of the Ministry of Education and Science of Ukraine dated 10.10.2025. № 1346;
2) specialized academic council D 26.185.02 with a term of office of 3 (three) years in specialties 05.13.06 - "Information technologies" (technical sciences) and 05.13.21 - "Information protection systems", established by the Order of the Ministry of Education and Science of Ukraine dated 07.08.2025. № 986.

By the decision of NAZYAVO, adopted on 24.06.2025 protocol № 10 (82), the Institute received accreditation of the educational and scientific program "Computer Science" (identifier in EDEBO 48002), level of higher education Doctor of Philosophy, field of knowledge 12 Information technologies, specialty 122 Computer science third (educational and scientific/educational and creative) level (Certificates of accreditation of the educational and scientific program 122 Computer science dated 24.06.2025 № 16442 validity period until 01.07.2030 and F3 Computer science dated 24.07.2025 № 18201 validity period until 01.07.2030).

The Institute operates a doctoral program in the specialty "Computer Science".

EDITORIAL ACTIVITY

1) International scientific and theoretical journal "Electronic modeling" (media identifier R30-04130, ISSN 0204-3572 (print), ISSN 2616-9525 (on-line), URL of the publication's own web resource https://www.emodel.org.ua, Journal DOI https://doi.org/10.15407/emodel).

2) The international scientific and theoretical journal "Electronic Modeling" is abstracted and indexed in the Sci Tech Premium Collection (ProQuest), Index Copernicus.

3) Free for readers and authors.

4) Specialist in technical sciences (cathetorium B).

Електронне моделювання
Electronic modeling

Засновник(и): **Національна академія наук України**
Інститут проблем моделювання в енергетиці ім. Г.Є.Пухова НАН України
Науки: **технічні /01.05.02, 01.05.03, 01.05.04, 05.13.03, 05.13.05, 05.13.06, 05.13.07, 05.13.09, 05.13.12, 05.13.21, 05.13.22, 05.13.23 / (24.05.2018)**
перереєстрація
технічні (02.07.2020)
Спеціальності: **151 - Автоматизація та комп'ютерно-інтегровані технології (24.05.2018)**
121 - Інженерія програмного забезпечення (24.05.2018)
122 - Комп'ютерні науки (24.05.2018)
125 - Кібербезпека та захист інформації (24.05.2018)
123 - Комп'ютерна інженерія (02.07.2020)
126 - Інформаційні системи та технології (02.07.2020)
183 - Технології захисту навколишнього середовища (02.07.2020)

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2. CONSEQUENCES OF ARMED AGGRESSION

PERSONNEL CHANGES and MATERIAL LOSSES

1) In 2025, 4 researchers were abroad due to hostilities without dismissal.
2) At the same time, the usual movement of personnel continued (3 were accepted, 4 were eliminated).
3) There are no direct material losses (destruction/loss of property) as a result of armed aggression.

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3. Statistical data for the reporting year, taking into account the indicators used in the State certification of scientific institutions

RESEARCH WORKS BY TYPES OF TOPICS

Type of topic of scientific research	Number of SDRs implemented in the reporting year				Volume of financing, thousand hryvnias		% to total funding
	Всього		including completed in the reporting year				
	ЗФ	СФ	ЗФ	СФ	ЗФ	СФ	
1. State themes	0	**3**	**0**	**2**	**0**	**5331,17**	**12,35**
1.2. Projects of the National Research Fund of Ukraine:	x	3	x	2	x	5331,17	12,35
2. Program-target and competition topics of the National Academy of Sciences of Ukraine	**3**	x	**1**	x	**5950**	x	**13,78**
2.1. Topics carried out within the framework of the competition in the direction "Supporting priority scientific research and scientific and technical (experimental) developments" of budget program 6541230:	1	x	0	x	5100	x	11,81
2.6. Research works of young scientists of the National Academy of Sciences of Ukraine	1	x	0	x	150	x	0,35
2.7. Grants of the National Academy of Sciences of Ukraine to research laboratories/groups of young scientists:	1	x	1	x	700	x	1,62
3. Departmental topic	**13**	**0**	**5**	**0**	**20892,5**	**0**	**48,38**
3.1. Topics of fundamental research 6541030	10	x	3	x	18489,5	x	42,82
3.2. Topics of applied research 6541030	3	x	2	x	2402,94	x	5,56
4. Search topic	0	x	0	x	0	x	**0,00**
5. Contractual subject	**x**	**29**	**x**	**14**	**x**	**11009,1**	**25,49**
5.1. Topics financed within the framework of contracts and contracts with domestic and foreign customers (fundamental research)	x	19	x	6	x	2326,23	5,39
5.2. Topics financed within the framework of contracts and contracts with domestic and foreign customers (applied research)	x	6	x	6	x	218,628	0,51
5.3. Topics carried out at the expense of grants from international and foreign organizations	x	4	x	4	x	8464,24	19,60
IN TOTAL	**16**	**32**	**6**	**16**	**26842,5**	**16340,3**	**100,00**

