LITHUANIAN
ENERGY
INSTITUTE

70
YEARS

Lithuanian Energy Institute

ANNUAL REPORT 2025

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LITHUANIAN ENERGY INSTITUTE

2025 Annual Report

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1956 – 2026 - 70th anniversary of the Lithuanian Energy Institute

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MESSAGE FROM THE DIRECTOR

Director of the
Lithuanian Energy Institute
Prof. Dr. Saulius Gudžius

The year 2025 was historic for Lithuania's energy sector – it marked the moment we achieved energy independence. This achievement, which strengthens national security and economic stability, would not have been possible without the long-term, consistent efforts of dedicated professionals. The Lithuanian Energy Institute also contributed to this process through strategic research, expert insights, and the consolidation of national competencies.

In 2025, the Institute operated steadily. We advanced high-level scientific research, strengthened international cooperation, and successfully implemented numerous projects. Particularly encouraging is the growing community of young researchers – this year, 16 new PhD students and 50 interns joined the Institute, choosing the field of energy science and the Lithuanian Energy Institute as a space for their academic growth and research development. This is a clear indication that the scientific environment we foster is attractive, dynamic and promising.

We devoted considerable attention not only to university students but also to school-aged youth – the potential future professionals of the energy sector. In 2025, we launched educational initiatives for school students, encouraging them to pursue a career in science. Through these activities, we aim to introduce young people to the world of energy and provide a first-hand look at how scientific research and technological solutions are developed.

The Lithuanian Energy Institute organized and participated in numerous national and international events, where we presented the Institute's activities, ongoing research, and opportunities for study and internships. We are pleased that the Institute gained broad visibility in the media – our experts actively commented on current energy issues, shared insights, and contributed to informing the public.

A significant milestone was our active participation in the Lithuanian Consortium for Engagement with the Massachusetts Institute of Technology (MIT), one of the world's leading scientific institutions. This collaboration opens new opportunities for advanced research, international partnerships, and strengthening the global visibility of Lithuanian science.

The professionalism and dedication of our employees form the foundation of all the Institute's achievements. I would like to sincerely thank you for your efforts, determination, and continuous pursuit of excellence, which enable us to achieve meaningful results together.

I would also like to express my sincere gratitude to our partners and public institutions. Thank you for your trust, joint projects, and constructive dialogue.

I am confident that strong scientific expertise, a growing new generation, and active international cooperation will continue to enable the Lithuanian Energy Institute to make a significant contribution to the development of a secure, sustainable, and advanced energy sector in Lithuania.

Director of the Lithuanian Energy Institute

Prof. Dr. Saulius Gudžius

70 YEARS OF THE LITHUANIAN ENERGY INSTITUTE: 1956–2026

In 2026, the Lithuanian Energy Institute (LEI) celebrates its 70th anniversary.

The Institute's history begins on 1 October 1956, when several laboratories of the Physics Technology Institute of the Lithuanian Academy of Sciences were reorganized into the Institute of Energy and Electrical Engineering, established in Kaunas.

On 1 January 1967, the Institute of Energy and Electrical Engineering was renamed the Physical Technical Energy Problems Institute (FTEPI).

After Lithuania regained its independence, the Institute underwent a restructuring to meet the country's new energy and research needs. In 1992, the Government of the Republic of Lithuania granted the Institute the status of a state research institution and its current name – the Lithuanian Energy Institute (LEI).

Since then, the Institute has gradually reorganized its activities to increasingly focus on addressing the key challenges of developing and improving Lithuania's energy sector, as well as enhancing its safety and reliability. Attention has been given to nuclear energy safety, metrology, environmental protection, and providing a scientific basis for energy policy.

Today, LEI operates as a research centre conducting both fundamental and applied research across various fields of energy, ranging from nuclear engineering issues to hydrogen energy technologies.

MAIN FACTS OF 2025

264 employees, including 142 researchers

45 PhD students

14 PhD students from abroad

16 new students enrolled

4 new international projects initiated

12 national projects

100 scientific publications published in the Clarivate Analytics WoS database

90 % of the publications appearing in Q1 and Q2 journals

4 long-term institutional research programs are being carried out

10 research divisions

14.1 mln. annual income[1]

37 R&D contracts per year

In this publication, the Lithuanian Energy Institute may be referred to as LEI or the Institute.

Unless otherwise indicated, the data presented here and elsewhere refer to 31 December 2025.

[1] *Including funds transferred to partners*

1 VISION, MISSION, AND OPERATIONAL GOALS

Vision of LEI

The Institute is an internationally recognised centre of excellence for science, innovation and technology in energy and related fields.

Mission of LEI

To conduct research and develop innovative technologies in the fields of energy, thermal engineering, environmental engineering, measurement engineering, materials science and economics, to carry out fundamental and applied research, to participate in study processes, to transfer the results of applied research and innovations to industry, to advise the state, the government, public, private institutions, and companies on issues related to the development of sustainable energy in Lithuania, to cooperate actively with higher education institutions in the preparation of specialists for the Lithuanian society.

Strategic objectives of LEI

• To perform long-term international level fundamental and applied scientific research, to ensure international excellence in the fields of technology and social sciences, and carry out long-term fundamental and applied research and development of an international standard, which is necessary for the sustainable development of the Lithuanian energy sector and the rest of the Lithuanian economy sectors, and for its integration into the European energy systems and the European Research Area;
• In cooperation with industry, government and society, to transfer scientific knowledge and innovations into technically and commercially useful processes and equipments, ensuring the development of energy technologies and the rational evolution of energy systems, the security and reliability of energy supply, the efficient use of energy resources, the protection of the environment and the reduction of climate change;

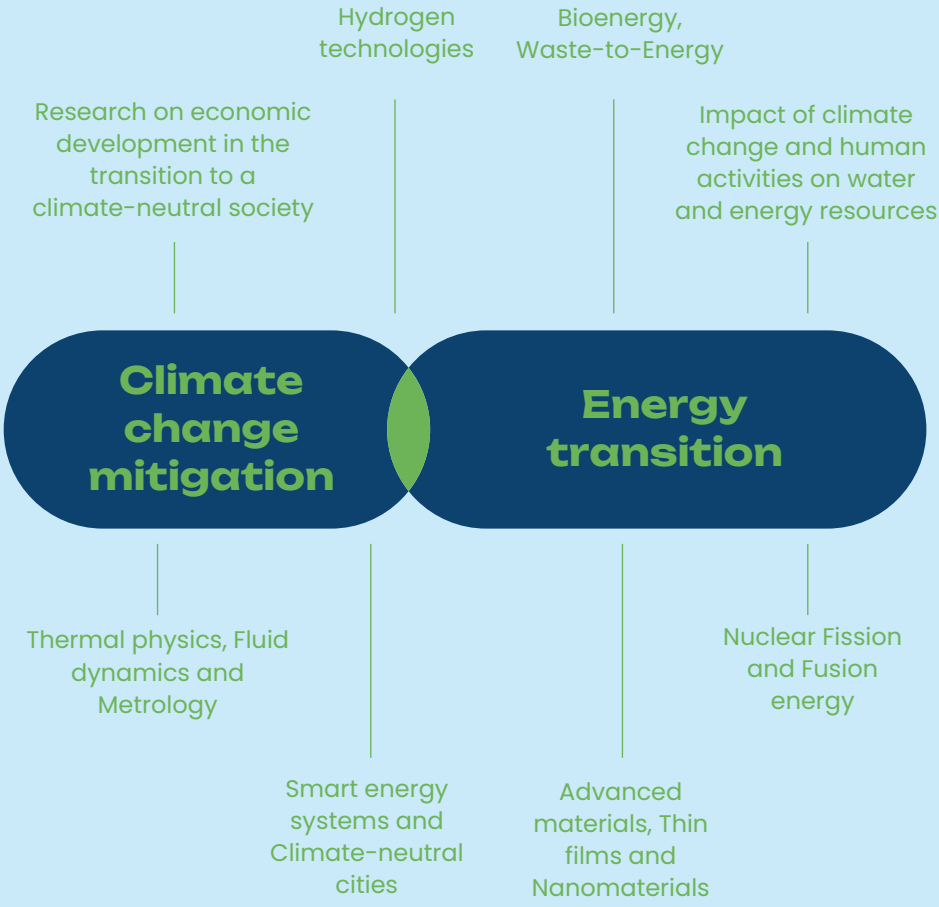
• To disseminate scientific knowledge to the public and contribute to the creation of an innovation- and knowledge-based Lithuanian economy;
• Initiate and actively participate in Lithuanian and international programme's projects, expand cooperation with Lithuanian and foreign research and educational institutions and scientists;
• To carry out the functions of the designated Institute in accordance with the provisions of the Law on Metrology of the Republic of Lithuania;
• In cooperation with universities, to train scientists of the highest competence for the conducting of research in the fields of economics, energy and the environment, and to ensure the attraction and development of doctoral students.

The Institute's main research areas include (but are not limited to):

- Renewable energy and technologies enabling it;
- Environmental impact of climate change and anthropogenic activities;
- Economic development research towards climate-friendly economy;
- Modelling of energy systems and research of their control systems;
- Safety and reliability studies on industrial and energy facilities;
- Thermal physics, gas and fluid dynamics and metrology;
- Decommissioning of nuclear facilities and radioactive waste management.

2 STRATEGIC DIRECTIONS

The Lithuanian Energy Institute distinguishes two main strategic R&D directions: climate change mitigation and energy transformation. These are supported by eight additional directions that encompass the key research areas in energy science.



3 MAIN INDICATORS OF THE STRATEGIC PLAN

LEI successfully achieved its operational objectives. One of the Institute's key goals is the creation of high-level knowledge that enhances the country's competitiveness. To support this objective, 4 new international programmes' projects were launched in 2025. The number of project proposals submitted to international programmes increased, rising by 13% over the year and by 30% over two years.

LEI considers improving the efficiency of doctoral studies to be an important objective. In 2025, a 70% successful completion rate of doctoral studies was achieved, representing an increase of 16.7% since 2023. The total number of doctoral students reached 45 this year, which is 18.42% more than in 2024. In 2025, six doctoral dissertations were defended, and 16 new doctoral students were admitted. The number of admitted doctoral students has increased twice compared to the previous year.

While conducting R&D activities in the fields of energy and thermal engineering, environmental engineering, and energy economics, a high quality of scientific publications was maintained. 90% of articles were published in Q1 and Q2 journals. Funds from contracts amounted to EUR 5.187 thousand in 2025, representing an increase of 18.78% compared to 2024.

LEI Objectives and Measures Indicators (KPIs) for 2023–2025

LEI Objectives and Measures	Indicators (KPIs) for 2023–2025	2023	2024	2025
OBJECTIVE 1: Develop high-level knowledge that enhances national competitiveness	International programmes' projects initiated in the given year R9	7	14	4
	Additional indicator: Number of project proposals submitted to international programmes R8	40	46	52
Measure for Objective 1: To implement R&D activities in the scientific fields of energy and thermal engineering, environmental engineering and energy economics	Number of articles per researcher published in Clarivate Analytics WoS journals (IF > 0.25 AIF)	0,52	0,64	0,45
	Percentage of articles published in journals indexed in the CA WoS Journal Citation Reports that are in Q1 and Q2 quartiles R4	85	89	90
	Additional Indicators:			
	Number of articles per researcher published in Clarivate Analytics WoS indexed journals (IF > 0.25 AIF)	0,98	0,83	0,69
	Funds from contracts, thousand euros R6	3955	4367	5187
	Funds for research infrastructure renewal, thousand euros R7	574	473	376
	Number of scientific presentations at international conferences* per researcher	0,58	0,83	0,64
OBJECTIVE 2: Increase the effectiveness of doctoral studies	Successful completion of doctoral studies, %	60	80	70
Measure for Objective 2: Ensure the preparation of doctoral dissertations	Total number of PhD students	40	38	45
	Number of PhD dissertations defended per year	4	8	6
	Additional indicator: Number of admitted PhD students R5	8	8	16

Table. Key indicators of the Strategic Action Plan

*An international conference is considered to be an event held abroad.
Indicators marked in blue refer to the full-time equivalent (FTE) per researcher.

