Report on the activities of the Institute of Renewable Energy of the NAS of Ukraine for 2025

Main scientific areas of the institute's activity

фізико-технічні основи процесів перетворювання і використання сонячної енергії

- наукові основи перетворювання і використання енергії вітру

теплофізичні основи використання геотермальної енергії

наукові основи процесів перетворювання і використання енергії малих річок і морів

наукові основи перетворювання і використання відновлюваних органічних енергоносіїв

технології і системи комплексного використання відновлюваних джерел енергії

СХВАЛЕНО
Протокол засідання вченої ради
ІВЕ НАН України
від «15» 04 2024 р.
№ 9

Організаційна структура Інституту відновлюваної енергетики НАН України

ЗАТВЕРДЖУЮ
Директор ІВЕ НАН України
_____ Степан КУДРЯ
«__» 05 2024 р.

Інститут відновлюваної енергетики
ідентифікаційний код 20476029

State certification of the Ministry of Education and Science and evaluation of the activities of the NAS of Ukraine

In 2025, the institute passed the state certification of scientific institutions in the scientific direction **"Engineering and Technology"** and classified as category "B" (certificate Series DA No. 0407 dated 10/15/2025, certificate validity until 12/31/2030)

СВІДОЦТВО

про державну атестацію наукової установи

Серія ДА № 0407 Дата видачі 15 жовтня 2025 року

Цим свідоцтвом визнається, що

Інститут відновлюваної енергетики Національної академії наук України

ідентифікаційний код за ЄДРПОУ 26476029

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

Науковій установі за напрямом "Інженерно-технологічний" відповідає дл групи Б.

Термін дії свідоцтва до 31 грудня 2030 року.

Заступник Міністра Денис КУРБАТОВ

An assessment of performance is planned for the second quarter of 2026.
IRE NAS of Ukraine
for the period 2019-2025.

By order of the Ministry of Education and Science of Ukraine dated 02.02.2026 No. 141 (paragraph 48)
IRE NAS of Ukraine is included in the State Register of Scientific Institutions Supported by the State by the end of 2030

Training of scientific personnel

	2020	2021	2022	2023	2024	2025
Postgraduate studies						
Total	5	6	10	16	17	**21**
Of these: By state order	5	6	10	9	11	**11**
Under contract, *specialty* ***141 - "Electrical power engineering, electrical engineering and electromechanics"***	-	-	-	7	6	**6**
Separate from production, *specialty* ***G3 "Electrical Engineering"***	-	-	-	-	-	**3**
Outside of postgraduate studies, *specialty* ***G3 "Electrical Engineering"***	-	-	-	-	-	**1**
Doctoral studies						
Total	-	1	-	-	-	**1**
Specialty ***141 – "Electrical Power Engineering, Electrical Engineering and Electromechanics"***	-	1	-	-	-	**1**

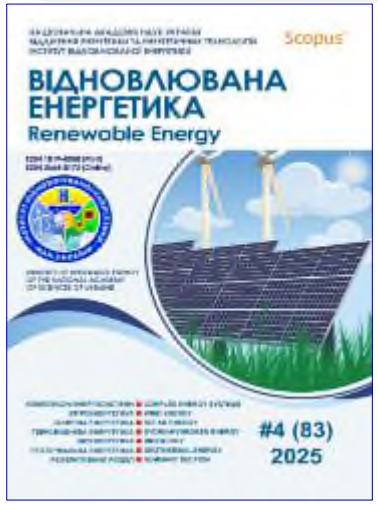
Specialized and one-time academic councils

The IRE of the NAS of Ukraine has a specialized academic council (SAC) with the right to accept dissertations for the defense of the scientific degree of Doctor of Sciences and Candidate of Sciences in the specialty 05.14.08 - "Conversion of renewable energy" and one - time councils for the defense of the degree of Doctor of Philosophy in the specialty 141 - "Electrical power engineering, electrical engineering and electromechanics"

Protection	2020	2021	2022	2023	2024	2025
Employees of the Institute of Electrical and Electronic Engineering of the NAS of Ukraine defended:						
PhD/PhD	**1**	**-**	**-**	**-**	**1**	**1**
Doctoral	**-**	**2**	**-**	**-**	**1**	**1**
Employees of other organizations defended:						
PhDs/Doctors of Philosophy	-	-	-	-	-	-
Doctoral	**1**	-	-	-	-	-

Publishing activities

Since 2004, IVE has been publishing a quarterly scientific periodical **"Renewable Energy".** During the 20-year existence of the journal, 83 issues have been published, including 4 in 2025. The journal is constantly available in open access (https://ve.org.ua/). All publications are assigned a DOI code , which provides permanent and unlimited access to them.



Since 2019, "Renewable Energy" has been included in the **Scopus** scientometric database (from 2024 quarter **Q4**)

The journal is included in **the List of Scientific Professional Publications of Ukraine** , approved by orders of the Ministry of Education and Science of Ukraine dated 06/26/2024 No. 920, category **"A"**

By decision of the National Council of Ukraine on Television and Radio Broadcasting dated August 10, 2023, No. 680, the magazine was included in the Register of Media Entities with the media identifier - R30-01158.

The journal is included in the electronic databases EBSCO and WorldCat , and is indexed in the Google search engine. Scholar , as well as in the Dimensions and OUCI systems, is abstracted in the abstract journal "Source".

To cover editorial and publishing costs from issue No. 3/2025, the journal introduced a publication fee: for authors affiliated with Ukrainian institutions - 5232 UAH, for foreign authors: 350 USD . Full exemption from payment is granted to: employees of the Institute of Information and Communication of the National Academy of Sciences of Ukraine; authors whose articles have co-authors from the Institute of Information and Communication of the National Academy of Sciences of Ukraine. The journal is distributed on the terms of editorial subscription - direct order placement for receiving printed copies directly from the editorial office.

Crossref

Dimensions

EBSCO INFORMATION SERVICES

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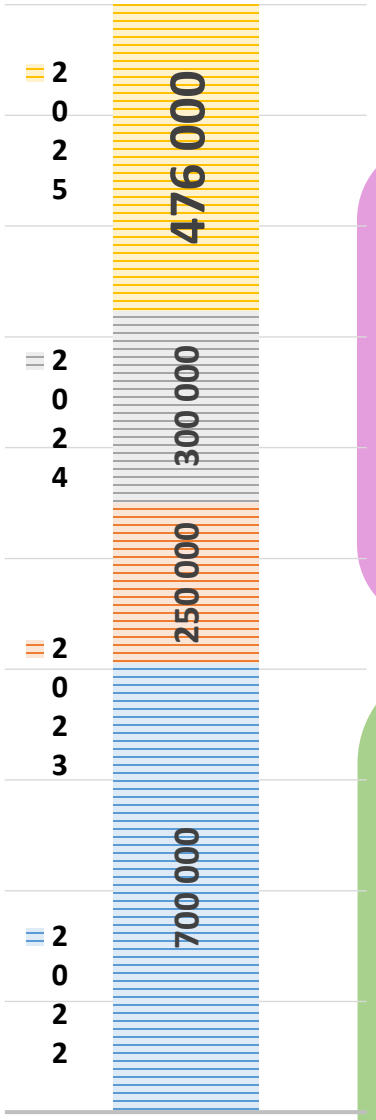
Національна бібліотека України імені В. І. Вернадського

Google scholar

IVE NASU helps the front



Total: UAH 1.76 million

During 2025, thanks to the volunteer initiative, the funds collected by the team regularly purchased the necessary equipment, gear and food kits for the Armed Forces of Ukraine, camouflage nets, protective suits for snipers, special equipment, power supplies for electrical devices, mobile autonomous power supply systems based on a car trailer , food, medicines, etc.
Also, a vehicle was purchased for **the "SVOBODA" battalion of the 4th operational brigade "Rubizh" of the Hero of Ukraine Stepan Mykhalchuk National Military University .**

The total amount of aid for the 4 years of the war is **1,726 thousand UAH** .
In addition, **about 400 thousand UAH** were transferred by the institute's employees to the accounts of various active charitable foundations ("Return Alive", "United24", etc.).
Thus, since the beginning of the full-scale invasion of Ukraine, the institute's team has raised funds for the Armed Forces of Ukraine in the amount of over **2 million UAH** .
Two employees of the institute currently serve in the ranks of the Armed Forces of Ukraine.

ssistance to the Armed Forces of Ukraine

The scientific and engineering group of the Institute consisting of: Matyakh S.V., Bondarenko D.V., Shevchuk V.I., Dyachenko O.S., Pundyev V.O., Soroka A.V., Sevryuk V.V. and Konovalov S.V. created a mobile autonomous power supply system based on a car trailer .
One has already been transferred to the Armed Forces of Ukraine to the "SVOBODA" battalion as volunteer assistance, which is effectively used in field conditions. The second was made to order by the charitable organization "Charity Fund "True Hope" for the amount of 250 thousand UAH. The third is in the production stage.