FINANCING OF THE INSTITUTE (in thousand hryvnias)

Type of topic \ years	2020	2021	2022	2023	2024	2025
GENERAL FUND OF THE STATE BUDGET in total:	**14 784,1**	**19 690,1**	**20 481,9**	**16 462,9**	**21 133,9**	**26 842,5**
PROGRAM-TARGET AND COMPETITION TOPICS OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE:	**870,0**	**2 140,0**	**1 375,0**	**209,7**	**850,0**	**5 950,0**
DEPARTMENTAL TOPICS:	**13 914,1**	**17 550,1**	**19 106,9**	**16 253,2**	**20 283,9**	**20 892,2**
SPECIAL FUND OF THE STATE BUDGET Total (funds received):	**4 129,2**	**5 508,8**	**2 363,8**	**13 949,0**	**11 504,4**	**18 590,3**
including contractual topics (including. NFSU)	2 071,0	2 215,2	1 465,2	4 336,3	8 160,5	7 876,0
including property lease	1 413,3	1 292,6	704,6	1 165,6	1 180,7	2 250,0
including international grant agreements	644,9	2 001,0	194,0	8 447,1	2 163,8	8 464,2
OVERALL FUNDING:	**18 913,3**	**25 1989,7**	**22 845,7**	**30 411,9**	**32 638,4**	**45 432,8**

CAPITAL EXPENDITURES ON EQUIPMENT /EQUIPMENT TO INCREASE THE ENERGY EFFICIENCY OF BUILDINGS, IMPLEMENTATION OF GREEN ENERGY TECHNOLOGIES

1) In 2025, there are no capital expenditures on equipment/equipment to increase the energy efficiency of buildings.

2) In 2025, there are no capital expenditures on the implementation of green energy technologies.

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PERSONNEL OF THE INSTITUTE

Indicator \ years	2020	2021	2022	2023	2024	2025
Total number of employees (without part-time employees)	134 (110)	130 (112)	125 (110)	125 (102)	132(99)	136(94)
Number of scientific workers (without part-time employees)	80 (46)	75 (47)	71 (49)	72 (43)	76 (44)	80 (44)
Number of academicians of the National Academy of Sciences of Ukraine	-	-	-	-	-	-
Number of corresponding members of the National Academy of Sciences of Ukraine	3	3	2	2	2	2
Number of doctors of science	13	17	16	15	15	16
Number of candidates of sciences	20	18	22	19	21	20
Number of candidates of sciences under the age of 35	4	4	4	2	1	2
Number of doctors of science under the age of 40	-	1	1	1	1	1

PERSONNEL OF THE INSTITUTE

Indicator \ years	2020	2021	2022	2023	2024	2025
Average age of scientific workers	58,6	59,64	56,0	56,06	56,88	56,3
Average age of doctors of science	70,4	65,64	62,5	60,07	61,07	61,42
Average age of candidates of sciences	54,8	54,7	53,5	52,15	54,19	52,0

AVERAGE SALARY OF EMPLOYEES OF THE INSTITUTE

Показник \ роки	2020	2021	2022	2023	2024	2025
Average salary of employees (according to the staff list)	9 044	10 064	12 845	14 142	16 899	21752
Average salary of scientific employees (according to the staff list)	10 280	11 848	15 353	16 903	19 093	25397

TRAINING OF SCIENTIFIC PERSONNEL

Indicator \ years	2020	2021	2022	2023	2024	2025
Number of doctoral students	4	4	4	4	4	6
number of postgraduate students	21	22	31	42	41	37
Number of doctoral theses defended by employees	2	3	0	1	3	0
The number of candidate theses defended by employees (including the Doctor of Philosophy)	2	6	0	1	1	5

EDITORIAL ACTIVITY

Number \ years	2020	2021	2022	2023	2024	2025
Number of monographs indexed in Scopus and /or WoS	0	1	0	0	0	1
Number of monographs published abroad in the languages of OECD and /or EU countries	0	0	0	0	1	1
The number of monographs published in Ukraine and other monographs	3	5	8	2	5	1
Number of published sections of monographs indexed in Scopus and/or WoS	5	9	6	2	6	7
The number of scientific articles indexed in Scopus and/or WoS in scientific journals with quartiles Q1, Q2	1	5	7	2	6	14
The number of scientific articles indexed in Scopus and/or WoS in scientific journals with quartiles Q3, Q4	6	7	7	9	10	22
Number of scientific articles indexed in Scopus and /or WoS - Total	22	37	25	32	30	52
The number of scientific articles published in Ukrainian publications of category B	42	35	37	30	38	53
Number of published dictionaries, reference books, textbooks, manuals, textbooks, catalogs of taencyclopedias, author. sheet.	14,8	14,2	24,2	11,8	33,5	53,2