4 HUMAN RESOURCES

To strengthen human resources management at LEI, documents were submitted to the European Commission to obtain the certificate for implementing the Human Resources Strategy for Researchers (HRS4R).

Scientific Council

The LEI Scientific Council is composed of both scientific and administrative staff, as well as representatives from institutions, enterprises, and organizations committed to the Institute's mission and the objectives outlined in its official documents. The Council's term of office is five years.

Based on the Director's proposals, the Scientific Council discusses and approves the Institute's structure and any amendments thereto; proposals to amend the Institute's Statute; documents regulating scientific research at the Institute; internal regulations concerning the ownership of intellectual property; permanent or temporary commissions related to the coordination of research and experimental development (R&D) activities and project preparation; it also develops and approves the procedures for the evaluation and recruitment of scientific staff, and performs other functions.

On 13 March 2025, a meeting of the LEI Scientific Council was held. Dr. Dovilė Gimžauskaitė was elected Deputy Chair of the Scientific Council, replacing Dr. Raminta Skvorčinskienė, who resigned from the Council upon becoming Deputy Director of the Institute. During the meeting, it was also decided to propose Dr. Sigitas Rimkevičius as the Head of the Laboratory of Nuclear Installation Safety to the Institute's Director, Prof. Dr. Saulius Gudžius. In addition, the updated composition of the Academic Ethics and Doctoral Committees was approved, along with the regulations governing the activities of the Doctoral Committee and the Finance and Strategy Committee.

On 20 May 2025, elections for a new member of the LEI Scientific Council were held. Dr. Egidijus Babilas was elected from among ten candidates.

Between April and November 2025, four meetings of the Scientific Council were held. During these meetings, the Institute's annual activity report was discussed; the draft of the Institute's statutes was reviewed and approved. The Council also confirmed candidates for the Prof. R. Viskantas Prize, discussed the results of the employee engagement survey and measures to improve involvement, and reviewed the results of a survey of doctoral students concerning the quality of doctoral studies and the attestation process. The draft LEI budget for 2026 was reviewed, the results of the annual R&D activity evaluation were discussed, and the Institute's policy on the use of artificial intelligence in research and study processes was considered.

Labour Council

The Lithuanian Energy Institute's Labour Council is a collegial body which represents the interests of the Employees of the Institute, and defends their Labour, Profession, Economic and Social rights at work.

In its activities, the Council adheres to the principles of goodwill and respect for the legitimate interests of the employer. However, the Labour Council is independent of its employing entity (LEI), and the Employer is prohibited from influencing the Council's decisions or interfering in its activities in any way.

On 21 October 2024, following the resignation of a member of the LEI Labor Council, the new composition of the Council was approved. The members of the LEI Labor Council are: Regina Kalpokaitė-Dičkuvienė, Asta Narkūnienė, Lina Murauskaitė, Andrius Šimonis, and Simona Breidokaitė.

Between February and December 2025, the LEI Labor Council held 16 meetings, participated in consultations with the Institute's management, and provided recommendations in preparing documents on internal regulations and the employee remuneration system, as well as addressing other matters of concern to employees.

Academic Ethics Committee

The LEI Academic Ethics Committee ensures that the scientific and academic activities conducted at the Institute follow ethical principles. The Committee examines potential breaches of academic ethics, provides recommendations for their resolution, promotes integrity in research, and organizes educational activities aimed at strengthening an ethical and responsible work culture within the Institute.

On 13 March 2025, the composition of the LEI Academic Ethics Committee was confirmed and updated as follows: Asta Narkūnienė (Chair, Nuclear Engineering Laboratory); Diana Meilutytė-Lukauskienė (Laboratory of Hydrology); Eimantas Neniškis (Laboratory of Energy Systems Research); Karolis Lašas (Laboratory of Nuclear Installation Safety); Jolanta Kazakevičienė (Studies Administrator); Remigijus Janulionis (Laboratory of Nuclear Installation Safety); Laima Taparauskienė (Ministry of Education, Science and Sport of the Republic of Lithuania).

In 2025, the Committee held five meetings, during which various issues were discussed, including updates to academic ethics documents, responsible research, the use of artificial intelligence, authorship, and other matters relevant to the academic community. In September and October 2025, training sessions on academic ethics were organized for LEI researchers, led by Dr. Rima Sinickė and Dr. Eglė Ozolinčiūtė from the Office of the Ombudsperson for Academic Ethics and Procedures. In 2025, Committee members further developed their competencies by participating in various events, both in person and online.

The 2025 Annual Report of the LEI Labour Council is available here:

The 2025 Annual Report of the LEI Academic Ethics Committee is available here:

Directorate

On 2 January 2025, the Deputy Directors began their new term.

Dr. Raminta Skvorčinskienė
Senior Research Associate of the Laboratory of Combustion Processes, responsible for organizational development and international cooperation.

Dr. Robertas Poškas
Chief Research Associate of the Nuclear Engineering Laboratory, responsible for infrastructure development.

Dr. Andrius Tamošiūnas
Chief Research Associate of the Plasma Processing Laboratory, responsible for research and innovation.

Heads of the Laboratories

On 2 January 2025, seven newly appointed Heads of Subdivisions began their duties:

Dr. Ernestas Narkūnas, Senior Research Associate and Head of the Nuclear Engineering Laboratory

The main research areas of Dr. E. Narkūnas include environmental impact assessments and radiation safety evaluations during the planning, operation, and decommissioning of nuclear energy facilities, as well as aspects of radioactive waste and spent nuclear fuel management, including radiological characterization.

Dr. Rolandas Paulauskas, Chief Research Associate and Head of the Laboratory of Combustion Processes

The main research areas of Dr. R. Paulauskas focus on combustion processes of solid, liquid, and gaseous fuels, as well as methods for improving combustion, including oxygen enrichment, plasma processes, and the thermochemical treatment (gasification, pyrolysis, carbonization) of biomass and non-hazardous waste.

Dr. Vytautas Akstinas, Senior Research Associate and Head of the Laboratory of Hydrology

The main research areas of Dr. V. Akstinas cover the assessment of extreme hydro-meteorological events, hydromorphological studies of water bodies, the impact of river morphology changes on river hydrodynamics and aquatic ecosystems, ecological flow evaluation under climate change, and the application of remote sensing methods in water body research.

Dr. Inna Pitak, Senior Research Associate and Head of the Laboratory of Materials Research and Testing

The main research areas of Dr. I. Pitak focus on the production of alternative fuels from municipal solid waste, textile waste, and post-incineration residues for energy-intensive industries; strategies for recycling solar panels and computer boards after their service life; and the synthesis of catalysts for alternative fuel production.

Dr. Liutauras Marcinauskas, Chief Research Associate and Head of the Plasma Processing Laboratory

The main research areas of Dr. L. Marcinauskas include the development and study of high- and low-temperature plasma sources for various applications; the use of plasma technologies for functional coating formation, the development of new materials, and the surface modification of structural materials; investigation of tribological and mechanical properties of coatings; and applications of plasma technologies in biotechnology and agriculture.

Dr. Marius Praspaliauskas, Senior Research Associate and Head of the Laboratory of Heat-Equipment Research and Testing

The main research areas of Dr. M. Praspaliauskas focus on determining the potential uses of solid products generated during the combustion or pyrolysis of biomass and municipal waste using experimental methods. His studies analyze the properties and conditions of biomass and municipal waste necessary for efficient combustion of different fuel types and for minimizing pollutant emissions.

Dr. Šarūnas Varnagiris, Senior Research Associate and Head of the Center for Hydrogen Energy Technologies

The main research areas of Dr. Š. Varnagiris focus on the development of hydrogen energy technologies, applying materials science and engineering solutions, including the synthesis of innovative catalysts for hydrogen production from methane pyrolysis and photocatalysis, metal hydrolysis, hydrogen storage in metal hydrides, the effect of hydrogen on materials, and other related technologies.

On 1 April 2025, Dr. Sigitas Rimkevičius, Chief Research Associate, began his term as Head of the Laboratory of Nuclear Installation Safety

The main research areas of Dr. S. Rimkevičius include advanced small modular reactor technologies and safety, resilience of energy systems to disturbances, and integration of energy systems for smart, climate-neutral cities.

On 4 April 2025, Dr. Darius Naujokaitis, Senior Research Associate, began his term as Acting Head of the Smart Grids and Renewable Energy Laboratory

The main research areas of Dr. D. Naujokaitis focus on digitalization, big data solutions, artificial intelligence and machine learning algorithms for power systems.

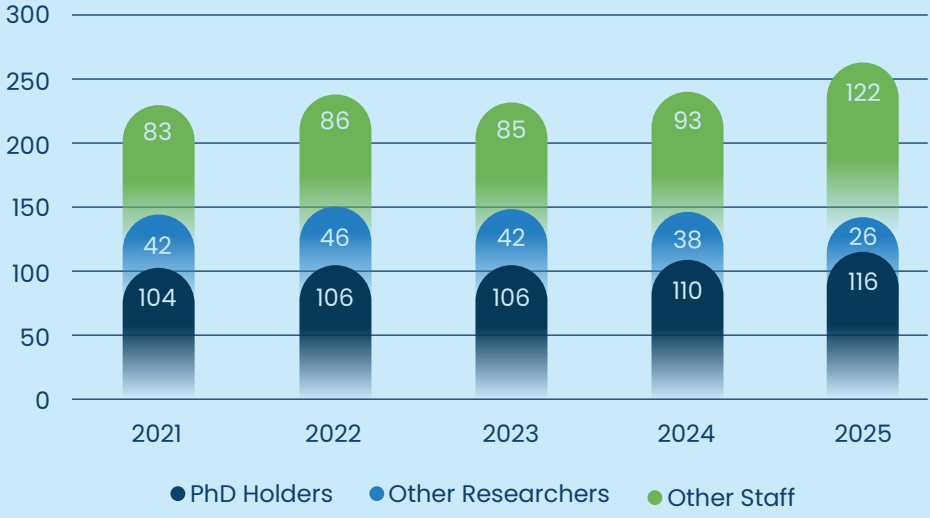
Dr. Arvydas Galinis, Chief Research Associate, continued his term as Head of the Laboratory of Energy Systems Research

The main research areas of Dr. A. Galinis include the analysis and mathematical modeling of the development and operation of energy and related systems, system integration, decarbonization, and enabling broader use of renewable energy sources.

Employees

As of 31 December 2025, a total of 264 employees worked at LEI. Researchers, doctoral students, and other research personnel accounted for 54% of all employees, while specialists and other staff comprised 46%. 15 early-career researchers joined the subdivisions during the year.

Employee Numbers 2021 – 2025



On 31 December 2025, the Institute employees consisted of 100 women and 164 men. The average age of employees was 47 years.

In 2025, 45 doctoral students studied at LEI in the fields of energy and power engineering, environmental engineering, and economics.

Employee achievements

LEI researchers awarded for their achievements:

On 29 January 2025, Dr. Marijus Šeporaitis was awarded the Honorary Badge by the Engineering and Technology Industries Association of Lithuania (LINPRA).

On 18 April 2025, Dr. Raminta Skvorčinskienė received a commendation from the Speaker of the Seimas of the Republic of Lithuania, S. Skvernelis, for her leadership.

On 17 June 2025, Dr. Justas Eimontas was awarded a Lithuanian Academy of Sciences (LMA) scholarship in the field of technological sciences. His research is topic: "Application of thermochemical processes for converting residual biomass and waste into valuable energy and/or chemical products."