Damage to the Institute buildings during the Russian-Ukrainian war. Compensation for the damage and elimination of the consequences of the destruction

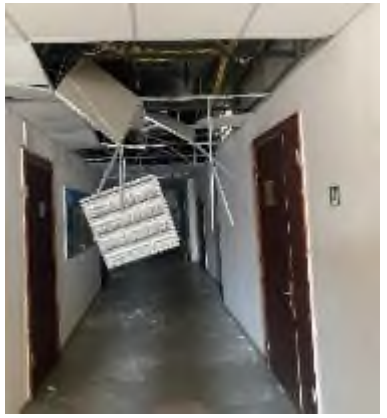
Hnata Street Khotkevycha , 20a (located next to the Darnytsia CHPP), was repeatedly damaged as a result of missile and drone strikes on the energy infrastructure of Ukraine: 11/23 and 12/16/2022, 01/14/2023, 10/22/2025, 01/8 and 02/3/2026.

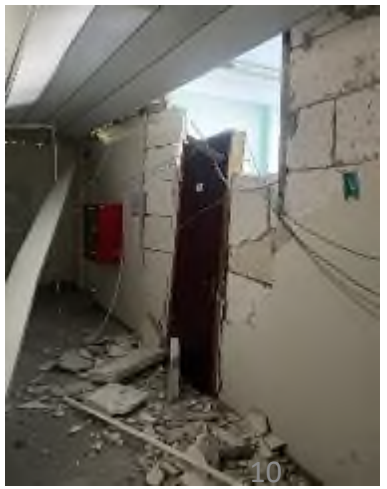
During 2024-2025, funds were allocated for the restoration of the building:
2024 - 190 thousand UAH,
2025 - 350 thousand UAH.

As of November 1, 2025, 100% of the building's damaged windows have been restored.

However, <u>on January 8 and On February 3, 2026,</u> the corps once again suffered from armed aggression and needs funds for restoration.

In 2026, an application was submitted for damage restoration in the amount of UAH 1,560,000.

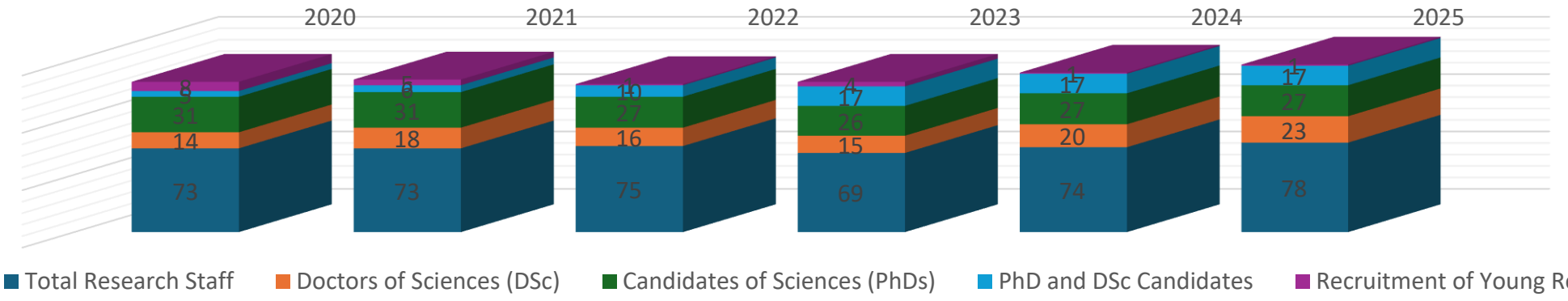




Institute funding: distribution by sources , thousand UAH

Year	Sources of funding							
	State	Departmental	Applied and targeted topics	Grants	Business contracts	Rent	Others	General finance
2020	-	20,771,412 *93.98%*	344.0 *1.56%*	-	213.0 *0.96%*	766,905 *3.47%*	6,571 *0.03%*	22 101,888 *100%*
2021	-	25,950.952 *95.78%*	300.0 *1.11%*	-	177.9 *0.66%*	656,612 *2.42%*	7,913 *0.03%*	27,093.377 *100 %*
2022	-	26,237,146 *98.9%*	-	-	31.76 *0.12%*	260,228 *0.98%*	0.48 *0.01%*	26,529,614 *100%*
2023	947.0 *3.19%*	24,157,637 *81.34%*	3,500.0 *11.78%*	345,315 *1.16%*	124,987 *0.42%*	626,442 *2.11%*	-	29,701,381 *100%*
2024	1,333,520 *3.71%*	30 161,617 *83.99%*	4,069.0 *11.12%*	-	348,761 *0.97%*	660,046 *1.81%*	-	36,572,944 *100%*
2025	-	30,808,966 *79.96%*	5,900.0 *15.31%*	614,025 *1.60%*	282,302 *0.73%*	825,657 *2.14%*	101,386 *0.26%*	38,532,336 *100%*

Institute staff



	2020	2021	2022	2023	2024	2025
Cadre	163	159	162	157	166	158
Total scientific employees , % of general numbers	73 45%	73 *46%*	75 *4 6 %*	69 *44%*	74 *45%*	7 9 *50%*
Doctors of Science, % of general quantities scientists	14 19%	18 *24%*	1 6 *21 %*	15 *22%*	20 *27 %*	23 29%
Candidates of Sciences (of whom up to 35 years old), % of general quantities scientists	31(5) 42%	31(5) *42%*	2 7 (6) *3 6 %*	26(5) *38%*	27 (2) *3 6 %*	27 (1) *34%*
Postgraduate students / doctoral students	5/-	6/-	10 /-	17/1	17/1	17/1
Replenishment young by specialists	8	5	1	4	1	3

Average age: researchers – **57.9** ; candidates of sciences – **48.6** ; doctors of sciences – **65.4**

Average salary, UAH

	2020	2021	2022	2023	2024	2025
By institute	9,995	12,092	12,857	14,649	17,178	17,687
In scientific departments	10,206	12,229	12,864	14,459	17,785	16,677
In the scientific staff	13,495	16,149	17,103	19,319	21,895	21,169

Number scientific publications (by the Institute)

Year	Monographs	Chapters for monographs Scopus	Articles Scopus			Articles category B	Collection scientific works	Conference abstracts	Tutorials	In general
			Q1-Q2	Q3-Q4	with out Q					
2020	5	0	0	0	28	11	1	48	0	93
2021	1	0	2	0	35	2	1	58	3	102
2022	2	0	2	4	46	4	1	54	11	124
2023	2	0	2	8	43	8	1	68	13	145
2024	10	2	0	51	12	3	1	61	0	140
2025	3	2	3	61	0	3	1	62	0	135

Number scientific publications (per 1 scientist)

Year	Monographs	Chapters for monographs Scopus	Articles Scopus			Articles category B	In general	Per scientist	Number of scientists
			Q1-Q2	Q3-Q4	without Q				
2020	0.06	0	0	0	0.39	0.15	44	0.60	73
2021	0.01	0	0.03	0	0.47	0.03	40	0.54	73
2022	0.03	0	0.03	0.05	0.61	0.05	58	0.77	75
2023	0.03	0	0.03	0.12	0.61	0.12	63	0.91	69
2024	0.13	0.03	0	0.69	0.16	0.04	78	1.05	74
2025	0.04	0.03	0.04	0.77	0	0.04	72	0.91	79

Information on Hirsch index (maximum , number employees by ranges)

Scopus				Google Scholar			
Number of employees	Swing.	Range $h < 10$	Range $h > 10$	Number of employees	Swing.	Range $h < 10$	Range $h > 10$
64	14	63	1	51	23	42	9

Inventive activity

	2020	2021	2022	2023	2024	2025
Applications for invention/utility model filed	0/7	0/6	0/5	0/2	2/10	2/5
Registered utility model patents	3	9	4	1	4	8
Number of security documents received and maintained as of December 31 of the current year	16	25	29	30	35	43

International projects

Project goal : Promoting the development of a low-carbon economy and entrepreneurship by creating an ecosystem for promoting environmentally friendly innovative projects.
The Institute of Renewable Energy of the National Academy of Sciences of Ukraine was chosen **as the lead institution . The total cost** of the project : **5.5 million USD , of which 350 thousand** USD was for training. 50 trainers and 450 specialists from small enterprises in the food and processing industry were trained.