INVENTIVE ACTIVITY

years	2020	2021	2022	2023	2024	2025
Useful models						
- **applications submitted**	3	4	-	1	1	1
- **patents obtained**	6	3	2	1		1
trademarks for goods and services						
- applications submitted		-	-	1	-	-
- certificates received	-	2	-	-	1	-
Copyright registration (submitted/received)						
- scientific works	2	1	5	2 / 5	1	15 / 1
- databases, computer programs	2	5	5	- / 3	1	6 / 9

HIRSCH INDEX INFORMATION

NHR Ukrainian National H-index Ranking 2025

Member of the ranking

G.E. Pukhov Institute for Modelling in Energy Engineering of the National Academy of Sciences of Ukraine

Інститут проблем моделювання в енергетиці ім. Г.Є. Пухова

Criterion	National H-index	Scopus	Web of Science	Google Scholar
H-index	16	21	8	37
Position	175	75	79	98

Date issued: 05/02/2026

Organization Page: https://ua.h-index.com/g-e-pukhov-institute-for-modelling-in-energy-engineering-of-the-national-academy-of-sciences-of-ukraine

HIRSCH INDEX INFORMATION - SCOPUS

Позиція	ПІБ	H-index
1	Artemchuk Volodymyr O.	19
2	Kovalchuk Lyudmila V.	7
3	Kameneva Iryna P.	6
4	Biloborodova Tetiana	5
5	Mokhor V. V.	5
6	Shevchenko S. S.	5
7	Honchar Serhii	5
8	Saukh Sergii Ye	4
9	Chemerys O. A.	4
10	Kutsan Yu G.	4
11	Khudyntsev M. M.	3
12	Dusheba Valentyna V.	3
13	Sushko Sergii V.	3
14	Boltov Yehor	3
15	Onyskova Alla	3
16	Komarov Maksym	3
17	Zubok Vitalii Y.	2
18	Davydiuk Andrii	2
19	Verlan Andriy A.	2
20	Berezkin Andrei L.	2
21	Davydenko Anatolii N.	2
22	Hilgurt Serhii Ya	2
23	Tkachenko Volodymyr	2
24	Evdokimov V. A.	2
25	Vynnychuk Stepan	2
26	Derenh Y.	2
27	Kryvakovska Regina	2
28	Lysenko Evgen	2
29	Lukashevych Ya P.	2
30	Polukhin A. V.	2
31	Bakalynskyi Oleksandr	1
32	Samoylov V. D.	1
33	Terekhov Volodymyr	1

ACTIVITIES TO ATTRACT GRANT FUNDS in 2025.

Part 1 - Applications submitted for national competitions

№ п/п	contest organizer	Project name	Name of the competition	Has the application received funding	execution time	Total amount of funding, thousand hryvnias
1	National Research Foundation of Ukraine	A protected interference-resistant system for transmitting video information from an unmanned aerial vehicle	Science for strengthening Ukraine's defense capabilities	yes	2025-2026	5 409,19
2	National Research Foundation of Ukraine	Parallel methods and algorithms for solving problems of mixed integer linear programming for planning the development of structurally changing and resistive electric power systems of Ukraine	Advanced science in Ukraine 2026-2028	yes	2026-2028	5 713,45

ACTIVITIES TO ATTRACT GRANT FUNDS IN 2025.
Part 2 - Applications submitted for international competitions

№ п/п	grant program	Project title	Has the application received funding	execution time	Total funding, Euro
1	Horizon Europe	AETHER: Adaptive Ecosystem of Trust and Hybrid Agentic Recovery	under review	2026-2029	125000,0
2	Horizon Europe	ECRIS – Emergency Communication and Response Inclusive System	under review	2026-2029	185300,0
3	Horizon Europe	EMPOWER - Empowering Municipalities to Plan and Operate for a Whole-of-Europe Energy Resilience	under review	2026-2029	155200,0
4	Horizon Europe	TWIN4FOOD: A cyber-physical-space digital twin for adaptive resilience of food critical infrastructures	under review	2026-2029	115630,0
5	Horizon Europe	WISER: Proposal title Water Innovation for Sustainability, Equity & Resilience	under review	2026-2029	125500,0
6	Horizon Europe	X-Rescue: Deployable Modular Robotics for Disaster and Conflict-Affected Zones	under review	2026-2029	0,0
7	NATO SPS MYP	Supply Chain Resilience for Biomanufacturing and Emerging Technologies	2 feeding phase	-	151812,0
8	NATO SPS MYP	Secure-by-design platform architecture with encryption and integrity checks	rejected	-	-
9	NATO SPS MYP	ENDURECOMM: Resilient6G-ready communication capabilities for enhanced UAV operations autonomy and cyberdefence	2 feeding phase	-	83500,0
10	NATO DIANA	Data-Assisted Decision Making	rejected	-	-
11	NATO SPS ARW	Workshop on Supply Chain Resilience	yes	20-23 квітня 2026	-
12	NATO SPS ARW	From Bytes to Terawatts: Cyber Resilience of Baltic Energy Infrastructure and Lessons from Ukraine	rejected	-	-