5 DOCTORAL STUDIES

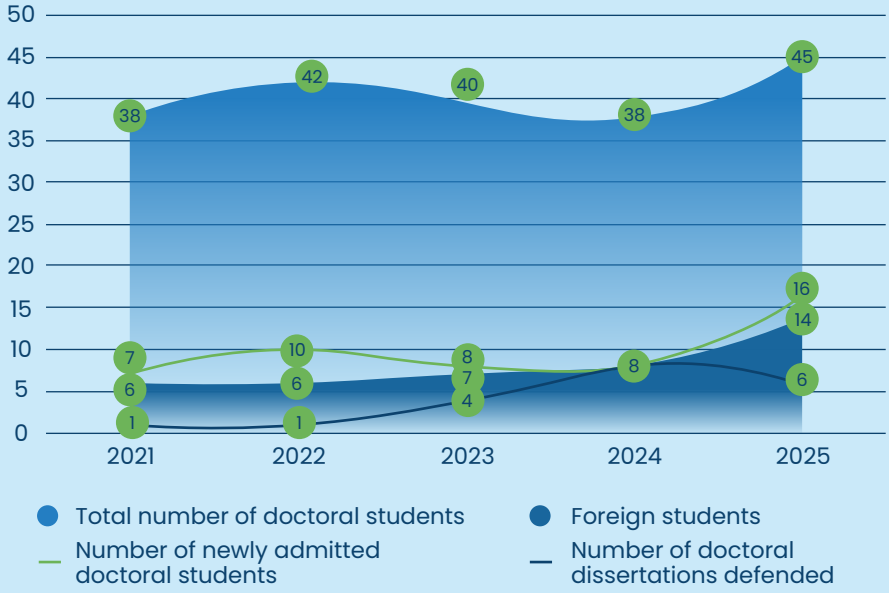
The Lithuanian Energy Institute considers the implementation of doctoral studies to be a particularly important activity, aiming to share experience and prepare specialists for the future. The Lithuanian Energy Institute has the right to conduct doctoral studies in three fields:

- Energetics and Power Engineering (T 006)
- Environmental Engineering (T 004)
- Economics (S 004)

Doctoral studies are implemented in collaboration with Kaunas University of Technology, Vytautas Magnus University, and Klaipėda University.

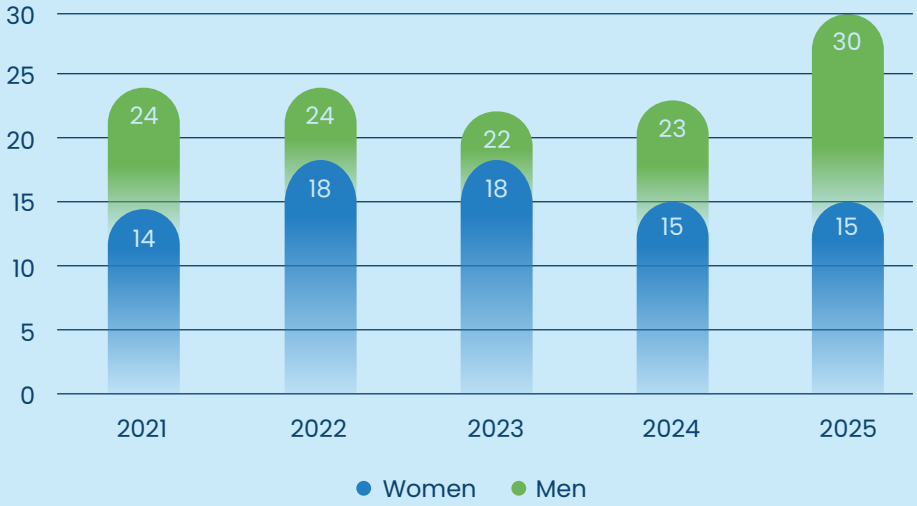
The total number of doctoral students this year was 45, including 14 international students (31% of all doctoral students). During the year, 6 doctoral dissertations were defended, and 16 new doctoral students were admitted.

Development of doctoral studies 2021 – 2025



In 2025, 45 doctoral students studied at LEI, of whom 15 were women and 30 were men. Compared with 2024, almost twice as many doctoral students were admitted in 2025, and the total number of doctoral students increased by nearly 20%.

Doctoral students by gender 2021 – 2025



Doctoral studies at the Lithuanian Energy Institute provide students with the opportunity to become actively involved in scientific activities from the very first year. Doctoral students conduct both fundamental research and experimental work in the fields of energy and thermal engineering, environmental engineering, and economics. Students contribute to international projects and seek solutions to global energy challenges.

Most research is carried out at the institute, where doctoral students can use modern laboratory equipment, receive guidance from their supervisors and other experienced researchers, be employed during their studies, and participate in internships at foreign research centers. They present their results in both national and international projects and conferences, improve their competencies, and acquire new skills.

Doctoral students also actively participate in conferences organized by the Institute. Traditionally, they have taken part in the International Conference of Young Scientists on Energy and Natural Sciences Issues (CYSENI), which has been held for 21 years, and have contributed to its organization. From 2026, LEI doctoral students will join the Institute's new conference "Energy Transformation Technologies for Sustainable Future" (ENTRUST), where they will be able to present their scientific achievements to an international audience.

Doctoral students admitted in 2025 and their research topics

The number of doctoral students admitted in 2025 is 16. Below is the list of admitted doctoral students and their dissertation topics.

IN THE FIELD OF ENERGY AND POWER ENGINEERING (T 006)

Donatas BARTKUS. Investigation of Waste Heat Recovery from Industrial Streams Using a Heat Pipe Heat Exchanger. Scientific supervisor Dr. Robertas Poškas.

Evaldas BIRBILAS. Development and Investigation of Effective Algorithms for Reducing/Suppressing Active Power Oscillations in Power Plants. Scientific supervisor Dr. Virginijus Radziukynas.

Gytis EŽERINSKAS. Study of Fine Particle Distribution in Logging Residues and Their Influence on Thermochemical Processes. Scientific supervisor Dr. Marius Praspaliauskas.

Akvilė GRIGALIŪNIENĖ. Study on the Possibilities and Impact of the Nodal Pricing on the European Electricity Market. Scientific supervisor Dr. Inga Konstantinavičiūtė.

Javid KARIMOV. Energy and Virtual Metrology Installation Safety Estimates Accuracy Dynamics' Investigation Applying Machine Learning. Scientific supervisor Dr. Robertas Alzbutas.

Eivinas MIKULIONIS. Virtual Power Grid Management and Efficiency Study. Scientific supervisor Dr. Virginijus Radziukynas.

Vishnu RADHAKRISHNAN NAIR. Optimization of Hydrogen Production from Methane Pyrolysis Using Innovative Nanocatalysts. Scientific supervisor Dr. Šarūnas Varnagiris.

Abu Muhammad Mustakim REZA. Research on the Integration of Waste Heat from Supermarkets Into District Heating Systems. Scientific supervisor Dr. Giedrė Streckienė.

Muhammad Shahzad AZIZ. Research on Safety and Integration of Energy Storage and Energy Systems Applying Trustworthy Artificial Intelligence. Scientific supervisor Dr. Robertas Alzbutas.

Abdul Moeed KHAN. Development and Research of Demand Response (DR) Control Algorithms in Smart Grids. Scientific supervisor Dr. Virginijus Radziukynas (Marie Skłodowska-Curie Doctoral Network Project No. 101169359-CoDeF-HORIZON-MSCA-2023-DN-01 "Consumer Electricity Demand Flexibility").

IN THE FIELD OF ENVIRONMENTAL ENGINEERING (T 004)

Bohdan CHUMAK. Bio-Derived Catalysts from Mugwort for Hydrogen Production and CO2 Reduction: A Sustainable Approach to Renewable Energy. Scientific supervisor Dr. Inna Pitak.

Saba FATIMA. The Effects of Environmentally Friendly Biological Additives on the Efficiency of Phytoremediation of Metal-Contaminated Soil and Recovery of the Health of Soils. Scientific supervisor Dr. Jūratė Žaltauskaitė.

Kibrewosen Zewdu BELAY. Effects of Land Cover Change on River Hydrological Processes in the Past and Under Climate Change. Scientific supervisor Dr. Diana Meilutytė-Lukauskienė.

Augustinas ŽILYS. Research of Patterns of Hydrodynamic and Sediment Transport Processes in Reservoirs. Scientific supervisor Dr. Darius Jakimavičius.

IN THE FIELD OF ECONOMICS (S 004)

Domantas LAPĖNAS. The Role of Multimodal Transport in the EU Decarbonization Strategy – Economic Benefits and Business Opportunities. Scientific supervisor Dr. Arvydas Galinis.

Indrė GEČAITĖ. The Economic Drivers That Are Enabling the Transformation of the Energy Sector Are Helping It to Adapt to the Challenges of Climate Change and Increasingly Stringent Environmental Requirements. Scientific supervisor Dr. Dalius Tarvydas.

Doctoral theses defended in 2025

In 2025, 6 doctoral dissertations were defended. Below is the list of doctoral students who defended their dissertations and their research topics.

On 24 January 2025, the doctoral candidate from the Laboratory of Combustion Processes, **Justas Eimontas**, defended his doctoral dissertation on the topic "Recovery of Energy Products by Pyrolysis from Seaweed and Fishing Nets" (Technological Sciences, Energy and Power Engineering, T006). Dissertation prepared as a single-volume publication in Lithuanian. Scientific Supervisor – dr. Nerijus Striūgas.

On 30 April 2025, the doctoral candidate from the Laboratory of Heat-Equipment Research and Testing, **Rita Petlickaitė**, defended her doctoral dissertation on the topic "Technological Environmental Assessment of Biofuel and Heat Production from Multi-Crop Biomass and the Use of Ash for Fertilization" (Technological Sciences, Environmental Engineering, T004). Dissertation prepared as a single-volume publication in Lithuanian. Scientific Supervisor – prof. dr. Algirdas Jasinskas.

On 25 August 2025, the doctoral candidate from the Laboratory of Nuclear Installation Safety, **Simona Breidokaitė**, defended her doctoral dissertation on the topic "Modeling of the Neutron Transport Based on the Monte Carlo Method and the Numerical Estimation of Radiological Quantities Towards the Future Nuclear Fusion Reactor DEMO" (Technological Sciences, Energy and Power Engineering, T006). Dissertation prepared as a single-volume publication in English. Scientific Supervisor – dr. Gediminas Stankūnas.

On 26 August 2025, the doctoral candidate from the Laboratory of Heat-Equipment Research and Testing, **Rimas Meištininkas**, defended her doctoral dissertation on the topic "Bioremediation Potential of Petroleum Contaminated Soil Using Legume Siderates, Biological Additives, and Seed Treatment Technologies" (Technological Sciences, Environmental Engineering, T004). Dissertation prepared as a single-volume publication in Lithuanian. Scientific Supervisor – prof. dr. Jūratė Žaltauskaitė.

On 24 October 2025, the doctoral candidate from the Laboratory of Nuclear Installation Safety, **Noura Ragab Abdelaty Elsalamouny**, defended her doctoral dissertation on the topic "Numerical Investigation of Severe Accident Phenomena Based on Experimental Investigations Applying BEPU Approach" (Technological Sciences, Energy and Power Engineering, T006). Dissertation prepared as a single-volume publication in English. Scientific Supervisor – dr. Tadas Kaliatka.

On 19 December 2025, the doctoral candidate from the Laboratory of Heat-Equipment Research and Testing, **Deimantė Čepauskienė**, defended her doctoral dissertation on the topic "The Influence of Mineral Additives on Ash Melting Behaviour and Slag Formation in Agro-biofuels" (Technological Sciences, Energy and Power Engineering, T006). Dissertation prepared as a single-volume publication in Lithuanian. Scientific Supervisors – dr. Nerijus Pedišius (September 2016 – February 2024), dr. Marius Praspaliauskas (since March 2024).

Doctoral students' achievements

LEI supports its doctoral students in various ways. Doctoral candidates at the institute are awarded annual incentive scholarships or bonuses. Monetary prizes are granted to winners of competitions for young researchers and for the most active doctoral student organized by LEI. Doctoral students are also given opportunities to undertake internships at foreign research centers, present their scientific achievements at international conferences, and participate in national and international research projects.