German-Ukrainian scientific cooperation on green hydrogen certification. Analysis of the legislative and regulatory framework in the EU and Ukraine for the formation of a hydrogen economy and the parameters of implementing a cross-border **certification system** for green hydrogen produced in Ukraine **for** sale on the EU market.

Promoting capacity building for the creation of sustainable energy systems among employees of IVE and Igor Sikorsky Kyiv Polytechnic Institute in **order to** apply the acquired knowledge to train Ukrainian energy professionals.

The Ukrainian team of the international REBUILD project , which includes the Institute of Renewable Energy of the NAS of Ukraine, received funding under the program "International Multilateral Partnership to Ensure the Sustainability of the Education and Science System in Ukraine". The source of funding is the US National Academy of Sciences (US NAS).

Organization and implementation of works by the Institute of Renewable Energy of the NAS of Ukraine in accordance with the schedule of the contract "3000144516 within the framework of the UNIDO project " Project for Green Industrial Reconstruction of Ukraine through Technology Transfer and Joint Creation of New Businesses with the Private Sector of Japan".

The Japan International Cooperation Agency (JICA) international training program, which took place in Japan as part of the Knowledge Co-Creation Program (KCCP). The program brought together specialists from different countries of the world - representatives of scientific institutions, government agencies and the energy sector - and was aimed at exchanging experience and studying modern approaches to integrating renewable energy sources into energy systems.

International grant (#1):
German-Ukrainian research cooperation on green hydrogen certification

Grant title in English:
German-Ukrainian Research Cooperation on the Certification of Green Hydrogen

project coordinator :
DLR Deutsches Zentrum für Luft- und Raumfahrt

Performer:
Hamburg Institute Research gGmbH

Source of funding:
German Federal Ministry of Education and Research (BMBF)

Duration: **01.06.2024 – 31.05.2026**

Total budget of the Ukrainian side :
40 thousand euros

Completed section: ENSURING GREEN WATER TRADE BETWEEN EU AND UKRAINE: PRINCIPLES OF APPROACHES TO CERTIFICATION, RECOMMENDATIONS AND MARKET CONDITIONS

A seminar was held on the topic: FRAMEWORK CONDITIONS FOR GREEN HYDROGEN PRODUCTION AND TRADE IN UKRAINE, with the participation of more than 20 Ukrainian participants (stakeholders)

Project objective: to establish research collaboration focused on supporting the development of a scientifically sound green hydrogen certification system.
The work within the framework of the project of highly specialized, application-oriented research institutions aims to scientifically prepare an important link in the supply chain of certified green hydrogen between Ukraine and Germany .

International grant (#2):

Renewable energy for strengthening infrastructure of Ukraine thro training and design (REBUILD)

Grant title in English: Renewable Energy for Bolstering Ukraine's Infrastructure by Learning and Design
Competition name: 2023 program "International Multilateral Partnerships for Resilient Education and Science System in Ukraine , IMPRESS -U"
Main program coordinator: National Science Foundation (NSF), USA
Program coordination in Ukraine: National Research Foundation of Ukraine (NRFU)
Source of funding for the competition: United States National Academy of Sciences through the Ukrainian Science and Technology Center (USTC) Contract number: STC contract No. 7135
Status: ✔ project ongoing
Project start date : May 1, 2025
Duration: 2 years
Budget: the total budget of the Ukrainian team (all participants) is $87,727 (~ UAH 3.785 million).

Project coordinator from the institution : Dr. O. Lysak
Coordinator's Department : Department No. 5 of Geothermal Energy
of the project participants :
main institution: heads the Ukrainian team and coordinates the cooperation of teams from three countries (Ukraine, USA, Lithuania).
foreign partners:
Institute for Future Intelligence, Natick, Massachusetts , USA; Kaunas University of Technology, Kaunas, Lithuania.
main coordinator in Ukraine: IRE NAS of Ukraine
Ukrainian partners: Institute for Digitalization of Education of the National Academy of Sciences of Ukraine; Kyiv National University of Construction and Architecture; Institute of Modeling Problems in Energy named after G.E. Pukhov of the National Academy of Sciences of Ukraine; Sumy State University; National University "Lviv Polytechnic"; State Institution "South Ukrainian National Pedagogical University named after K.D. Ushynskyi"; Berdyansk State Pedagogical University; Vinnytsia State Pedagogical University named after Mykhailo Kotsiubynskyi.

Project goal : Improving the skills of teachers in Ukraine by providing them with the necessary knowledge and methodological tools to conduct extracurricular activities dedicated to the issues of energy efficiency of buildings and renewable energy.

Applications submitted for grant programs

Project name : Development of research plans to assess the environmental impact of heat pumps

Competition name: Special call for proposals "Ukraine" (2025) from the German Federal Environment Fund (DBU)

Project name : Revitalizing green industry for Ukraine through technology transfer and joint creation of new businesses with private indu enterprises in Japan

UNIDO program .
Parties involved: Hynfra Japan Co., Niterra Co., UTEM Engineering LLC , Hynfra PSA , CONNEXX , etc. **Project content** : Conducting a feasibility study for the preparation of a pilot demo installation in Ukraine

Project name : Ukrainian Energy Efficiency Skills Platform for Clean Energy Transition

Source of funding - European Commission

Partner institutions : Kyiv Academic University – coordinator, and 12 other partners, including foreign ones.
Project goal: creation of a platform (internet portal) for communication in order to develop national measures and a system of continuing education in the field of energy efficiency, green and digital transition, taking into account Ukraine's commitments to European integration.

Scientific topics carried out in the reporting year.1

No. salary	Type of research topic			Funding volumes, thousand UAH	
	Topic name	Scientific advisor	Years of implementation	General fund	General fund
Program-targeted and competitive topics of the NAS of Ukraine					
1.	Determination of technical potential and creation of information support for the production of "green" hydrogen using renewable energy sources to provide Ukraine with thermal and electrical energy in the post-war period and to preserve and restore the environment (code: **"Hydrogen transition"**)	Kudrya S.O. Corresponding Member of the NAS of Ukraine, Doctor of Technical Sciences, Prof.	01.2025 - 12.2026	5900,000 6541230 Applied research	-
Departmental topics of the NAS of Ukraine					
2.	Features of integration of combined power supply systems based on renewable energy sources at the levels of system-forming and distribution networks (code: " **Complex -Integro "**)	Kuznetsov M.P. Corresponding Member of the NAS of Ukraine, Doctor of Technical Sciences, Senior Researcher	01.2023 - 12.2027	3404,693 6541030 Fundamental research	-
3.	Develop and elaborate methods for analyzing the electrothermal state of solar collectors, photovoltaic cells and photothermal modules, taking into account the complex of complicating factors caused by the use of new functional materials and solar radiation concentrators (code: **"Sun-UV"**)	Surzhik T.V. Doctor of Technical Sciences, Senior Researcher	01.2023 - 12.2027	5154,884 6541030 Fundamental research	-

Scientific topics carried out in the reporting year.2

No. salary	Type of research topic			Funding volumes, thousand UAH	
	Topic name	Scientific advisor	Years of implementation	General fund	General fund
4.	To develop the scientific foundations for a multifactorial information cadastre to optimize the siting of wind-hydrogen energy enterprises in Ukraine (code: "**Wind-Hydrogen**")	Kudrya S.O. Corresponding Member of the NAS of Ukraine, Doctor of Technical Sciences, Prof.	01.2023 - 12.2027	5439,236 6541030 Fundamental research	-
5.	Scientific and technological principles of using renewable energy sources for desalination of sea water (code: " **Hydrosystem"**)	Vasko P.F. Doctor of Technical Sciences, Senior Researcher	01.2023 - 12.2027	4168,863 6541030 Fundamental research	-
6.	To develop technical and technological methods for increasing the energy efficiency of geothermal installations based on the study of thermal and hydrodynamic processes of geothermal resource extraction and use systems (code: " **Geoterm-3D"**)	Morozov Yu.P. Doctor of Technical Sciences, Senior Researcher	01.2023 - 12.2027	1832,942 6541030 Fundamental research	-
7.	To develop scientific and technical foundations for biomass conversion processes to replace fossil fuels at existing energy facilities with the aim of decarbonizing the economy (code: " **Bioenergy** " **),** state registration	Dr. Chetverik H.O.	01.2023 - 12.2027	5344,653 6541030 Fundamental research	-