4. Obtained scientific results

TOTAL RESEARCH, WHAT WAS PERFORMED IN THE REPORTING YEAR - part 1

I. State theme

№ п/п	Research title	supervisor	Years of execution	funding source
1	Development of a hardware and software complex and methods of operational detection of damage to heat and water supply systems, taking into account their wear and tear and military influences	д.т.н. Владимирський О.А.	2024–2025	НФДУ
2	A protected interference-resistant system for transmitting video information from an unmanned aerial vehicle	д.т.н. Гільгурт С.Я.	2025–2026	НФДУ
3	Development of methods and layout of ARM "DEMETRA" for constant and periodic control of the functioning of cryptographic applications using statistical methods	д.т.н. Ковальчук Л.В.	2024–2025	НФДУ

II. Program-target and competition topics of the NAS of Ukraine

№ п/п	Research title	supervisor	Years of execution	funding source
1	Development of distributed energy in the conditions of the electricity market based on digitalization technologies and systems. Chapter 1. Organizational and mathematical models of interaction of participants of the decentralized electricity market	чл.-кор. НАН України Мохор В.В.	2025–2026	НАН України
2	Development of methods and means of increasing the efficiency and resilience of local decentralized power supply systems of Ukraine	д.т.н. Артемчук В.О.	2024–2025	НАН України
3	Development of the theoretical foundations of ensuring the resilience of cyber systems of critical infrastructure	д.т.н. Шкарупило В.В.	2025–2026	НАН України

TOTAL RESEARCH, WHAT WAS PERFORMED IN THE REPORTING YEAR - part 2

III. Departmental topics (fundamental)

№ п/п	Research title	supervisor	Years of execution	funding source
1	Methodological principles of the organization of interaction of heterogeneous data structures and automated formation of models of thermal and hydraulic dynamic processes	д.т.н. Винничук С.Д.	2021–2025	НАН України
2	Models of functioning of local energy systems with a surplus of electricity	д.т.н. Чемерис О.А.	2024–2028	НАН України
3	Development of theoretical foundations of formalization of presentations of processes of processing operational information in energy	д.т.н. Шкарупило В.В.	2025–2029	НАН України
4	Development of decentralized market mechanisms in the field of electric power, based on blockchain and smart contract technologies	д.т.н. Ковальчук Л.В.	2023–2027	НАН України
5	Development of methods and technologies for the construction of simulators by industry specialists for the training of personnel of energy enterprises	д.т.н. Самойлов В.Д.	2022–2026	НАН України
6	Development of methods and development of models of resonant single-wire electric energy transmission systems	к.т.н. Васильєв О.В.	2025–2029	НАН України
7	Development of the scientific foundations of the algebraic theory of strong artificial intelligence in relation to the cyber security of critical infrastructure objects in the field of energy	чл.-кор. НАН України Мохор В.В.	2023–2027	НАН України
8	Development of the theoretical foundations of the information technology of periodic corrosion monitoring and operational search for leaks of heat network pipelines based on acoustic space-frequency selection	д.т.н. Владимирський О.А.	2021–2025	НАН України
9	Creation of models, methods and means of increasing the safety and efficiency of the operation of power pumping equipment	д.т.н. Шевченко С.С.	2025–2029	НАН України
10	Game-theoretic models and risk minimization methods for decision support systems for demand management in the electricity market	д.т.н. Боркаєв З.Х.	2021–2025	НАН України

TOTAL RESEARCH, WHAT WAS PERFORMED IN THE REPORTING YEAR - part 3

VI. Departmental topics (applied)

№ п/п	Research title	supervisor	Years of execution	funding source
1	Development of methods and means of monitoring research on greenhouse gas emissions in the energy sector of Ukraine	д.т.н. Артемчук В.О.	2023–2025	НАН України
2	Development of scientifically based criteria and principles for building a system of cyber protection of nuclear energy facilities	д.т.н. Зубок В.Ю.	2023–2025	НАН України
3	Development of methods and means of increasing the level of cyber security of digital substations	д.т.н. Давиденко А.М.	2024–2026	НАН України

V. Contractual topics (main, there were 29 contracts in total in 2025)

№ п/п	Research title	supervisor	Years of execution	funding source
1	Calibration and installation of a new version of the software Measuring the kinematic and dynamic parameters of elevators IKPL-M3	д.т.н. Владимирський О.А.	2025	Договір
2	The primary state expertise in the field of technical information protection of the object of expertise - a complex of protection tools of the unified analytics system based on artificial intelligence (neural networks) ULA MEDIA	к.т.н. Потенко О.С.	2025	Договір
3	Assessment of security and optimization of the database structure of the information and telecommunication system	к.т.н. Васильєв О.В.	2025	Договір
4	Pathways for Infrastructure Resilience in Ukraine	д.т.н. Чемерис О.А.	2025-2027	Грант НАТО
5	Agnostic risk management for HILP events	д.т.н. Зубок В.Ю.	2023-2027	Горизонт Європа