MOST OUTSTANDING RESEARCHERS OF 2025, AWARDED BY LEI:

Most outstanding bachelor's student – Vilmantė Kudelytė
Laboratory of Combustion Processes

Most outstanding master's student – Emilija Stankutė
Laboratory of Nuclear Installation Safety

Most outstanding first-year doctoral student – Julius Venckus
Laboratory of Nuclear Installation Safety

Most outstanding second-year doctoral student – Andrius Ambrutis
Laboratory of Nuclear Installation Safety

Most outstanding third-year doctoral student – Ieva Kiminaitė
Plasma Processing Laboratory

Most outstanding fourth-year doctoral student– Justina Jaseliūnaitė
Laboratory of Nuclear Installation Safety

Most outstanding young researcher – dr. Justas Eimontas
Laboratory of Combustion Processes

In 2025, young scientists were awarded the Honorary Professor Romas Viskanta Prize, established by the Vydūnas Youth Fund to encourage young scientists and doctoral students for their achievements in energy research:

dr. Justas Šereika
Laboratory of Heat-Equipment Research and Testing

dr. Adolfas Jančauskas
Laboratory of Combustion Processes

The Honorary Professor Romas Viskanta Prize is awarded to young scientists and doctoral students of LEI who are actively working in the fields of thermal physics, gas and fluid dynamics, renewable energy, nuclear and thermonuclear energy, and energy in general, and have achieved significant scientific results. Candidates must be active in the social, community, and cultural activities of various organizations and engage in the dissemination of scientific information.

RIMANTĖ BALSIŪNAITĖ, a doctoral student from the Laboratory of Energy Systems Research, participated in the "Researchers' Grand Prix 2025" project, where she presented her research on the dissertation topic "Assessment of the Socioeconomic Impact of Environmental Sustainability Practices and Greenhouse Gas Emissions" and reached the event's final.

Student interns

LEI hosted 50 student interns from various higher education and research institutions. Among them were three students from Polytech Orléans (France), one from Toulouse INP-ENSIACET (France), and one from Massachusetts Institute of Technology (USA).

Thalia Nahmiaz from France completed a four-month internship within the project "Sustainable Glass Industry with Fuel-Flexible Technology" (GIFFT), where she contributed to research in the field of combustion processes. On 20–22 May, she also participated in the international conference of Young Scientists on Energy and Natural Sciences Issues (CYSENI), organized by LEI, which she found particularly valuable for networking with researchers from around the world.

French students Arnaud Duchâteau, Guillaume Ardi, and Tony Alloza carried out internships within the "GIFFT" and "Rad2Fun" projects. The interns first conducted scientific literature reviews and later became involved in experimental work related to combustion processes and plasma parameters.

In June, Massachusetts Institute of Technology student Lance Berkey, who studies physics and mathematics, began his internship at LEI. While working in the Laboratory of Thermal Equipment Research and Testing, he contributed to molecular dynamics research on material degradation caused by hydrogen permeation. L. Berkey performed computational modeling and data analysis, investigating hydrogen-induced damage in alpha iron. According to the student, the internship at LEI opened new perspectives and encouraged him to consider pursuing doctoral studies.

All interns gained experience in both theoretical research and practical experimentation, worked with modern laboratory equipment, and contributed to international energy research projects.

Student feedback on internships at LEI

> *"The internship at LEI opened new perspectives for me. Until now, I was certain that I would not pursue a PhD immediately after my master's degree, but now I am seriously considering this option. I enjoyed conducting research and working in a laboratory, so I believe I could choose this career path in the future,"*
>
> – MIT student L. Berkey.

> *"I am impressed by the institute—the abundance of scientific equipment, the number of researchers working here, and the diversity of ongoing research activities are remarkable. I also gained valuable experience at the international CYSENI conference held at LEI at the end of May. It was a great opportunity to meet researchers from all over the world,"*
>
> – T. Nahmiaz, a student from France.

> *"LEI left a great impression due to its modern laboratories, the conferences we had the opportunity to attend during the internship, and the genuine attention given to students. We had the opportunity to grow both as specialists and as individuals. Few people get the chance to work in such a high-level scientific laboratory. I learned a lot—this is a valuable experience that will benefit me in the future, regardless of the career path I choose,"*
>
> – intern T. Alloza.

During the summer, a chemistry bachelor's student from Vilnius University, Deimantas Šmigelskas, also completed an internship at LEI. He achieved four perfect scores in his national final exams, missing a fifth by just one point. At the Laboratory of Heat-Equipment Research and Testing, he carried out research on "Hydrogen Embrittlement in Steel Alloys Using the Molecular Dynamics Method."

D. Šmigelskas noted that the internship at LEI enriched his knowledge and strengthened his motivation to further pursue his chosen field.

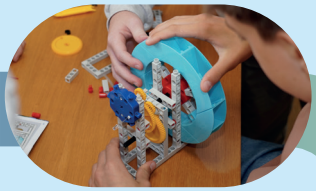
> *"From a professional perspective, I am most pleased that I learned to use specialized software for molecular modeling. Although my research was more theoretical, it is also practically applicable. This is particularly important from an economic standpoint, especially in technical fields such as hydrogen storage. The internship at LEI not only provided knowledge but also helped me grow as a specialist. It is an excellent place for independent and curious students, regardless of their field of study,"* – he said.

School students

In 2025, LEI joined the Ignitis #EnergySmartSTART programme, aimed at engaging school students in energy science. A total of 11 different educational activities were offered, some of which were newly developed. From May to November, 24 specialized educational sessions were organized at the Institute for Lithuanian school students. During these activities, more than 500 students in grades 4–11 from schools in Kaunas, Vilnius, Prienai, Kėdainiai, and Šilutė visited LEI. Participants explored various topics in energy science, participated in practical activities, and learned about the daily work of researchers.

In 2025, LEI received a letter of appreciation from LINPRA for its contribution to the organization of the National Young Engineers Championship STEAM TEAM 2025.



Promotion

In 2025, LEI organized national and international events to present the Institute's activities, study and internship opportunities, and participated in the following events:

- 29 January LEI participated in the event "Higher Education Fair 2025"
- 9 April LEI participated in Vilnius University's Career Days event "VU KD'25"
- 5 June LEI participated in the "Green Ideas Festival" held in the inner courtyard of the Presidential Palace
- 21 June LEI participated in the festival "Savos bangos: Sustainable Future Creators", held at Danė Square in Klaipėda
- 2 October LEI participated in KTU WANTed Career Days at "Žalgiris Arena"
- 9 October LEI participated in the event "Your Career: Make a choice, take action", organized by Klaipėda University and held at "Švyturys Arena", the largest career fair in Western Lithuania
- 14 November LEI participated in the event "VMU Connections" held at Vytautas Magnus University
- 4 December LEI participated in the KTU Faculty of Chemical Technology event "Partners' Days 2025"

CYSENI Conference

On 20–22 May 2025, LEI organized the 21st International Conference of Young Scientists on Energy and Natural Sciences Issues "CYSENI 2025". The conference brought together 80 participants from 7 countries and featured 5 keynote speakers.

CYSENI is an annual event dedicated to young researchers from Europe and around the world working in the fields of energy and environmental sciences. The aim of CYSENI is to support young scientists in presenting their latest research and establishing long-term scientific collaborations.

The conference was held at the Lithuanian Energy Institute, where participants had the opportunity not only to present their research but also to interact with one another, establish new connections, exchange ideas, and discuss current scientific topics.

6 SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT

Long-term research and experimental development programmes

In 2025, four long-term institutional R&D programs for the period 2022-2026 were carried out:

Programme 8.1.

Development and integration of advanced energy technologies

Manager – Dr. Raimondas Pabarčius

Objective – By continuing ongoing and initiating new numerical and experimental research, and by applying both established and novel research methods, the aim is to further develop advanced energy technologies, comprehensively assess their reliability, safety, and optimal integration into the overall energy network.

This newly initiated program represents the continuation of LEI's scientific research efforts, enabling the accumulation and transfer of Lithuanian scientists' expertise and knowledge to future generations, thus ensuring a sustainable environment and circular way of life.

Programme 8.2.

Interdisciplinary research on decarbonisation and adaptation to climate change

Manager – Dr. Vidas Lekavičius

Objective – Through interdisciplinary research in the social, natural, and technological sciences, to obtain and systematize new scientific knowledge necessary for assessing the impacts of climate change, selecting climate change mitigation measures, and preparing practical recommendations for the application of this knowledge.

Programme 8.3.

Investigation of process regularities and resulting products in innovative energy/technological systems that use renewable resources

Manager – Dr. Robertas Poškas

Objective – To investigate the regularities of thermal, chemical, and hydrodynamic processes occurring in innovative technological systems, in order to address the challenges of the circular economy, the production of heat, electricity, and valuable materials, as well as related environmental issues.

Programme 8.4.

Numerical investigations of safety issues and processes in the facilities for spent nuclear fuel and decommissioning radioactive waste storage and final disposal.

Manager – Dr. Artūras Šmaižys

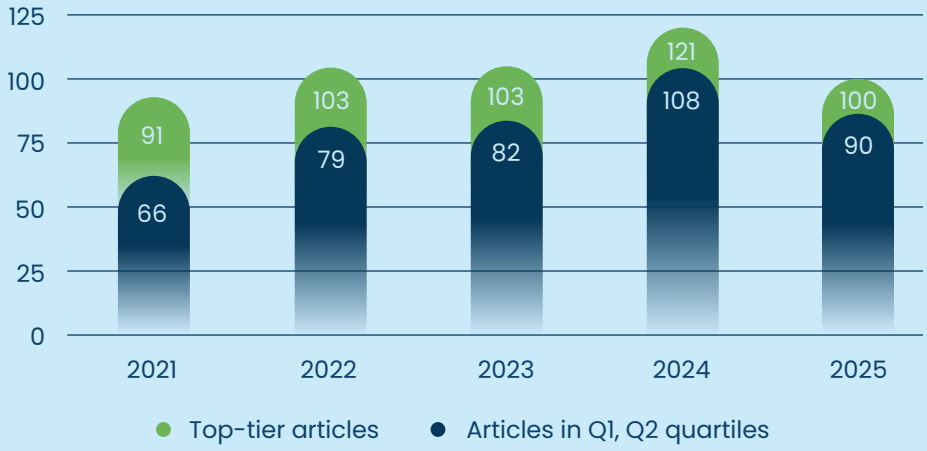
Objective – To continue research aimed at ensuring the safe management and storage of radioactive waste and spent nuclear fuel generated during the decommissioning of the Ignalina Nuclear Power Plant, by assessing radiological impact and appropriate engineering solutions.

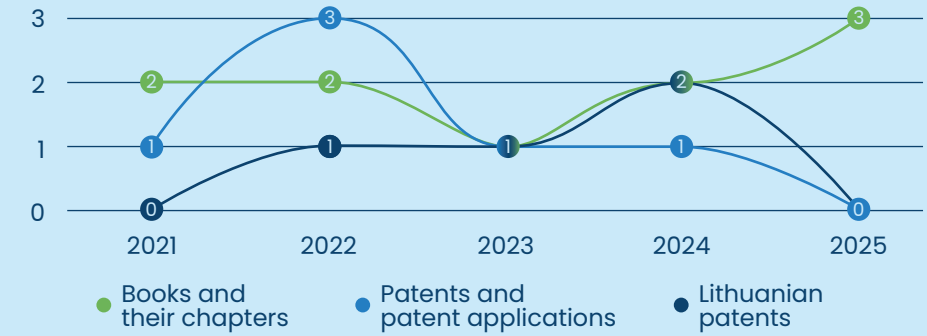
Scientific publications

In 2025, a total of 100 scientific publications were published in the Clarivate Analytics Web of Science (WoS) database, with 90% of the publications published in Q1 and Q2 journals.

In 2025, chapters were published in 3 books.