Scientific topics carried out in the reporting year.3

No. salary	Type of research topic			Funding volumes, thousand UAH	
	Topic name	Scientific advisor	Years of implementation	General fund	General fund
8.	Develop systems for using renewable energy sources based on new means and technologies for energy conversion (code: " **VDE- Techno** ")	Kudrya S.O. Corresponding Member of the NAS of Ukraine, Doctor of Technical Sciences, Prof.	01.2023 - 12.2025	5463,695 6541030 Applied research	-
Contractual topics (grants)					
9.	Subcontract agreement for German-Ukrainian scientific cooperation on green hydrogen certification Agreement dated 30.08.2024 German-Ukrainian project	Kudrya S.O. Corresponding Member of the NAS of Ukraine, Doctor of Technical Sciences, Prof.	08.2024 - 05.2026	-	613,691 Applied research
10.	Renewable energy for strengthening infrastructure of Ukraine through training and design ("REBUILD") (code: " **REBUILD**") Grant dated 01.05.2025 No. 7135 under the contract of the Ukrainian Science and Technology Center (USTC)	Dr. Lysak O.V.	05.2025 - 04.2027	-	0.334 Applied research

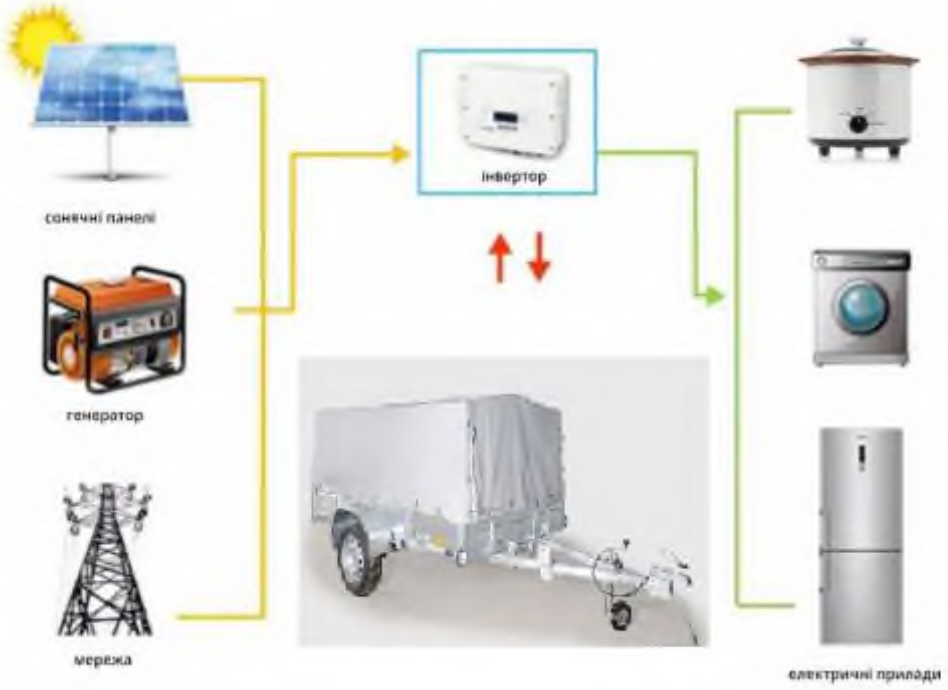
Research Project **"VDE-TECHNO"** (applied)

" Develop systems for using renewable energy sources based on new means and technologies for energy conversion ."

KPKV 6541051, DR No. 0123U100980, implementation period 2022-2025 (completed)

The goal is to solve the problem of reliable provision of environmentally friendly electrical and thermal energy by creating energy systems using new materials and technologies for converting various types of renewable energy sources.

Specific tasks : 1. **Combined use of solar energy**



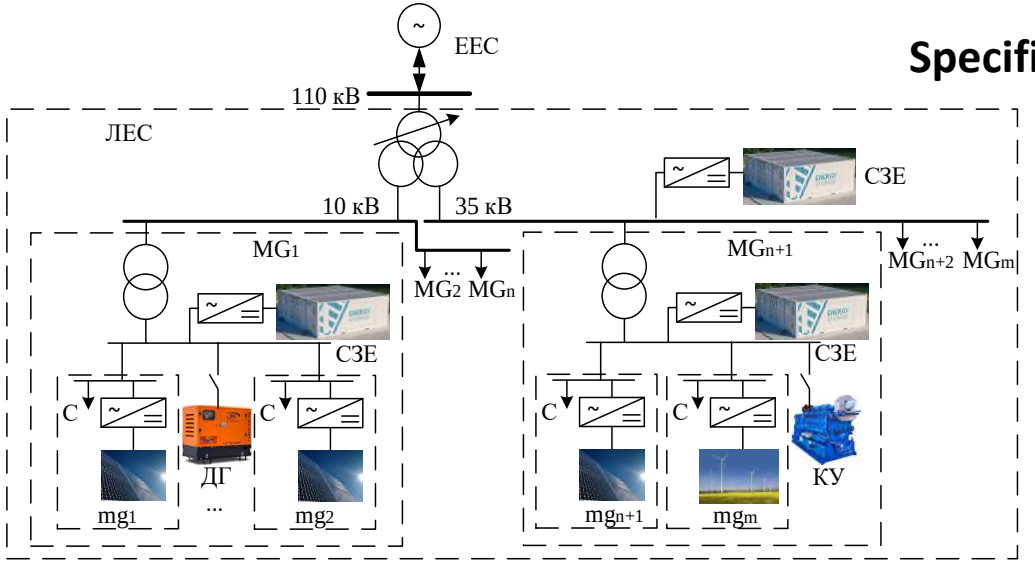
Mobile autonomous backup power system consisting of: photovoltaic modules with a capacity of 3 kW; 5 kW inverter; 5 kWh battery; 2.8 kW backup generator (internal combustion engine); water filtration device with a capacity of 2-3 liters per hour. Experimental model.

Research Project **"COMPLEX-INTEGRO"**

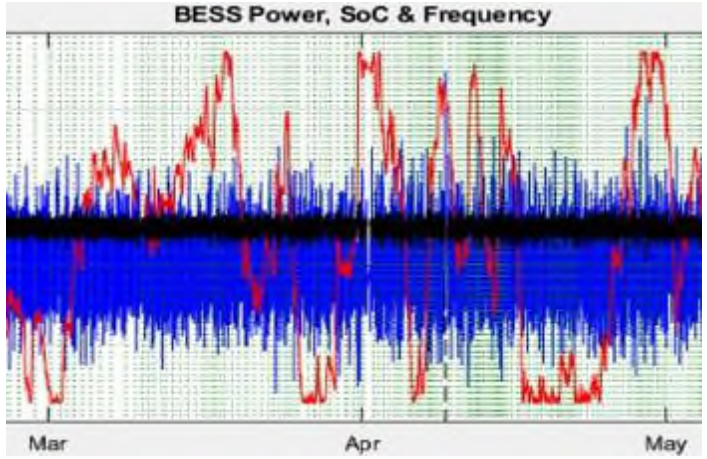
" **Features of integration of combined power supply systems based on renewable energy sources at the levels of system-forming and distribution networks** " (KPKV 6541031, implementation dates 2022-2027)

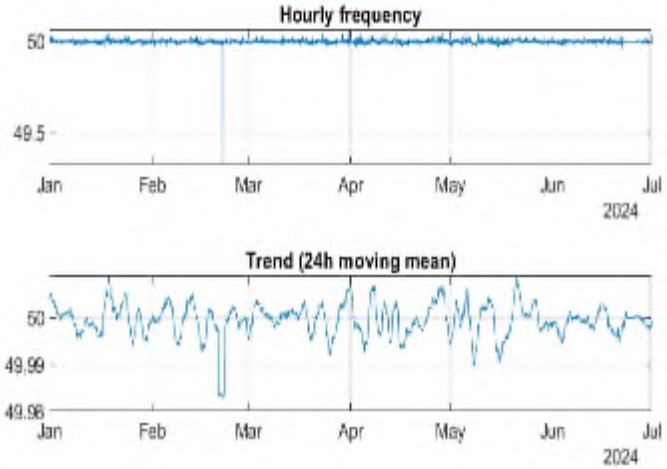
Stage 3. Modeling the impact of various scenarios for the development of RES and storage systems on the operation of the power system

The goal is to find sustainable and smart energy solutions, develop reliable energy management systems that optimize energy flows, ensuring efficiency, reliability, and cost-effectiveness. Different operating modes (grid, island, mixed), control options (critical, flexible loads), composition and volumes of renewable energy, and methods of energy storage.