MOST SIGNIFICANT RESULTS, WHAT WERE RECEIVED IN THE REPORTING YEAR - part 1

A cluster mathematical model for assessing the resistance of the electric power system of Ukraine to systematic massive rocket-drone attacks is proposed, in which the consequences of damage to typical energy objects are formalized due to the characteristics of the scale of destruction and the dependence of the duration of repairs, and the state of the system is described by the equations of the dynamics of subsets of generating power units/network elements available in the current period of time. This makes it possible to predict the readiness of the power system to cover the demand for electricity and to justify the priorities of restoration works, taking into account both direct damage and loss of connection ability due to damage to critical network facilities (cor-member NAS of Ukraine Saukh SE).

The concept of "risks with zero precedent" (Zero-precedent HILP risks) is proposed for the security analysis of complex sociotechnical systems (in particular, the electric power industry), which singles out a critical subclass of HILP threats without documented cases of implementation (including "unknown unknown" scenarios) and justifies the methodological change of focus from forecasting to the formation of a system potential for adaptation in conditions of radical uncertainty. This provides a scientific and methodological basis for reorienting security management strategies to proactively build adaptation capacity at different levels of the hierarchy (cor-member NAS of Ukraine V. V. Mohor).

MOST SIGNIFICANT RESULTS, WHAT WERE RECEIVED IN THE REPORTING YEAR - part 2

A comprehensive hardware and software solution and methodology for diagnosing underground pipelines has been developed, which combines low-frequency acoustic, ultrasonic and thermometric means, including instrument modes for high-precision determination of the speed of water impact waves and adaptive interference filtering for correlation determination of the leakage coordinate, as well as a computer program for assessing damage and residual resource of pipelines which ensures the acceleration of the localization of accidents and an increase in the rate of restoration of heat and water supply in conditions of high wear and tear of networks and military destruction and is already being implemented at the enterprises of the industry. (Vladimirsky O.A, Nedoseka S.A, Zvarych V. M., Artemchuk V. O., Vladimirskyi I.A., Kryvoruchko I.P.)

MOST SIGNIFICANT RESULTS, WHAT WERE RECEIVED IN THE REPORTING YEAR - part 3

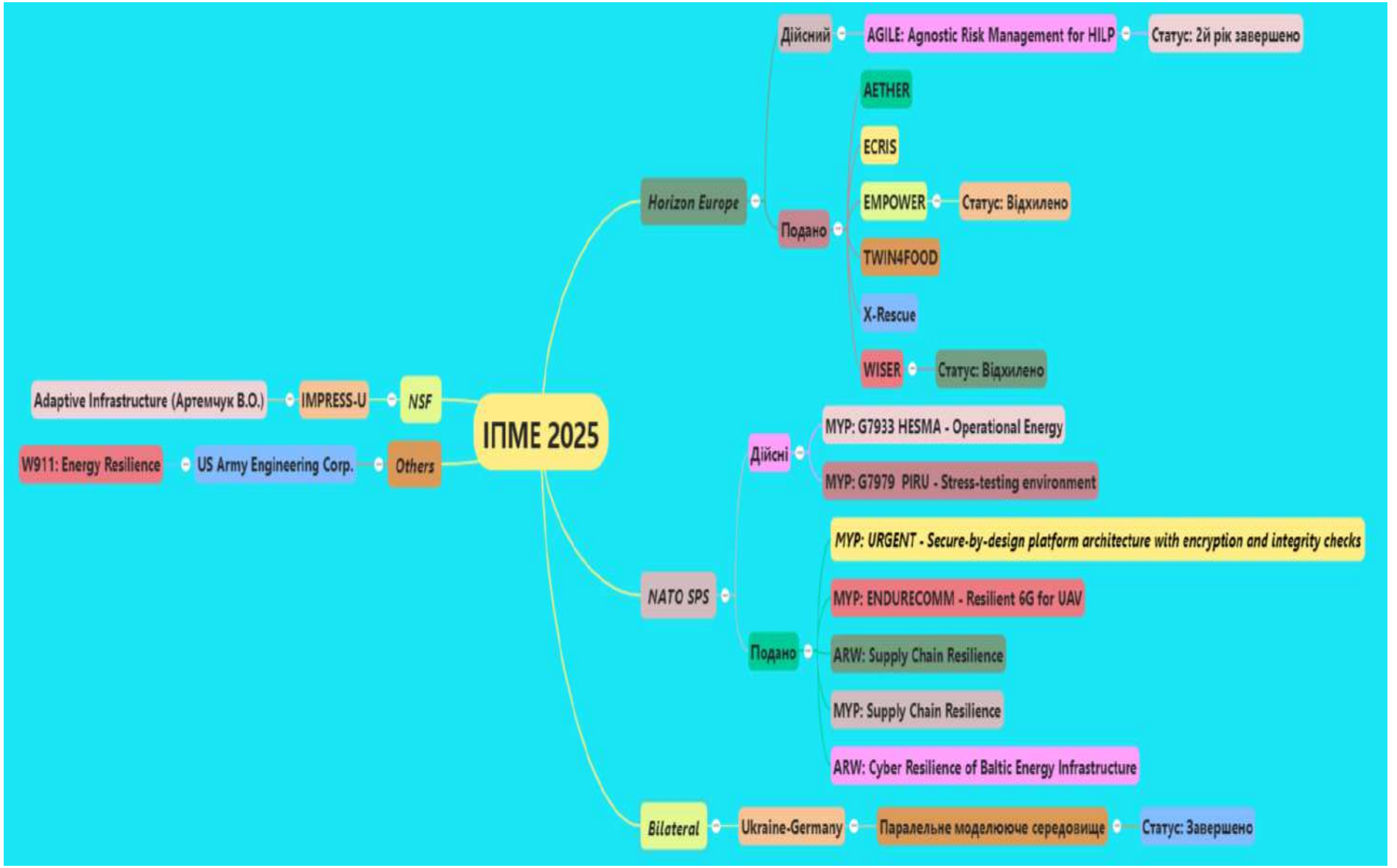
For the first time in the world, a complex of methods of statistical quality control of generators of random/pseudorandom sequences (RMS/RMS) for cryptographic applications was developed with the selection of stages of functioning, the appointment of specific statistical checks for each stage and decision-making algorithms in case of non-compliance, and a mock-up of ARM and software was created, which implements these methods for constant and periodic control, ensuring increased trust in cryptocomponents and reduced the risk of using substandard RMS/RMS in critical systems. (Kovalchuk L.V, Oliynikov R.V, Nelasa G.V, Rodinko M.Yu., Bespalov O.Yu., Klymenko T.M.).