Scientific production development





Achievements and main research areas of research divisions

- Laboratory of Heat-Equipment Research and Testing
- Laboratory of Combustion Processes
- Nuclear Engineering Laboratory
- Plasma Processing Laboratory
- Laboratory of Materials Research and Testing
- Laboratory of Nuclear Installation Safety
- Center for Hydrogen Energy Technologies
- Smart Grids and Renewable Energy Laboratory
- Laboratory of Energy Systems Research
- Laboratory of Hydrology

Laboratory of Heat-Equipment Research and Testing

MAIN RESEARCH AREAS OF THE LABORATORY:

Processes and technologies for the efficient use of R.E.S. and reduction of environmental pollution:

- physical and thermal properties of solid biomass and recovered fuel;
- fuel preparation methods and technologies;
- thermal conversion processes (combustion, gasification) of solid fuel;
- solid biofuel drying;
- solid biofuel dynamics and thermal conversion on moving grate and in fluidized bed;
- emission formation processes in heating appliances;
- efficiency of low-capacity boilers and heating appliances fired by solid fuel;
- research into the sustainable transformation of district heating systems by integrating renewable and low-potential energy resources.

Thermal physics, fluid mechanics and metrology:

- flows mixing in chambers of limited dimensions and various geometry;
- permeability of gas mixtures through membranes;
- particulate emission reduction;
- flow dynamics in elastic channels;
- ultrasound propagation in flows;
- heat and mass transfer by molecular dynamics;
- maintenance of five national flow and pressure standards and assurance of measurement traceability.

LABORATORY ACHIEVEMENTS:

- **In 2025, the National Accreditation Bureau re-accredited the laboratory's calibration, testing, and inspection activities and issued new accreditation certificates.** For the calibration of measuring instruments, Certificate No. LA.02.004 was issued on 2025-08-06 and is valid until 2030-08-05. For testing activities covering solid fuel heating equipment, gas-fired appliances, pollution sources, solid biofuel and recovered fuel, as well as water and heat meters, Certificate No. LA.01.036 was issued on 2025-08-06 and is valid until 2030-08-05. For the verification of measuring instruments and equipment, the laboratory was accredited as a Type A inspection body under Certificate No. LA.06.005, issued on 2025-05-18 and valid until 2030-05-17.

- **In 2025 a mass-transport-based cerebrospinal fluid flow model was significantly improved by integrating patient-specific anatomy derived from magnetic resonance imaging data.** The model includes transport of blood degradation products, enabling analysis of their spatial distribution over time. The developed method provides a basis for future clinical applications, including subarachnoid hemorrhage, hydrocephalus, and brain tumors.

Laboratory of Combustion Processes

MAIN RESEARCH AREAS OF THE LABORATORY:

- Investigation of gaseous, liquid and solid fuels combustion processes;
- Development and optimization of industrial combustion devices;
- Thermochemical (gasification, pyrolysis, carbonization) processing of biomass and non-hazardous waste;
- Liquid and gaseous biofuel synthesis research.

LABORATORY ACHIEVEMENTS:

LEI INSTALLED A MOBILE RESEARCH LABORATORY FOR THE UTILISATION OF EXTREMELY LOW-CALORIFIC LANDFILL GAS FOR ENERGY PRODUCTION

On the LEI premises, an innovative mobile laboratory dedicated to the utilisation of extremely low-calorific landfill gas for energy production has been successfully installed. The mobile cogeneration plant laboratory, designed by the Laboratory of combustion processes, enables the recovery of valuable energy resources and the reduction of CH4 emissions, thus contributing to the implementation of the objectives of the Interreg South Baltic project "Low Calorific Gas for Green Power Production" (LoCaGas).

By modifying the spark-ignition internal combustion engine and applying oxygen-enriched combustion, operating conditions are created that extend the engine's operating limits beyond those normally considered acceptable from a technological standpoint. Experimental studies show that it is possible to recover energy from waste landfill gas with a methane concentration below 40%. Upon successful completion of the laboratory tests at LEI, the project will move to the next stage – concept testing under real operating conditions.

Nuclear Engineering Laboratory

MAIN RESEARCH AREAS OF THE LABORATORY:

- Safety of spent nuclear fuel management;
- Safety of radioactive waste management;
- Assessment of different factors related to decommissioning of nuclear facilities;
- Waste heat recovery from flue gases during biofuel combustion and reduction of resulting emissions;
- Investigation of heat transfer and hydrodynamic processes in various systems and their components;
- Fire safety investigation.

LABORATORY ACHIEVEMENTS:

Projects being conducted by the Laboratory relating to the EU level actual topics on development of circular economy, reuse of waste heat and decrease of harmful emissions:

- Research has been completed in the Project of EU Programme "Horizon 2020": "iWAYS – Innovative Water Recovery Solutions through Recycling of Heat, Materials and Water across Multiple Sectors" (2020–2025)

9 COUNTRIES 19 ORGANISATIONS

The project developed a set of industrial technologies and systems to recover water and heat, and in some cases materials, from exhaust gas streams. The main part of laboratory's activities was related to the waste heat recovery

and contaminated condensate purification (together with colleagues from Italy (SIMAM), a prototype for contaminated condensate purification was tested in the laboratory).

Projects being conducted by the Laboratory relating to the exceptional state-wide importance and significance Megaproject of the decommissioning of Ignalina NPP:

- Activities are ongoing in the Projects: "Environmental Impact and Safety Assessments of the Reconstruction and Conversion of INPP Bituminised Waste Storage Facility into a Repository" (B-20) (subcontractor to UAB "Svertas Group"); "Technical Support Organisation Assistance to INPP in respect of Safety Analysis and Repository Waste Acceptance Criteria" (TSO.02); "Services for the Overarching Environmental Impact Assessment of the Entire Ignalina NPP Decommissioning Process and Preparation of the Environmental Impact Assessment Report"; "Dismantling of Steam Drum Separators in the Units 1 and 2 of Ignalina Nuclear Power Plant" (subcontractor to "Westinghouse Electric Spain, SAU").

- Activities have been completed in the Project: "Engineering Services Associated with Dismantling of Ignalina Nuclear Power Plant Reactor-cores" (R3D).

- Research has been completed in the Project of EU Programme "Horizon 2020" ("Euratom"): "HARPERS – Harmonised Practices, Regulations and Standards in Waste Management and Decommissioning" (2022–2025).

HARPERS

13 COUNTRIES 26 ORGANISATIONS

Projects being conducted by the Laboratory relating to the unique long-term Megaproject of the implementation of a deep geological repository in Lithuania (Ignalina NPP):

- Research is ongoing in the Project of EU Programme "Horizon Europe" ("Euratom"): "EURAD-2 – European Partnership on Radioactive Waste Management-2" (2024–2029).

eurad 2
European Partnership on Radioactive Waste Management

26 COUNTRIES >100 ORGANISATIONS

In this project, the research covers not only the management of radioactive waste from existing (conventional) nuclear reactors, but also focuses on radioactive waste management for future Small Modular Reactors (SMRs).

Plasma Processing Laboratory

MAIN RESEARCH AREAS OF THE LABORATORY:

- Development and research of direct current plasma sources for various applications;
- Investigation of processes and phenomena occurring in discharge channels, plasma flows, and currents;
- Diagnostics of plasma and high-temperature flows, and development of diagnostic tools;
- Interaction of plasma flows with materials in various plasma-based technological processes;
- Research and implementation of plasma processes for hazardous substance neutralization;
- Synthesis of catalytic and tribological coatings in a plasma environment and investigation of their properties;
- Plasma-based formation and modification of surface layers of structural materials;
- Synthesis and property analysis of micro- and nano-dispersed particles and mineral fibers from refractory materials;
- Generation of water vapor plasma and its use for fuel conversion and hazardous waste neutralization;
- Synthesis of hydrogen and synthetic gases in water vapor plasma.

LABORATORY ACHIEVEMENTS:

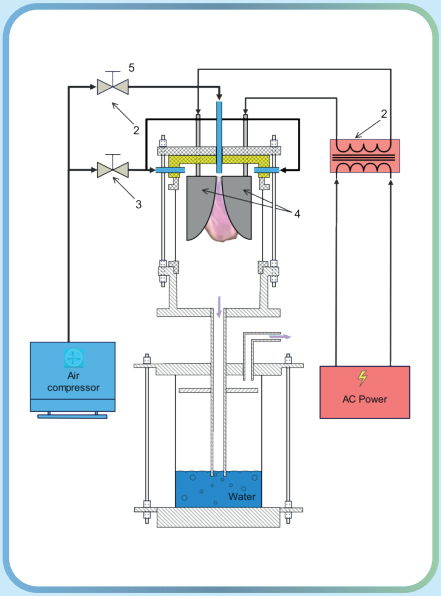
LMT research group's project "Application of plasma and aeroponic technologies for increasing plant biomass gain and yield of biologically active compounds (AEROPLASMA)" was implemented

Within the framework of the joint VMU-LEI "AEROPLASMA" project, two plasma systems were developed to produce plasma-activated water. The chemical composition and stability of plasma-activated water were determined.

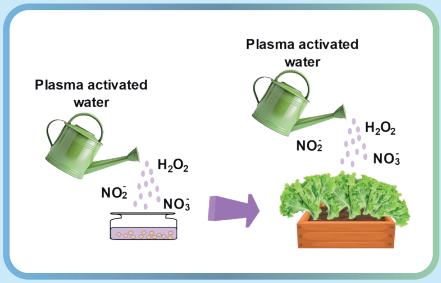
Plasma-activated water was used for the treatment of lettuce seeds, lettuce watering, and spraying. It was found that by properly selecting plasma discharge parameters, it is possible to produce the plasma-activated water that stimulates secondary metabolite production and increases lettuce (*"Pearl Gem"* and *"Cervanek"*) productivity.

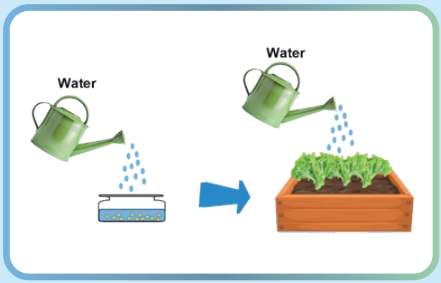
Application areas of plasma activated water:

- Promotion of seed germination.
- Improve plant growth.
- Control of plant diseases.
- Food disinfection.
- Healing and treatment of chronic wounds.



Schematic diagram of a gliding arc discharge plasma system producing plasma-activated water. 1 – high-voltage transformer, 2 – steel electrodes, 3 – plasma, 4,5 – gas rotameters.





Laboratory of Materials Research and Testing

MAIN RESEARCH AREAS OF THE LABORATORY:

- Development and research of multifunctional materials and composites;
- Recovery of valuable materials from multilayer composites;
- Material testing, evaluation, and analysis of quality indicators.

LABORATORY ACHIEVEMENTS:

Development of a Biocatalyst

During the project "Preparation for submitting an application under the Horizon Europe calls for proposals for the project: Synthesis of a catalyst from mugwort for the production of hydrogen fuel (KIETisH2)", an applied research study was carried out aimed at developing and scientifically validating a methodology for the synthesis of a plant-derived biocatalyst based on mugwort. The experimental methodology encompassed the selection of the initial plant feedstock, its preparation steps, chemical treatment, and optimisation of synthesis parameters to obtain a material suitable for use in alternative fuel production
processes. A synthesis methodology for the biocatalyst was developed and experimentally validated, and the optimal conditions for its preparation were established.