Specific tasks:





Local power system formed from microgrids

An intelligent power supply system that operates based on the coordinated actions of individual agents and provides self-healing.

Response of UZE power and state of charge to frequency changes

Modeling the response of an integrated power grid to frequency changes in a network that combines traditional generation, renewable energy, and virtual renewable energy with different parameters.

Research Project **"SONCE-UV"**

"Develop and develop methods for analyzing the electrothermal state of solar collectors, photovoltaic cells and photothermal modules, taking into account the complex of complicating factors caused by the use of new functional materials and solar radiation concentrators" (KPKV 6541031, implementation 2022-2027)

1. Electric models of hybrid photovoltaic thermal collector

Electrical models of the thermal and photovoltaic parts of a hybrid photovoltaic thermal collector with a combination of thermal and photovoltaic parts in a single energy-generating device have been created.

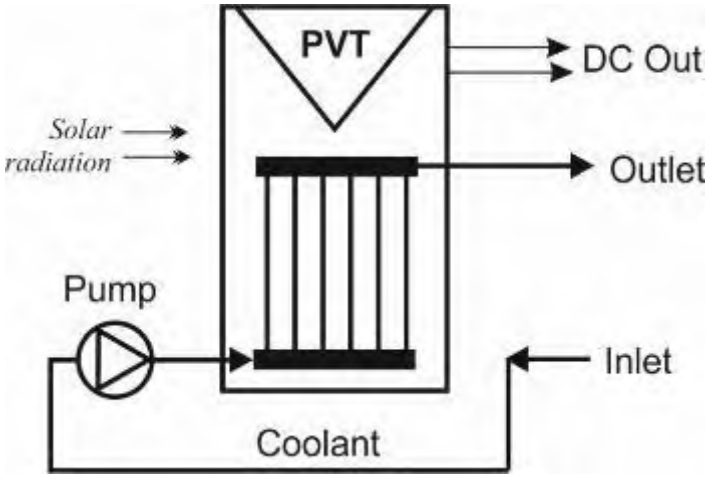
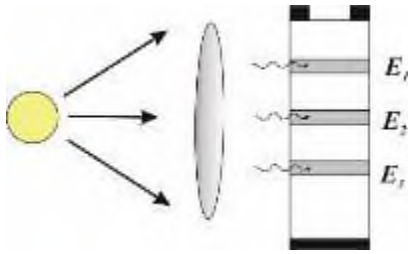


Fig. 1. Hybrid photovoltaic thermal collector

Electrical models of systems for converting solar radiation energy into electrical and thermal energy have been analyzed. The process of photon absorption and the formation of charge carriers and phonons, which approaches the equilibrium value, has been simulated.

2. Electrical models of concentrator photovoltaic systems

Based on electrical models for standard photovoltaic solar energy converters, electrical models of photovoltaic sources with solar radiation concentrators that irradiate photovoltaic cells with vertical multilayer and horizontal multilayer semiconductor structures have been developed.



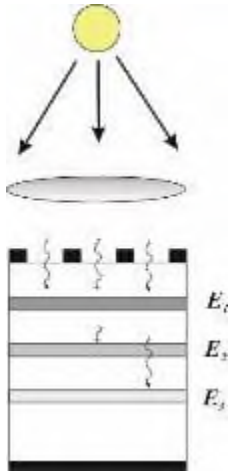


Fig. 2. Vertical and horizontal multilayer photovoltaic cells

An analysis of the electrical characteristics of a photovoltaic module with a solar energy concentrator was carried out using the example of a commercially available module without additional cooling systems, which makes such a solution technically simple and commercially attractive. The feasibility of using concentrators was determined.

Research Project "Wind-Hydrogen"

"Develop scientific principles for a multi-factor information cadastre to optimize the location of wind and hydrogen energy enterprises in Ukraine" (KPKV 6541031, implementation 2022-2027)

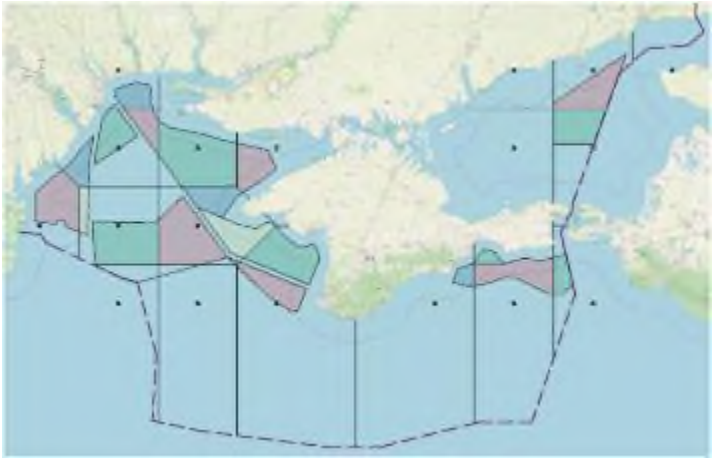
Methods for using the information database of the wind energy cadastre and criteria for determining the territories of potential placement of wind and hydrogen energy facilities have been developed, an analysis of systems for converting air flow into electricity and systems for accumulating and consuming hydrogen in autonomous wind and hydrogen installations has been conducted. The specific energy characteristics of various forms of hydrogen accumulation and storage have been determined.

47.5% with minimum buffer zone parameters

22% at maximum buffer zone parameter limits

Available areas for wind turbine placement within Voronoi cells and administrative regions of Ukraine according to minimum and maximum restrictions

Available areas for wind turbines within Voronoi cells for the exclusive maritime economic zone



55% of the water area with minimum buffer zone parameters
21% at maximum buffer zone parameter limits

Research project " **HYDROSYSTEM** ": **"Scientific and technological principles of using renewable energy sources for seawater desalination"** (2023-2027, Doctor of Technical Sciences Vasko P.F.)

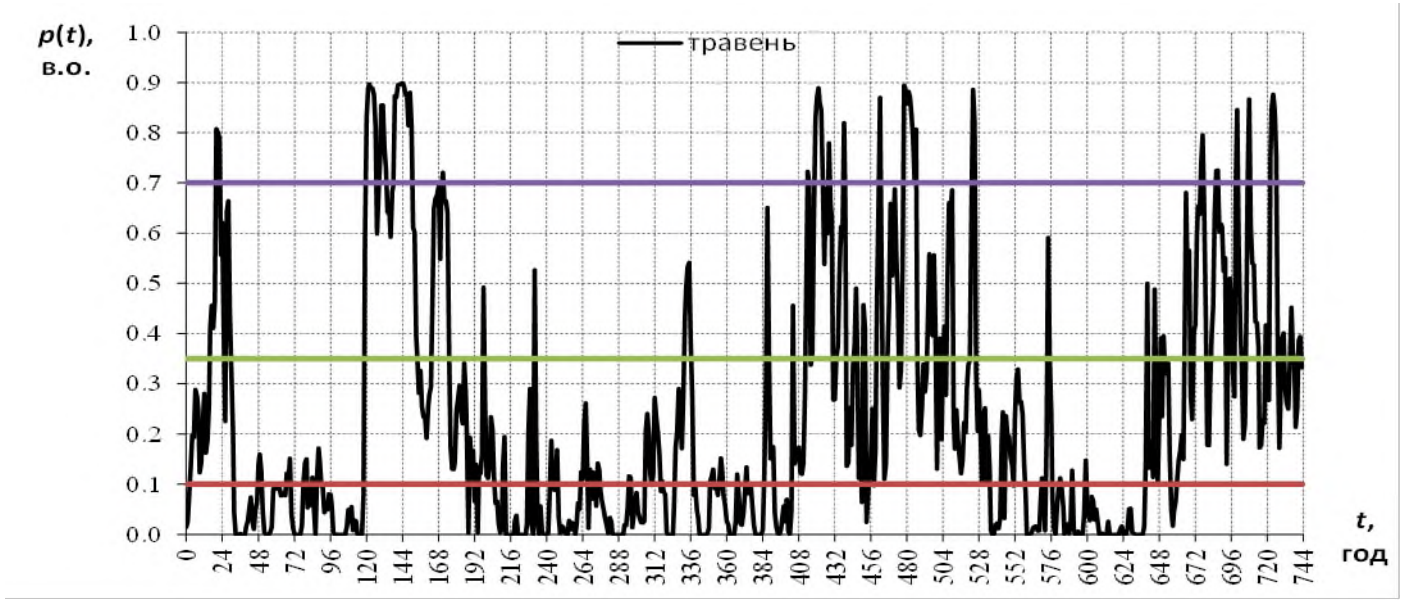
Obtained and investigated in 2025 - quantitative estimates of the dynamics of the stochastic process of generating power of wind power plants (WPPs) as an energy source for water desalination in the Azov-Black Sea region of Ukraine.