The concept of protected interference-resistant transmission of video data from UAV was developed and the low-resource method of closing and interference-resistant conversion of the communication channel was substantiated, as well as a universal test platform (microcontroller/PLIS/SoC) was created to work out options for hardware and software implementation, which provides practical verification of key technical solutions according to the requirements for delay, security, interference resistance and energy consumption and forms the basis for the further creation of a prototype system. (Gilgurt S.Ya., Davydenko A.M., Kovalchuk L.V., Fedorenko D.V., Dubrovskyi S.V.)

5. Other activities in the year under review

International Cooperation

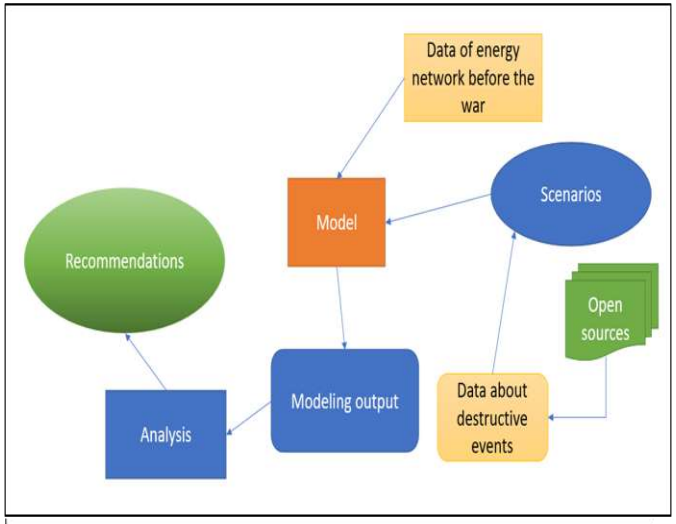
INTERNATIONAL PROJECTS



METHODS AND TOOLS OF ARTIFICIAL INTELLIGENCE FOR ANALYTICS OF STABILITY OF ENERGY SYSTEMS

AWARD: W911NF-17-S-0003 (US Army Engineering Corp.)

The project involves the analysis of historical data related to cyber and physical attacks on energy infrastructure, in particular, focusing on cases in Ukraine. Identifying patterns and correlations in these data, an idea of the general attack vectors used by threat subjects is formed.
The project examines complex interdependencies in the critical infrastructure system. It studies how failures in one segment can cause cascading effects and affect other sectors. A comprehensive approach will allow scenarios to be constructed that reflect potential effects over time, covering their wide-ranging impact on the environment, population and economy.

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Project duration– 36 months. (08.2022-07.2025)

Full project budget– $ 299 640,0 .