A comprehensive physical and chemical analysis of the synthesised material was performed. The obtained catalyst exhibited a crystalline structure and a well-developed porous architecture. The specific surface area was determined using the BET gas adsorption method with nitrogen adsorption at cryogenic temperatures, enabling the assessment of total surface area, pore volume and pore size distribution. The specific surface area ranged from 300 to 500 m^2/g, and the average pore size was 2–4 nm, meeting the requirements for catalysts used in alternative fuel production and confirming the high potential of the synthesised material.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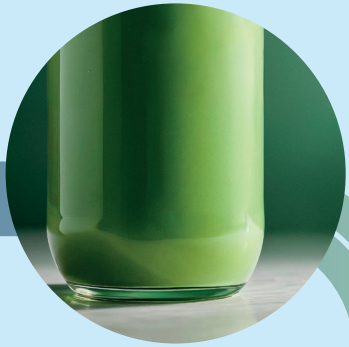
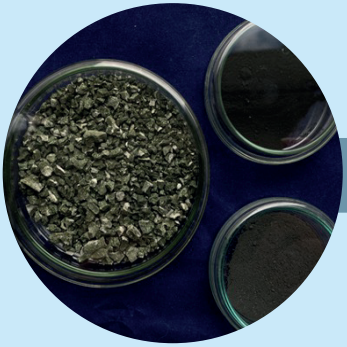




Laboratory of Nuclear Installation Safety

MAIN RESEARCH AREAS OF THE LABORATORY:

Nuclear energy technology research:

- safety and reliability of operating nuclear power plants;
- advanced small modular reactor technologies, their safety and reliability;
- nuclear decommissioning technologies, safety and reliability;

Nuclear fusion technologies and accelerators (CERN, etc.) research:

- transport of elementary particle and activation of materials;
- safety and reliability of nuclear fusion facilities;

Thermodynamic knowledge application in development of innovative products and technologies:

- fundamental and applied research in thermal physics;
- computational fluid dynamics research;

Energy systems integration, reliability, security and resilience research:

- climate-neutral smart cities and their systems integration;
- security of energy supply and resilience of energy systems;
- reliability and structural integrity of building structures and piping's systems;
- safety, reliability and risks of industrial facilities and processes.

LABORATORY ACHIEVEMENTS:

In 2025, the LEI coordinated Horizon Europe EURATOM programme project HARMONISE was successfully completed.

The aim of the project was to prepare for the licensing of next-generation nuclear energy technologies by assessing their specific characteristics and identifying potential gaps in licensing and regulatory requirements across different countries.

The project was implemented by 17 organizations, including European research centers, nuclear regulatory authorities, small and medium-sized enterprises, and the EU Joint Research Centre.

The project results were presented on 15–18 September 2025 during a Lithuanian side event, "Towards Harmonisation in Licensing of Future Nuclear Power Technologies in Europe," organized at the General Conference of the International Atomic Energy Agency (IAEA).

Together with the HARMONISE project partners, the achieved results were presented and participants' questions were addressed. In total, around 50 participants from various countries and international organizations attended the event.

Center for Hydrogen Energy Technologies

MAIN RESEARCH AREAS OF THE LABORATORY:

- Research in the field of hydrogen energy technologies;
- Hydrogen production via methane pyrolysis;
- Hydrogen production using water reactions with metals and nanoparticles of their alloys;
- Synthesis of metals and their alloy hydrides designed for hydrogen storage: analysis of their properties;
- Synthesis of hydrogen fuel cell components (anodes/electrolytes/cathodes) applying physical vapour deposition methods;
- Hydrogen production through water reaction with degraded, shredded solar modules;
- Synthesis and analysis of photocatalytic materials;
- Application of physical vapor deposition methods for thin films formation and surface modification;
- Improvement of various surface characteristics by application of glow discharge plasma;
- Antibacterial materials for hydrogen storage and transportation systems.

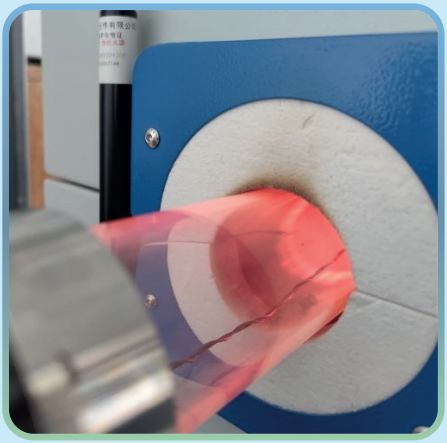
An innovative catalyst for clean hydrogen production via methane pyrolysis

- As part of the InnoHyppy project "Development and Regeneration of an Innovative Catalyst for Hydrogen Production via Methane Pyrolysis," an innovative iron-based catalyst with nickel nanoclusters is being developed for hydrogen production.

- An 80 % conversion rate of methane to hydrogen was achieved, with carbon nanotubes formed as a byproduct.

- Research is being conducted on the regeneration of carbon-contaminated catalysts using cold plasma. An efficiency of 40% has been achieved.

- The carbon byproduct obtained during methane pyrolysis is used as a secondary raw material in the production of electrodes for pesticide detection.



Project partners:

LITHUANIAN ENERGY INSTITUTE

Jožef Stefan Institute

LATVIJAS UNIVERSITĀTES CIETVIELU FIZIKAS INSTITŪTS
INSTITUTE OF SOLID STATE PHYSICS
UNIVERSITY OF LATVIA

Smart Grids and Renewable Energy Laboratory

MAIN RESEARCH AREAS OF THE LABORATORY:

- Mathematical modeling of energy systems and networks, and investigation of control-related issues;
- Modeling and optimization research of information and control systems in energy systems;
- Research on the integration of renewable energy technologies into electrical power systems;
- Research on energy efficiency in industry and other sectors of the national economy.

LABORATORY ACHIEVEMENTS:

Development and Validation of Mathematical Models of Wind Farm Parks

- During the study, mathematical models of three wind farms were developed and validated using measurements from field tests, enabling the modelling of real physical processes.

Client: European Energy Lithuania, UAB

AI-Based Smart Grid Model for Operational Management of Distribution Networks

- During the project, a pilot smart grid model was developed for the operational management of distribution networks and the assessment of electricity losses. The model is based on forecasting network node loads and renewable energy generation using artificial intelligence methods.

International partner: Institute of Electrodynamics of the National Academy of Sciences of Ukraine

Client: Research Council of Lithuania

Programme: The Lithuanian–Ukrainian Cooperation Programme in the Fields of Research and Technologies

Project duration: 1 January 2024 – 31 December 2025

Laboratory of Energy Systems Research

MAIN RESEARCH AREAS OF THE LABORATORY:

- Economic modelling at micro and macro level, analysis and solution of economic and social problems, development and application of economic models of various types (micro-simulation, cost-production, general equilibrium);

- Analysis and mathematical modeling of the development and functioning of various systems related to the decarbonization of the economy and climate change mitigation, including complex studies on the integration of different systems (technical, natural, and social), the use of renewable energy sources, and their impact on the environment. Formation and analysis of medium- and long-term development scenarios, policy formulation;

- Analysis of the optimal allocation of generation, reservation and balancing capacities in power systems and interconnectors. Finding optimal ways to balance the use of energy from renewable energy sources;

- Research on transport decarbonization. Studies on smart charging of electric vehicles and the potential use of alternative fuel production to balance the intermittent generation of renewable energy sources;

- Research on the long-term development links between building renovation and the construction of new energy-efficient buildings with the development of energy systems;

- Environmental impact assessment of energy, analysis and impact evaluation of abatement technologies and environmental protection measures;

- Analysis, impact assessment and development of recommendations on measures to integrate renewable energy sources and improve energy efficiency;

- Research on climate change mitigation and the promotion of behavioral changes among households, assessment and integration of residents' preferences in this field using methods such as willingness-to-pay and others for climate change mitigation, as well as the formulation of climate change mitigation policy measures in this area;

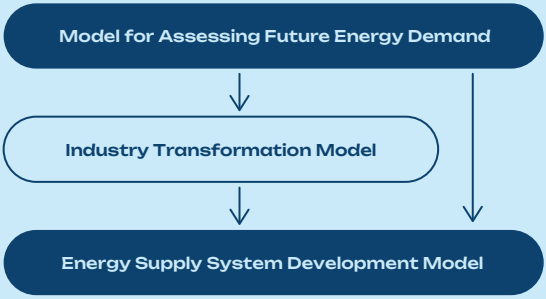
- Research and development of modern management and marketing solutions in the energy sector aimed at building a welfare society.

LABORATORY ACHIEVEMENTS:

LIFE IP EnerLIT project

The objective of the project is to facilitate the implementation of the National Energy and Climate Plan (NECP) regarding energy efficiency through the implementation of efficiency measures, the development of strategic capacities, and the integration of GHG emission reduction goals.

The model system developed by LEI allows for more detailed and accurate energy planning and policy measure assessment during the preparation and updating of the NECP.



Trained to use:

APLINKOS APSAUGOS AGENTŪRA

LIETUVOS ENERGETIKOS AGENTŪRA

Research in the field of economic efficiency

- A methodology for assessing the economic impact of industrial energy transformation was developed and adapted to the Lithuanian case.
- An innovative methodology was developed to model district heating transformations by assessing controllable and uncontrollable uncertainties.
- Trends in energy efficiency improvement were analyzed, and the impact of national measures was assessed in order to ensure the implementation of the main provisions of the Energy Efficiency Directive.

Lithuanian Energy Institute Social Sciences Directory

- Competence of the Laboratory's researchers was systematized.
- A plan based on specific actions was created to help the Laboratory participate more actively in Horizon Europe and other international programs.

Business and societal issues related to the transition to sustainable low-carbon energy

- The impact of voluntary business initiatives, such as corporate social responsibility and green budget reform, on employment, corporate sustainability, and income in the EU was examined.
- The effects of income inequality on population energy consumption, carbon dioxide emissions, and the share of renewable energy in the EU were revealed.
- The impact of gender inequality on the digital transformation of small and medium-sized businesses and the transition to low-carbon energy was investigated.
- A study of the public acceptance of innovative solutions, allowing for a comparison of the attitudes of societies in different countries, was conducted together with REEFLEX project partners.
- An assessment of the effectiveness of municipal waste collection and management policies was carried out.

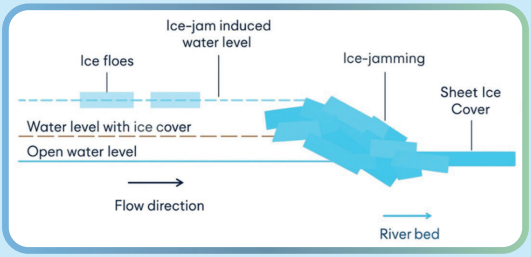
Labaratory of Hydrology

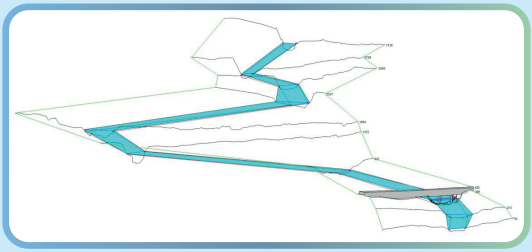
MAIN RESEARCH AREAS OF THE LABORATORY:

- Research of renewable energy sources under climate change;
- Environmental impact studies on energy and water transport infrastructure development;
- Application of remote sensing and artificial intelligence for the research of water bodies;
- Research of hazards of hydrological extremes and their management under climate change;
- Numerical modeling of hydrodynamic processes of waves, currents and sediments.

LABORATORY ACHIEVEMENTS:

Within the project „Ice-jam flood risk management in Latvian and Lithuanian regions with respect to climate change“ (ICEREG) under Interreg VI-A Latvian–Lithuanian cross-border cooperation programme, the ice-jam floods models were developed for the first time in Northern Lithuanian rivers using HEC-RAS hydrodynamic modelling system and Finnish Environment Institute (SYKE) ice-jam flood model.





Applied scientific research

In 2025, the Institute provided applied research services to the public and private sectors amounting to nearly EUR 2 million.
Among the most significant contracts in terms of value and scope were: the cumulative environmental impact assessment of the decommissioning process of the Ignalina Nuclear Power Plant; the dismantling of steam drum separators of Units 1 and 2 of the Ignalina Nuclear Power Plant; a feasibility study on the transition of AB ESO from GOST standards to IEC standards; and the development of a plasma welding seam cooling technology for stainless steel sheets for AB ASTRA LT.