The results of the research are used in the development of measures to implement Ukraine's participation in the European program.

« *2×40 GW Green Hydrogen Initiative* .

Global water desalination volumes (2023) – 99 million cubic meters/day
Europe…… – 9.2 million cubic meters/day
Ukraine's needs for the " 2×40 GW Green Hydrogen Initiative " – 24 million cubic meters/year

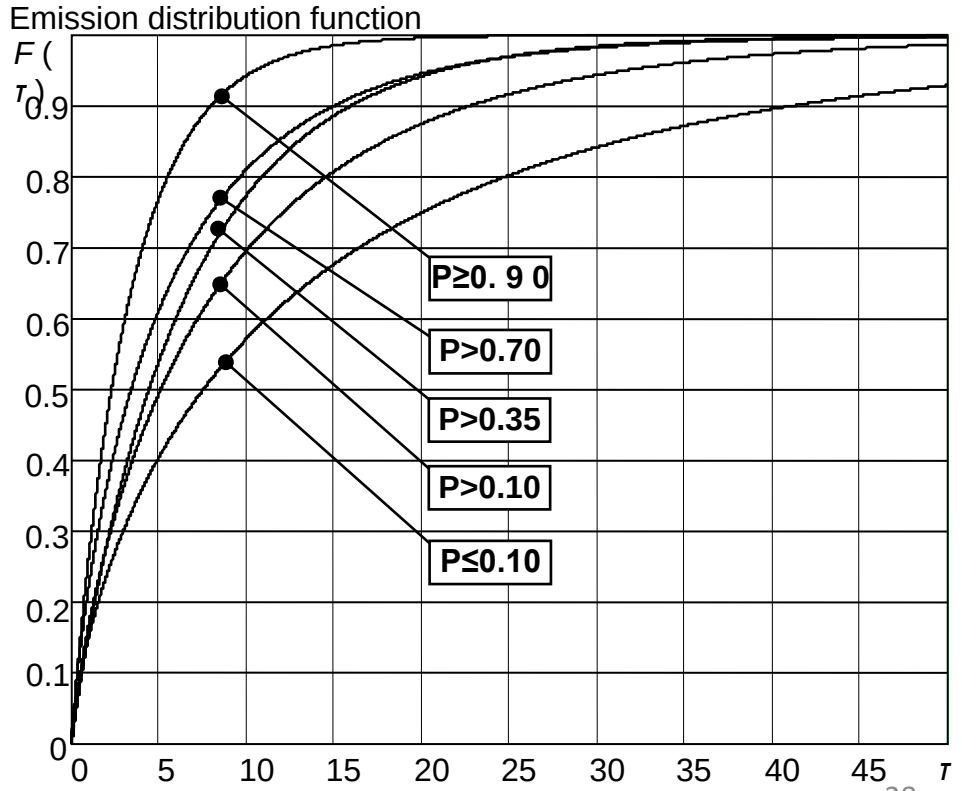
The process of generating power by an industrial wind farm during a month



Differential function of the probability distribution of the duration of continuous exceedance of different power levels and

$$f(\tau;\alpha,\beta)=\frac{\beta}{\alpha}\left(\frac{\tau}{\alpha}\right)^{\beta-1}e^{-\left(\frac{\tau}{\alpha}\right)^{\beta}}$$

Probability distribution of the duration of continuous exceedance of different power levels and



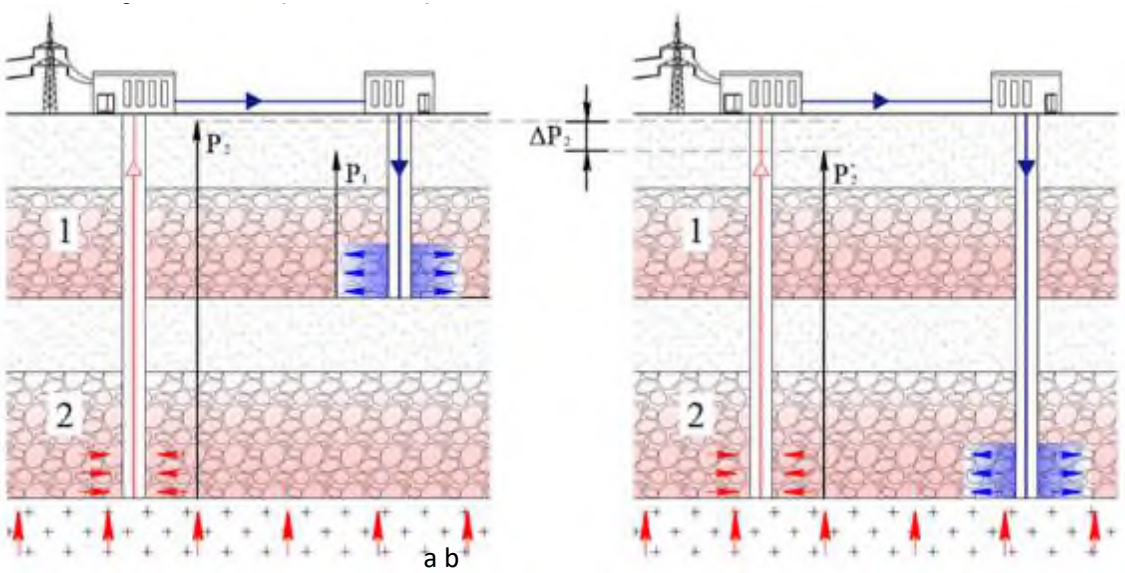
Research project "**GEOTHERM-3D**"

"To develop technical and technological methods for increasing the energy efficiency of geothermal installations based on thermal and hydrodynamic processes of geothermal resource extraction and use systems"

(2023-2027, Doctor of Technical Sciences Morozov Yu.P.)

Objective – Justification of the application of two-stage technology for the extraction of geothermal resources based on a specific depleted hydrocarbon deposit; development of technological solutions and optimization of the technical characteristics of a geothermal power plant; assessment of the energy and environmental benefits of two-stage extraction of energy resources

Two-stage technology for extracting geothermal resources based on depleted hydrocarbon deposits



The transition to the second stage is determined by the ratio of the cost of pumping the coolant and the cost of the additional heat received .

$$C_{VTV} \cdot V_{VTV} < C_T \cdot DV_{TV} \cdot C_{TV} \cdot (T_p - T_k)$$

Relevance: the prevalence of elevated reservoir pressures in the thermal aquifers of Ukraine technically complicates the process of coolant return (the need for specialized equipment for injection, increased accident risk) and leads to an increase in the cost of geothermal projects, which necessitates the need to substantiate effective geothermal technological solutions.

The following is proposed: a two-stage scheme for operating a geothermal installation, in which at the first stage, under conditions of increased initial reservoir pressure, the spent coolant is returned to the overlying aquifer, and after decreasing reservoir pressure, the transition to the second stage with the return of the coolant to the productive horizon for safe disposal and replenishment of the field reserves.

Completed: a comparative analysis of traditional and two-stage geothermal technologies was conducted using the example of the Hlynsko-Rozbyshivske deposit; the feasibility of two-stage operation for Ukrainian conditions was substantiated and the conditions for transition to the second stage were determined. Technological schemes for the production of geothermal electricity and heat and criteria for environmental safety were developed.

Research project "**BIOENERGIA**": " **To develop scientific and technical foundations of biomass conversion processes to replace fossil fuels at existing energy facilities with the aim of decarbonizing the economy** " (2023-2027, Dr Chetveryk H.O.).