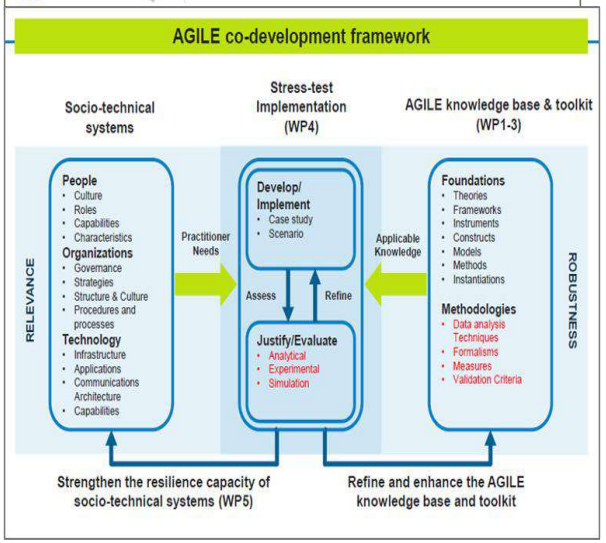
In 2025 received $ 150000,0 .

AGILE: AGNOSTIC RISK MANAGEMENT FOR EVENTS WITH A LOW PROBABILITY OF HIGH IMPACT

HORIZON EUROPE: HORIZON-CL3-2022-DRS-01-02

The AGILE project is developing and will apply a holistic methodological framework and practical tools for understanding, assessing, managing and reporting on low probability and high impact (HILP) events in terms of systemic risk and resilience. The project should integrate a wide range of innovative technologies into a new and replicable multisectoral stress testing methodology for:

- UNDERSTANDING (system theory, horizontal thinking, strategic forecasting, machine learning),
- FORECASTING (scenario building and computer exercises, multi-stage decision analysis, machine learning),
- MANAGEMENT (sustainability assessment, strategic development of training capacity).



Project duration – 48 months. (10.2023-09.2027)
14 organizations participate in the project.
Full project budget – 5 529 195.00 євро.
It is planned for the Institute - 149 125.00 євро

HESMA: SPECIAL PURPOSE POWER SYSTEM

NATO SPS MYP G7933

- **•HESMA (High-resilient Energy Systems for Military Applications) is a mobile energy system modeling tool for the design, construction, development and organizational management of mobile highly stable energy systems using renewable energy sources. This tool (computer system) is designed to solve current problems of planning electricity production and managing the energy consumption of a mobile energy system, researching various scenarios of military influence on such an energy system, improving existing systems for monitoring and controlling local energy systems. The tool will also be used to model various energy supply systems for critical infrastructure and territories of Ukraine that have been released and require new electricity generation.**

The duration of the project is 48 months. (04.2024-03.2028)
10 organizations participate in the project.
The full budget of the project is 1400,000.00 euros. EUR 438500.0 is planned for the Institute

NCP HORIZON EUROPE CLUSTER 3 "SECURITY"

NCP functions on the basis of an agreement with the Ministry of Education and Culture: Agreement № NCP/NCP/112-2024 dated 2024-08-30.

№	Indicator (KPI)	value
1	The number of organized and held events (information days, trainings), including joint ones	8
2	Number of consultations provided	51
3	The number of prepared materials for events, in particularpresentations, surveys, etc	9
4	Number of project proposals,prepared with the support of the NCP	9
5	The number of projects prepared with the support of the NCP and receivedfinancing	1

COOPERATION WITH DOMESTIC SCIENTIFIC INSTITUTIONS, INSTITUTIONS OF HIGHER EDUCATION, INDUSTRIAL ENTERPRISES

1) September 12, 2025. The Institute held a public discussion of the scientific work "Digital transformation of the electric power industry of Ukraine in the conditions of martial law and post-war recovery", which was accepted for the competition for the 2025 Boris Paton National Prize of Ukraine in the field of science and technology.

2) Cooperation with institutions of higher education: 32 current agreements on cooperation with higher education institutions as of December 31, 2025; 1 contract was concluded in 2025. (04/07/2025 Memorandum on scientific cooperation with KPI named after. Igor Sikorskyi).

3) Many scientists traditionally take part in the DEC (master's defense, bachelor's certification, etc.) and teach part-time in a number of higher education institutions.

4) In 2025, 25 farm contracts and contracts worth UAH 2,544,853,000 were executed (6 - customers from Ukraine; in particular, 19 - m. Kyiv). Examples: calibration/update of the software of the IKPL-M3 elevator parameter meter for enterprises (Karat-Liftkomplekt LLC, TESKO LLC, etc).