Scientific Projects

52 new international project proposals submitted

12 national projects launched

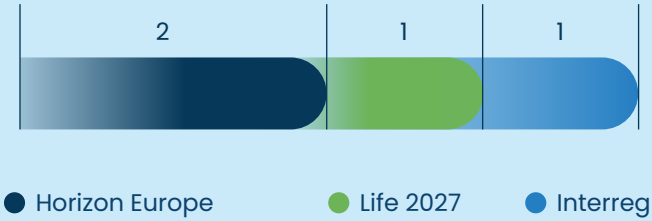
4 new international projects launched

2 projects under the "Horizon Europe" programme initiated

1 project under the "LIFE 2027" programme initiated

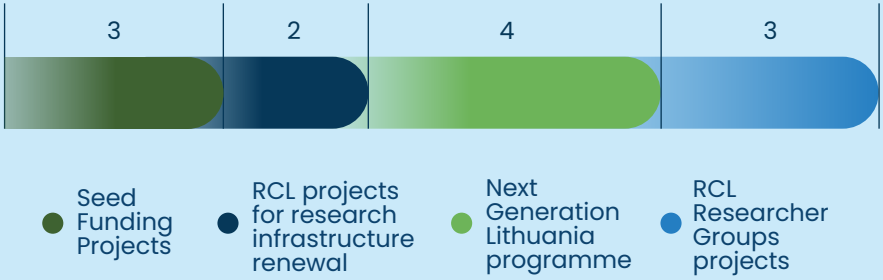
1 project under the "Interreg" programme initiated

International projects initiated in 2025



In 2025, 3 Seed Funding projects, 2 infrastructure renewal projects funded by the Research Council of Lithuania, 4 projects under the "Next Generation Lithuania" programme, and 3 projects under the Researcher Groups Programme of the Research Council of Lithuania (RCL) were launched.

National projects initiated in 2025



In 2025, 12 national projects were launched. Five of them were among the largest in terms of budget and scope.

The **"ReCap" project** addresses an environmental challenge related to the recycling of used fishing nets. A significant proportion of nets entering the oceans each year are made of nylon-6, which is suitable for recycling. The project is developing a technology for recovering β-caprolactam from the nets as a valuable raw material for the production of new materials. The research includes the application of a novel catalyst and testing of different pyrolysis methods, assessing efficiency, selectivity, and environmental impact.

The **"CliMed-LT" project** investigates how extreme climate events—such as heat and cold waves, precipitation, and air pressure fluctuations—affect the risk of stroke, acute myocardial infarction, and suicide in Lithuania. Using meteorological data and mortality registers, advanced models are being developed to predict risk factors. Early warning systems and recommendations for the national healthcare system are also planned.

The project **"New Technologies for Selective Microorganism Elimination in Algae Applications Using Pulsed Electric Fields and Plasma"** aims to develop a sustainable solution for protecting algae from unwanted microorganisms. In open algae cultivation systems, contamination by various viruses and bacteria is a common issue. However, conventional disinfection methods are often non-selective, eliminating not only harmful microorganisms but also affecting the algae and their beneficial properties. The project applies pulsed electric fields (PEF) and plasma technology to regulate microbial balance in the cultivation system while preserving the biochemical integrity of algae and enhancing their productivity.

The project **"Updating Flood Hazard and Risk Maps and Preparation of Management Plans"** aims to update flood hazard and risk maps in accordance with the requirements of the European Parliament and Council Directive. The activities of LEI researchers within the project include flood hazard modelling and assessment, preparation of maps, and evaluation of the impact of climate change on flooding.

The **EUROfusion project** aims to acquire knowledge and develop technologies required for the construction of a demonstration fusion power plant (DEMO), in line with the roadmap for electricity generation from nuclear fusion, following the commissioning of the ITER experimental reactor.

International projects started in 2025

In 2025, 4 international projects were launched, their descriptions are provided below.

HORIZON EUROPE PROGRAMME

The project **"Metrology for Smart Gas Meters in Gas Networks (SmartGasNet)"** aims to improve the measurement infrastructure of gas networks and enable the integration of renewable gas energy sources such as biomethane and hydrogen. Project duration: 1 August 2025 – 31 July 2028. Project leader: Dr. Agnė Bertašienė.

The project **"Development of Metrological Standards for Microfluidic Devices II"** (MFMET II) aims to develop methodological protocols and guidelines to address gaps in the microfluidic supply chain, including future applications of "organ-on-a-chip" technologies. Project duration: 1 June 2025 – 31 May 2028. Project leader: Dr. Agnė Bertašienė.

LIFE 2027 PROGRAMME

The project **"ODYSSEE-MURE – EED Monitoring"** analyses trends in energy consumption and energy efficiency improvement and assesses the impact of national energy efficiency measures in EU countries, Switzerland, and Energy Community countries. Project duration: 1 May 2025 – 31 October 2027. Project leader: Dr. Inga Konstantinavičiūtė.

INTERREG PROGRAMME

The project **"Local Heat Planning – Implementation of Heat Transition in BSR Municipalities (PlanHeat)"** aims to bring together municipalities and expert organisations from seven Baltic Sea Region countries to jointly develop a transnational guide on local heat planning, which can significantly contribute to reducing greenhouse gas emissions. Project duration: 1 March 2025 – 28 February 2028. Project leader: Dr. Rimantas Bakas.

7 COMMUNICATION AND PARTNERSHIPS IN LITHUANIA AND ABROAD

LEI actively participated in events of importance to science, business, and society. Researchers took part in more than 25 events in Lithuania and abroad as key speakers or panel discussion participants, presenting the Institute's achieved results and developed expertise. R&D achievements were presented to visitors from 7 foreign countries and 9 Lithuanian science, business, and public sector institutions.

Selected events in which LEI participated:

3–4 March
Dr. Ramūnas Gatautis participated in the 10th European Congress of Local Governments in Mikołajki, Poland

18–19 March
Daivis Virbickas participated in the Baltic Nuclear Energy Forum in Gdańsk, Poland

27 March
Prof. Dr. Saulius Gudžius participated in the seminar-discussion "Operation of the Lithuanian electricity system in conditions of dominant variable generation" at the Lithuanian Academy of Sciences in Vilnius

6 June

Dr. Marius Urbonavičius participated in the conference “DigiGreen 2025” in Vilnius

9–11 June

Dr. Raminta Skvorčinskienė participated in the Lithuania–Japan Science Forum “Innovations in life sciences, biotechnology and high technologies” in Tokyo, Japan

10–11 June

Dr. Egidijus Urbonavičius and Dr. Artūras Šmaižys participated in the 10th Central & Eastern Europe Nuclear Industry Congress in Warsaw, Poland

23–24 June

Prof. Dr. Saulius Gudžius participated in the conference “Powering Europe's Future” in Warsaw, Poland

10 July

Dr. Andrius Tamošiūnas participated in the EPS 51st Conference on Plasma Physics in Vilnius

14–18 July

Dr. Edgaras Misiulis participated in the 47th IEEE Engineering in Medicine and Biology Conference (EMBC 2025) in Copenhagen, Denmark

28–31 July

Prof. Dr. Saulius Gudžius and Dr. Robertas Poškas participated in the 17th International Conference on Sustainable Energy and Environmental Protection (SEEP 2025) in London, United Kingdom

30 August – 7 September

Dr. Mantas Povilaitis and Julius Venckus participated in the 21st International Conference on Nuclear Reactor Thermal Hydraulics (NURETH-21) in Busan, South Korea

8–11 October

Dr. Rolandas Paulauskas participated in the conference “Human and More-than-Human Futures: Innovating Technologies for Coexistence” in Vilnius

29 October
Dr. Egidijus Urbonavičius and Daivis Virbickas participated in the energy, transport and green economy forum "Vilnius GreenTech Forum" in Vilnius

20 November
Prof. Dr. Saulius Gudžius participated in the Environmental Project Management Agency (EPMA) conference "Energy Transition: the Role of the State and the Potential of Prosumers" in Vilnius

In 2025, the name of LEI was mentioned in the media more than 30 times. LEI experts provided their insights in public information channels on nuclear energy, renewable energy sources, hydrogen technologies, and other relevant topics. Significant media attention was given to LEI consultant Daivis Virbickas' public explanation of the events on 8–9 February, when Lithuania disconnected from the BRELL electricity ring and completed synchronization with the continental European electricity grids. The media also published comments on the National Energy Independence Strategy by the head of the Laboratory of Nuclear Installation Safety, Dr. Sigitas Rimkevičius, and the head of the Center for Hydrogen Energy Technologies, Dr. Šarūnas Varnagiris.

LEI experts' insights also attracted attention in the foreign press. The Chief Research Associate of the Nuclear Engineering Laboratory, Dr. Robertas Poškas, gave an interview to "Direct Industry Magazine". The scientist spoke about the Institute'sparticipation in the EU-funded iWAYS project,

which aims to promote the transition of industrial sectors toward more sustainable and efficient solutions. During the interview, Dr. R. Poškas also presented LEI's research on heat pipe-based condensation heat exchangers, corrosion resistance testing, and real-world trials conducted in manufacturing companies.

Strategy for Public Engagement in R&D Activities and the Communication Strategy have been developed.

The aim of the Strategy for Public Engagement in R&D Activities is to intensify the promotion of scientific achievements to the public and to involve citizens in science campaigns. The strategy is focused on broader and clearer dissemination of the Institute's newly developed scientific achievements to the public, as well as on encouraging researchers' participation in engaging citizens in research and experimental development activities.

As part of the strategy, direct communication with upper-grade school students, college and university students, and representatives of associated communities is being expanded, presenting the Institute's achievements and discussing opportunities for joint projects. In order to strengthen researchers' knowledge of science communication and citizen science initiatives, training sessions and consultations were conducted for representatives of scientific laboratories involved in promoting scientific achievements to the public.

The aim of the Communication Strategy is to establish LEI's communication model and action plan, which will ensure the development of both external and internal communication in order to achieve the defined goals and objectives for 2025–2030. The strategy defines the main target audiences, sets out the tools and channels for external and internal communication, establishes procedures for organizing activities, and outlines principles for measuring the effectiveness of the plan, ensuring consistent, transparent, and purpose-driven communication that supports the implementation of the Institute's objectives.

Partnerships in Lithuania

In its efforts to develop innovations needed by the national industry, LEI actively participates in networks of Lithuanian industrial organizations. Below is a list of networks in which the Institute is a member:

- Association “Santaka Valley”
- Association “RTO Lithuania”
- Biopower Plant Development Cluster
- Lithuanian Nuclear Energy Association
- Lithuanian Association for Energy Economics
- Food Technologies Digitalization LT Cluster
- Smart Energy Digital Innovation Hub
- Lithuanian biomass energy association
- Lithuanian Electricity Association
- Lithuanian Engineering Industries Association
- Lithuanian Research Library Consortium
- Lithuanian Confederation of Industrialists
- Lithuanian Solar Energy Association
- Lithuanian Thermal Engineering Association
- Lithuanian State Research Institutes Directors’ Conference
- Lithuanian Hydrogen Platform
- Liquefied Natural Gas Cluster
- Lithuanian Association for Hydrogen Energy

21 August 2025 – The Lithuanian Energy Institute and the Lithuanian Confederation of Industrialists signed a cooperation agreement expressing their intention to establish an Energy Competence Centre, collaborate on national and international projects, and carry out communication and dissemination activities.

22 August 2025 – The Lithuanian Energy Institute, together with partners, signed an agreement on the establishment of the “VYTIS” Defence Innovation Testing and Prototyping Centre in Kaunas and Kaunas District.

Partnerships abroad

LEI, by conducting research and experimental development, cooperates with national and international energy market participants, as well as scientific and business organizations. Membership in international organizations is of key importance for the active implementation of international scientific activities.