1. Research on low-temperature combustion of straw pellets

Studies of the burning intensity of straw pellets and the completeness of their combustion depending on the air supply flow rate and the thickness of the fuel layer for selected batches of pellets were carried out, which made it possible to establish the primary air velocity and the value of the initial fuel layer thickness in order to prevent melting and agglomeration of ash under the condition of a low-temperature combustion regime. The results obtained are the basis for organizing low-temperature combustion of straw pellets and developing a furnace device for burning solid biofuels.

2. Combined thermoelectric generator based on a pyrolysis burner

A microsystem for combined heat and power generation consisting of a pyrolysis burner “PP-8” and a thermoelectric generator “Altek 8047” was tested. The thermophysical characteristics of the system were investigated, and the conditions for matching the parameters of the burner and the thermoelectric generator were determined. It was shown that the burner “PP-8” is capable of ensuring the functioning of a TEG of the “Altek” type for 18 modules, with a power of 50 W_{el} throughout the entire operation time of the pyrolysis furnace in continuous mode, the operating cycle of one fuel load is approximately 3 h, and the peak power is up to 120 W_{el} .

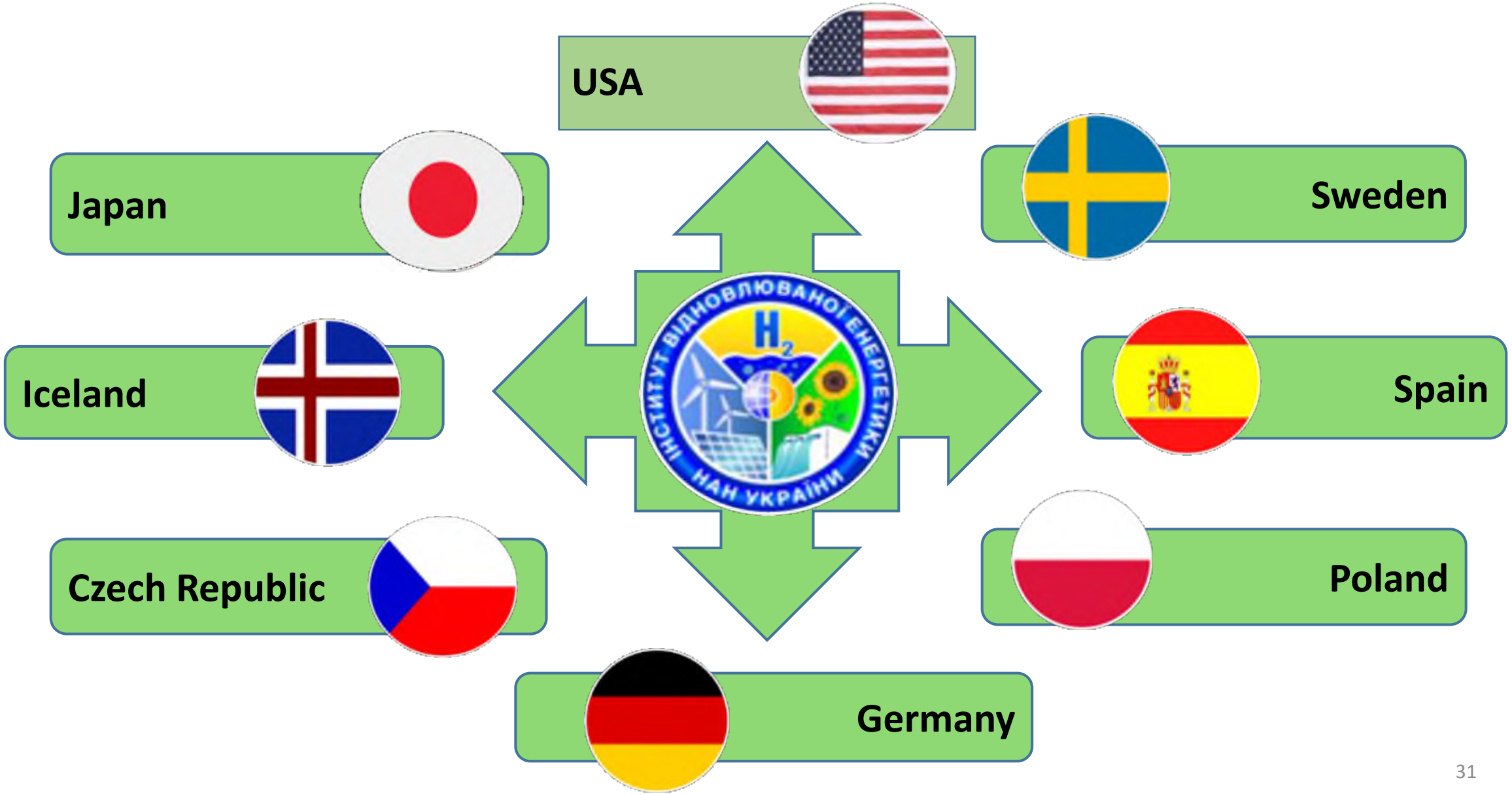
3. Biogas production from wastewater sludge from aquaculture enterprises

Studies of the fermentation of wastewater sludge from aquaculture enterprises in laboratory conditions were carried out, which made it possible to determine the optimal value of the reactor loading frequency to ensure the maximum yield of biomethane during fermentation, which is 1.48 m^3/m^3 day^{-1} with biomass retention of 21 days and with a frequency of loading the reactor with fresh raw materials from 4.5 to 6 days. The results obtained are necessary for predicting the operation of industrial plants on the specified raw materials.

4. Thermochemical processing of biomass

A new method of thermochemical processing of biomass has been developed, which, unlike existing methods, involves obtaining two different in composition and calorific value generator gases in one reactor by dividing the process into biomass pyrolysis and coke oven residue gasification, which makes it possible to obtain pyrolysis gas that has a low resin content in its composition by obtaining secondary pyrolysis gas from resin, which can be used to produce electrical and thermal energy.

International cooperation



Cooperation with domestic scientific institutions, higher education institutions, industrial enterprises

Vinnytsia National Technical University of the Ministry of Education and Science of Ukraine

State scientific institution « Ukrainian institute scientific and technical examinations and Information (UkrINTEI)"

State scientific institution "Kyiv Academic University"

NGO " Energy" association « Ukrainian hydrogen council»

Technical committee standardization Ukraine TC 48 " Energy Saving "

Scientific and educational association "Joint Department of Renewable Energy" based on the Department of Renewable Energy Sources of NTUU "Igor Sikorsky Kyiv Polytechnic Institute"

SE " Institute" evolutionary ecology NAS of Ukraine »

National university bioresources and nature management

National university "Poltava Polytechnic University named after Yuriy Kondratyuk"

NGO "National Ecological Center of Ukraine"

Expert commissions for assessing the effectiveness of the activities of the Institute of Electrodynamics of the NAS of Ukraine, the Institute of Technical Thermophysics of the NAS of Ukraine and the Department of Physics of Mining Processes of the M. S. Polyakov Institute of Geotechnical Mechanics NAS of Ukraine

Kyiv National University named after Taras Shevchenko

SE " Production Association " Southern machine-building plant named after O.M. Makarov"

Public Organization "SIGRE-Ukraine"

NGO " Scientific and Technical union energy workers and electrical engineers Ukraine »

“Grand Overon " LLC

In 2025, 11 developments were implemented in the following organizations:

National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute" -1

Svytinetska VES" LLC - 1

Limited liability company responsibility
« Scientific and industrial Enterprise " Enertex " - 1

State Enterprise " Southern - alternative" sources » - 1

Zaporizhia National University - 1

State Geophysical Enterprise " Ukrgeofizika " - 3

State commission Ukraine in terms of useful reserves fossil
at the State service geology and subsoil Ukraine - 2

Public organization " Agency" sustainable development " Synergy " - 1

Cooperation with state and local authorities

Institute supports tight Community relations :

- In Gurivskaya rural territorial community;
-Karolina- Bugazka territorial community ;
-Pogrebyshchensk territorial community ;
- Popelnastivska rural territorial community;
- Samhorodskaya rural territorial community;
- Hrebinkivska urban territorial community;
- Koblivska with Ilska territorial community;
- Pirnivska rural territorial community.