COOPERATION WITH STATE AND LOCAL AUTHORITIES

1) In 2025, the Institute continued cooperation with the State Special Communications Administration of Ukraine. Specifically: proposals for the plan of measures for the implementation of the Cyber Security Strategy of Ukraine for 2026 have been developed and sent; - the draft document "Methodology for collecting statistical data on cyber attacks, cyber incidents and countermeasures by areas of responsibility of the main subjects of the national cyber security system" was developed and submitted. By order of the Administration of the State Service for Special Communications and Information Protection of Ukraine dated August 5, 2025, № 482, relevant methodological recommendations were approved (https://ips.ligazakon.net/document/FN089095)

2) For KP "Teploenergetik" of the Kropyvnytskyi City Council and KP "Teplokomunenergo" of the Oleksandriysk City Council, the correlation leak detector has been modernized, in particular, the specialized computer program "Parametric correlation leak detector K-10.5M3, version V10.27-2025-MAX" has been updated.

HOLDING OF SCIENTIFIC CONFERENCES

title	date of the
Scientific and practical conference "Use of blockchain technologies in energy - 2025"	March 26, 2025
Scientific and technical conference of young scientists and specialists of IPME named after. G.E. Pukhova National Academy of Sciences of Ukraine	May 14, 2025
Scientific and practical conference "Energy cyber security"	May 28, 2025
Scientific and practical conference "Resilience of dynamic systems"	June 12, 2025 November 6, 2025
Scientific and practical conference "Energy security in the era of digital transformation"	November 20, 2025
Scientific and practical conference "Artificial intelligence and security 2025"	December 4, 2025

EXPERT ACTIVITY

1) In 2024, many scientists of the Institute were elected experts of the Ministry of Education and Culture (order №982), and in 2025, a number of examinations were performed and expert opinions were provided for competitions of the Ministry of Education and Culture/State Order, etc.

2) Scientists of the Institute joined the working groups and took part in the preparation of professional standards for the protection of critical infrastructure, which were approved by the order of the State Special Communications Service №865 dated 12.29.2025.

3) The Institute is included in TC 162 (subcommittee on cyber security of energy systems).

SCIENCE POPULARIZATION

In 2025, about 100 publications (announcements/news/reporting materials) were posted on the IPME website, the results were also covered on the portal of the National Academy of Sciences of Ukraine.

At the Ukrainian Internet Management Forum IGF-UA 2025 (November 20, 2025), Ph.D. Vitaly Zubko presents a scientific approach to stress testing of digital infrastructure, in particular - model experiments on the Cloudnet network using network analysis and simulation methods to assess risks and sustainability.

Interview on the DOU platform (03.12.2025) with Institute graduate student Roman Draguntsov (head of the cyber defense department of IT Specialist) regarding the practice of Security Operations Center (SOC), the role of SIEM, typical attack vectors (phishing, known uncorrected vulnerabilities), as well as the impact of power outages and infrastructure destruction on observation and response to incidents. https://dou.ua/lenta/articles/questions-about-security-operations-center/

At the international energy forum 5E, scientists of the Institute of Modeling Problems in Energy named after. G.E. Pukhova presented her results to energy market stakeholders.

RECEIVED AWARDS

- The National Prize of Ukraine named after Boris Paton (2025) was awarded to Doctor of Technical Sciences, Prof. Lyudmila Vasylivna Kovalchuk, a leading researcher at the Institute, for the work "Assessment and optimization of security risks for critical infrastructure" (on the basis of the Decree of the President of Ukraine №861/2025).
- The thanks of the Presidium of the National Academy of Sciences of Ukraine were announced by Ph.D. Oleksandr Serhiyovych Potenko, senior researcher of the Institute, for fruitful work and contribution to priority research in energy and on the occasion of Energy Day.
- The Kyiv Mayor's Award for special achievements of youth in the development of the capital of Ukraine in 2025 was awarded to Oleksandr Oleksandrovych Tsypliak, a graduate student of IPME (order dated 05/29/2025 № 424).
- For many years of fruitful scientific and pedagogical work, highly professional achievements and significant personal contribution to the development of scientific research in the field of modeling of energy systems under the conditions of modern market mechanisms, the Presidium of the National Academy of Sciences of Ukraine awarded the award of the National Academy of Sciences of Ukraine "For professional achievements" to the chief researcher of the Institute of Modeling Problems in Energy named after. G.E. Pukhov of the National Academy of Sciences of Ukraine, corresponding member of the National Academy of Sciences of Ukraine Saukh Serhiy Yevhenovich. (Resolution of the Presidium of the National Academy of Sciences of Ukraine dated July 2, 2025 № 210)
- For many years of fruitful scientific, scientific-organizational and pedagogical work, highly professional achievements and significant personal contribution to the development of scientific research in the field of modeling of aviation air conditioning systems and aircraft fuel systems, the Presidium of the National Academy of Sciences of Ukraine awarded the head of the department of the Institute of Modeling Problems in Energy named after. G. E. Pukhov of the National Academy of Sciences of Ukraine, Doctor of Technical Sciences Stepan Dmytrovych Vinnychuk. (Resolution of the Presidium of the National Academy of Sciences of Ukraine dated July 2, 2025 № 210)

THANK YOU!