In 2025, LEI is a member of the following international organizations:

Scientific Research Development and Policy Organisations:

- European Association of Research and Technology Organisations (EARTO)
- European Energy Research Alliance (EERA)
- European Association of Research Managers and Administrators (EARMA)
- Coalition for Advancing Research Assessment (CoARA)

Nuclear Energy Organisations:

- Sustainable Nuclear Energy Technology Platform (SNETP)
- The FuseNet Association
- CERN Baltic Group
- European Atomic Energy Society
- European Safety, Reliability & Data Association (ESReDA)
- European Technical Safety Organisations Network (ETSON)
- Implementing Geological Disposal of Radioactive Waste Technology Platform (IGD-TP)
- Industrial Alliance on Small Modular Reactors

Flow Research Organisations:

- The European Association of National Metrology Institutes (EURAMET)
- International Measurement Confederation (IMEKO)
- European Network of Freshwater Research Organisations (EurAqua)
- European Research Community on Flow, Turbulence and Combustion (ERCOFTAC)

Lithuanian Consortium for Engagement with MIT

On 28 January 2025, a historic cooperation agreement signing ceremony between Lithuania and the Massachusetts Institute of Technology (MIT, Boston, USA), a global leader in science and innovation consistently ranked among the world's top universities, took place at the Office of the President of the Republic of Lithuania. LEI actively participated in the first-year activities of the Lithuanian Consortium with MIT:

4 LEI researchers visited MIT in March and June

1 MIT student completed an internship at LEI

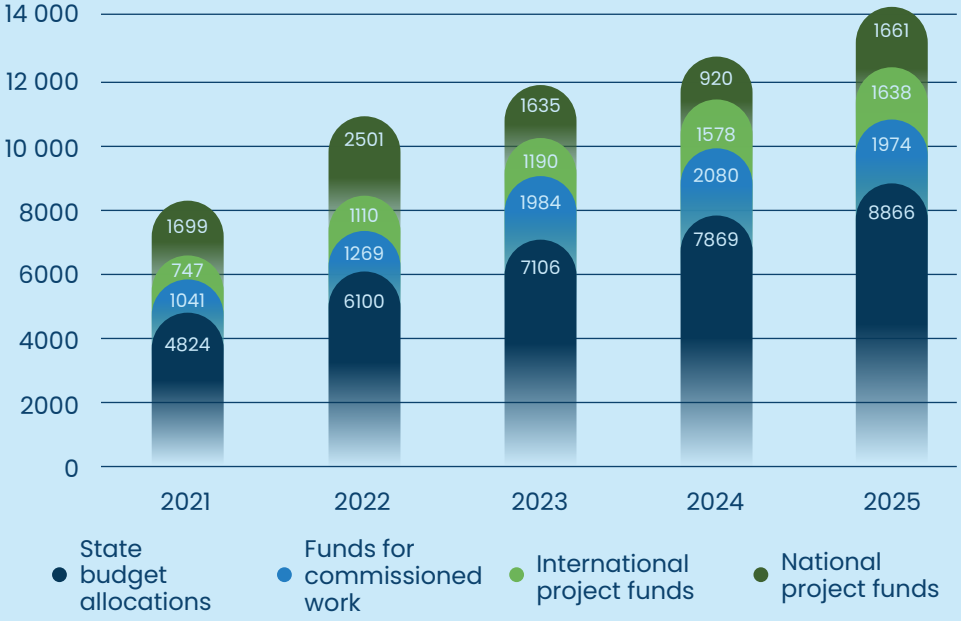
Head of the Laboratory of Combustion Processes, Dr. Rolandas Paulauskas, took part in the panel discussion at the Lithuanian Consortium and MIT conference "Human and More-than-Human Futures: Innovating Technologies for Coexistence", and LEI contributed to the organization of the conference

LEI researchers submitted 2 Global Seed Fund applications

8 Funding

The LEI budget consists of state budget allocations, funds for commissioned work, international project funds and national project funds.

Dynamics of funding 2021 – 2025



Amounts indicated in thousands of euros.

Revenue and costs structure for 2025

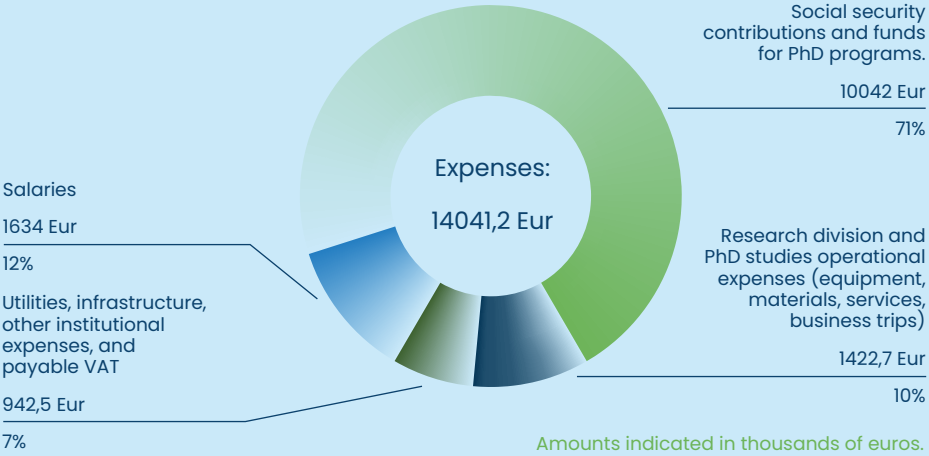
In 2025, the LEI revenue amounted to 14 139 EUR, with the following breakdown: 63% from state budget allocations, 14% from commissioned work funds, 11% from international project funds, 12% from national project funds.

Revenue structure in 2025

Amounts indicated in thousands of euros.

In 2025, the costs were distributed as follows: 83% for salaries, social security contributions, and funds for PhD programs; 10% for research divisions and PhD studies operational expenses (equipment, materials, services, business trips); 7% for utilities, infrastructure, other institutional expenses, and payable VAT.

Distribution of costs in 2025



Amounts indicated in thousands of euros.

ENTRUST Energy Transformation Technologies for Sustainable Future

Conference for visionieers and innovators

8 – 11 September 2026 | Kaunas

The modern energy sector is undergoing an unprecedented period of transformation, with geopolitical challenges, climate change issues, and technological innovations all coming together. Energy security is becoming a priority, taking on particular importance in the context of global tensions and disruptions to energy supply chains. At the same time, rising energy prices pose serious challenges to industrial competitiveness, innovation, and public welfare, requiring a balance between decarbonization goals and economic logic. Technological innovation opens up new opportunities for the transformation of energy systems.

The conference aims to bring together visionary scientists, innovators, and investors, policy makers, and other stakeholders for a constructive dialogue on the challenges of modern energy and their solutions, promoting interdisciplinary cooperation and the search for innovative solutions for a sustainable future.

Main thematic areas

- **Sustainable Technologies in Industries**
  Industrial decarbonization, water and land transport decarbonization, transportation fuels, chemicals feedstocks, energy storage and grid balancing
- **Power to X Technologies**
  Power-to-hydrogen, power-to-gas, power-to-liquids, power-to-chemicals
- **Policy for Sustainable Development and New Technologies Integration**
  Energy safety, market development and business models, regulatory frameworks and carbon pricing, energy sector strategies, investment and financing strategies, cost reduction pathways
- **Micro - nano systems**
  Equipment, materials, etc.
- **Water Resources Management**
- **Energy Sources for Power to X**
  Thermo energy, hydro energy, gasification, nuclear energy, fusion energy, SMR
- **Sustainable Waste Management**
  Recovered fuel, water purification technologies, waste heat recovery, plasma processes, radioactive waste management
- **Energy Systems Integration**
  Grid integration and energy storage solutions, renewable energy coupling (solar, wind), distribution and transportation infrastructure, sector coupling (energy, transport, industry)
- **Life Cycle Assessments**
  Carbon capture integration, climate impact and emissions reduction, circular economy approaches
- **Innovative Materials**

Publications. All abstracts will be published in the Book of Abstracts under an ISBN number. Selected papers will be invited to submit an extended version to the following journals: Thermal Science and Engineering Progress, International Journal of Thermofluids, etc.

Important dates:

2026-06-15 Receipt of Abstracts
2026-07-15 Notification of Abstract acceptance
2026-08-15 Receipt of full Paper (optional)
2026-08-15 Registration deadline
2026-09-08 Start of the conference
2026-09-11 End of the conference

Who will attend conference?

- visionary scientists
- innovators and investors from companies
- policymakers
- perspective young scientists

• On-site event • Online participation • Posters
• Workshops, seminars, symposiums

Sustainable event solutions

Tickets	Early Bird Prices until 15 June	Regular Prices from 16 June to 15 August
Onsite participation	300 €	350 €
Onsite participation for student	150 €	200 €
Online participation	200 €	250 €
Online participation for student	100 €	150 €
Accompanying person's participation	150 €	200 €

Learn more

info@entrust.lt
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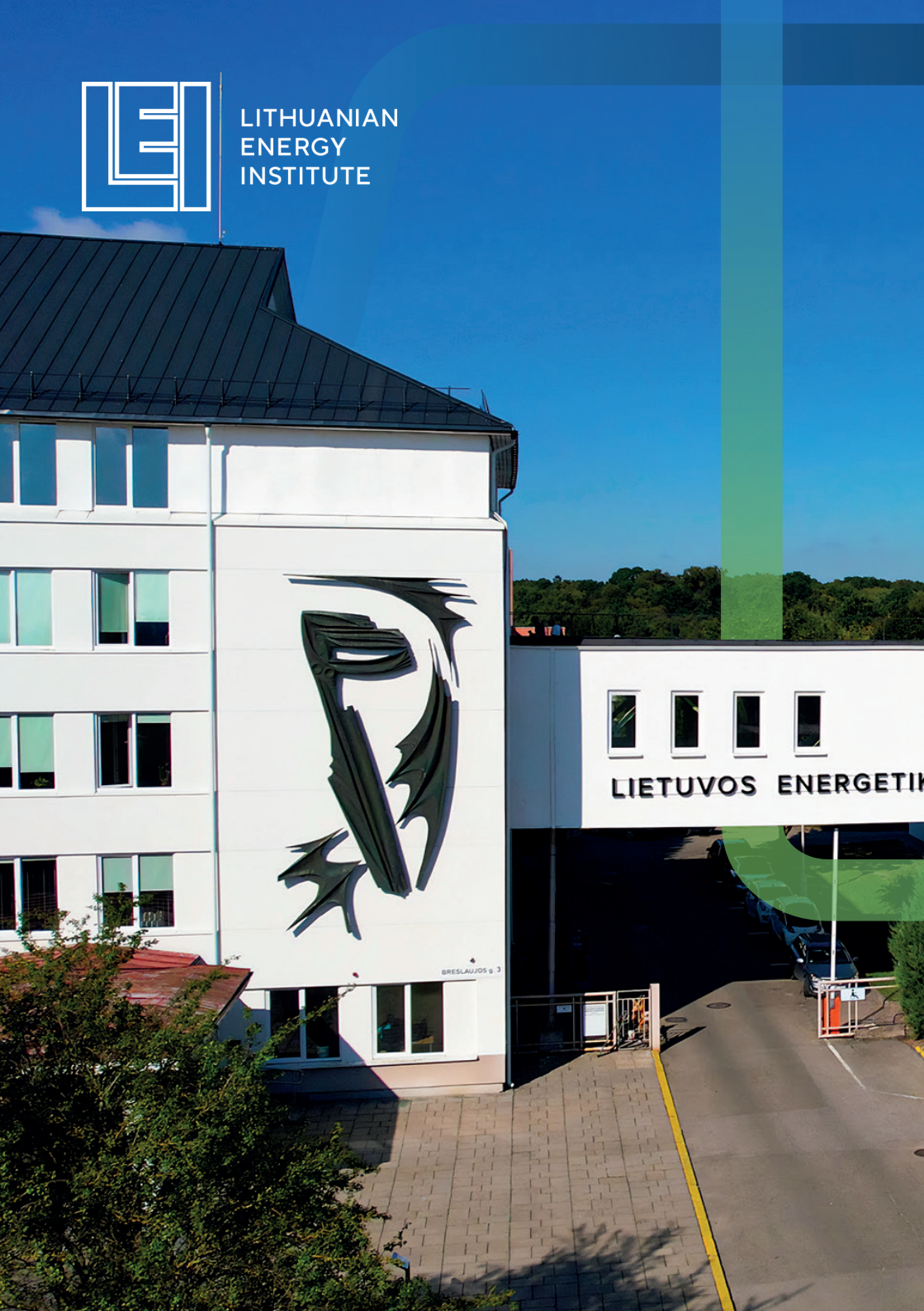


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