Specialists of the Institute of Renewable Energy of the NAS of Ukraine participated in the Sustainable Energy Days in the Fastiv community, 12-17.05.2025.
(Participants – Corresponding Member of the NAS of Ukraine Kudrya S.O.,
Ph.D. Zuryan O.V. and Ph.D. A.A. Tolkunov)

Director of the Institute of Electrical and Electronic Engineering of the NAS of Ukraine, Corresponding Member of the NAS of Ukraine, S. O. Kudrya, and Deputy Director of the Institute, Corresponding Member of the NAS of Ukraine, M. P. Kuznetsov, have repeatedly participated in the work meetings of the Anti-Crisis Headquarters for Economic Stability in Martial Law, Ukrainian Union of Industrialists and Entrepreneurs

Participation in the meeting of the Board of Directors of enterprises of the industrial complex, institutions and organizations of the Dniprovsk district of Kyiv under the Dniprovsk district in Kyiv state administration, Kyiv, June 24, 2025: Khristan M. V.

Holding and participating in scientific conferences

Traditionally, in May, the Institute of Energy and Power Engineering of the National Academy of Sciences of Ukraine hosted **the XXVI International Scientific and Practical Conference "Renewable Energy and Energy Efficiency in the 21st Century"** and **the youth section within the framework of the XXVI International Scientific and Practical Conference "Renewable Energy and Energy Efficiency in the 21st Century".**
Fellow scientists from Poland, the Czech Republic, Poland, Turkey, Sweden, and others participated in the presentations.

During the year, scientists participated in many scientific conferences and round tables, including 12 international ones.

Participation in expert and working groups, commissions, etc.

The director of the institute , corresponding member of the NAS of Ukraine, S. O. Kudria, participated in the work:

- Expert group on determining priority areas of development of scientific, scientific-technical and innovative activities, section "Energy and Energy Efficiency" of the Ministry of Education and Science of Ukraine;
- Expert group on the implementation of state policy in the field of efficient use of fuel and energy resources, energy saving and alternative fuels of the State Agency for Energy Efficiency of Ukraine;
- Working Group on the Development of the Hydrogen Economy and the Latest Nuclear Technologies of the National Security and Defense Council of Ukraine;
- included in the Scientific Coordination Council of the NAS of Ukraine on climate change issues.

Corresponding Member of the NAS of Ukraine **Kudria S.O.** and **Benmenni Mukhub included in** the Project Development Working Group ***Hydrogen energy development strategies in Ukraine for the period until 2050 of the Ministry of Energy of Ukraine.***

Corresponding Member of the NAS of Ukraine **Kudria S.O.** and Doctor of Technical Sciences **Kuznietsov M.P.** are members of ***the Hydrogen Energy***

Corresponding Member of the NAS of Ukraine **Kuznetsov M.P.** Member of the Working Group on the Development of ***the National Action Plan for the Development of Renewable Energy for the Period Until 2030.***

Corresponding Member of the NAS of Ukraine **Kudria S.O.,** Corresponding Member of the NAS of Ukraine **Kuznetsov M.P.** and Doctor of Technical Sciences **Surzhyk T.V.** participated as experts in ***international research projects of the Ministry of Education and Science of Ukraine.***

Doctor of Technical Sciences **Surzhik T.V.** Member of the ***"Energy and Energy Efficiency" section of the Scientific Council of the Ministry of Education and Science of Ukraine.***

IVE NASU website
https://www.ive.org.ua

opularization of scientific knowledg

Official **Facebook page**

Articles:
- **"Renewable Energy and Energy Efficiency in the 21st Century": Challenges and Future** .
Newspaper "Kyiv Polytechnic", No. 23-24 dated 06.06.2025, p.4.
- **« Round table « From molecules to the market".** Newspaper "On the impact on the environment ", December 26, 2025, No. 53 (274), p. 1.
- **" Renewable" energy and distributed generation »**
Svit " newspaper , 08/24/2025.
(Speaker – Corresponding Member of the National Academy of Sciences of Ukraine) Kuznetsov M.P.)

Report of Corresponding Member of the NAS of Ukraine Kuznetsov M.P. at the meeting of the Presidium of the NAS of Ukraine “Renewable energy sources and their use for distributed generation systems”

On October 23, 2025, the 4th grade students of the International Primary School "Crystal" visited the IBE of the NAS of Ukraine. The future inventors were hospitably met by IBE scientists. In an accessible format for this age group of students, they held a conversation about renewable energy, in particular, about solar energy and how it can be used

Round table « From molecules to market: development chains creation cost of green hydrogen in Ukraine ", from GEOnews / 2025-12-18

Meeting of scientists at the innovation center " MHP Eco Energy Innovation Lab" in the field of renewable energy, 08/28/2025. (Participants – Corresponding Member of the NAS of Ukraine Kudria S.O., Corresponding Member of the NAS of Ukraine Kuznetsov M.P., Doctor of Technical Sciences Zurian O.V., Doctor of Technical Sciences Budko V.I.)

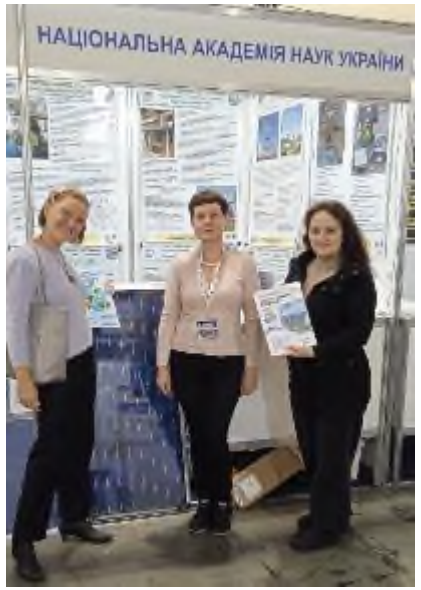
Participation in specialized exhibitions

The Institute actively participated in specialized exhibitions and received participant diplomas:

— exhibitions-presentations of research and developments of the NAS of Ukraine, in support of the development of science and on the occasion of Science Day in Ukraine, May 14-16, 2025;

— V III International Specialized Exhibition " ADDIT EXPO 3D", 27-29 , 2025;

— XBII International Specialized Exhibition " EcoEnergy Expo'2025", 14-16 , 2025



Information about scientific activities is presented in the collective exhibition catalogs:

— International Industrial Forum, International Specialized Exhibitions " PLAST EXPO UA " and " ADDIT EXPO 3 D ";

— International specialized exhibitions "Energy in Industry", " ELECTRO INSTALL ", " ECOENERGY EXPO ".

Advanced training of scientific personnel

Throughout the year, the institute's scientists constantly improved their professional level, participated in educational programs, trainings, workshops , etc., and received about **30 certificates of completion.**

Recognition of professional merits of the institute's scientists

The Presidium of the NAS of Ukraine at a meeting on February 5, 2025 awarded a prestigious scientific award for outstanding work in the field of electric power and electrical engineering - **the V. M. Khrushchev Prize to the director of the institute , corresponding member of the NAS of Ukraine, Kudria .O., deputy director of the institute , corresponding member of the NAS of Ukraine, Kuznetsov M.P. and Doctor of Technical Sciences , Surzhik T.V.** for the series of works ***"Scientific and Technical Principles of Combined Power Systems with Renewable Energy Sources".***

On May 1, 2025, a session of the General Meeting of the NAS of Ukraine was held, during which elections of full members (academicians) and corresponding members of the NAS of Ukraine were held. **Deputy Director of the Kuznetsov Institute M.P. was elected as a corresponding member of the NAS of Ukraine for the Department of Energy and Energy Technologies of the NAS of Ukraine.**

Deputy Director for Scientific Work, ***Doctor of Technical Sciences Zurian O.V. was awarded the Certificate of Honor of the Presidium of the NAS of Ukraine.***

Recognition of the scientific activities of young scientists

The scientific achievements of the institute's employees - young scientists - were recognized with awards from the NAS of Ukraine:
- Candidate of Technical Sciences Ivanchuk V.Yu. received the award of the Presidium of the NAS of Ukraine for young scientists **"Talent. Inspiration. Work";**
- Doctor of Technical Sciences Rubanenko O.O. was awarded **a certificate from the Presidium of the NAS of Ukraine** for active participation and significant achievements in scientific activity.

In the reporting year **3 young scientists** postgraduate students Lysy V. M., Stepenko V. S. and junior researcher Ivanchuk V. Yu. received **NAS of Ukraine scholarship for young scientists** , postgraduate student Volodarskyi V. G. – **scholarship of the President of the NAS of Ukraine for young scientists** .

Thank you for your attention!