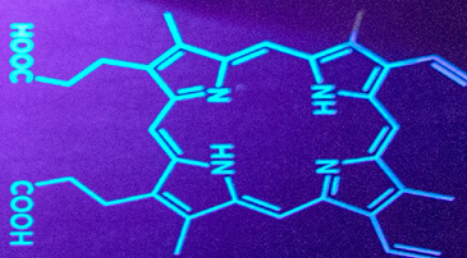


THE CHEMISTRY OF EGG FLUORESCENCE



PROTOPORPHYRIN IX



- 1 Molecule absorbs UV
- 2 Loss of some energy (heat)
- 3 Energy released as light

When a UV light is shone on an egg shell it fluoresces a red, T. This is due to the presence of protoporphyrin IX, which is a heme molecule. It's also the compound which gives chicken eggs their brown colour.



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DEAR COLLEAGUES AND PARTNERS,

The year 2025 was another period of intensive development for the Centre for Energy and Environmental Technologies, marked by stronger international cooperation and the further strengthening of CEET's position as an important research centre in sustainable energy, materials science and environmental technologies. In an environment increasingly shaped by geopolitical changes, energy security, decarbonization and Europe's technological self-sufficiency, we continued to fulfil our long-term vision of connecting excellent research with the practical needs of society and industry. Current developments in energy, industry and security also confirm that CEET's long-term strategic direction is well chosen. The areas in which our centre has been active for many years are now becoming one of the main conditions for Europe's competitiveness, energy stability and technological resilience.

An important topic in 2025 was the continued strengthening of research capacities and the modernization of the centre's infrastructure. Work continued on the CEETe II project and the CEETe

H₂ hydrogen research test site, both of which represent major investments in modern facilities for research into hydrogen technologies, materials engineering and future energy systems. These projects significantly contribute not only to increasing the scientific competitiveness of the centre, but also to the modernization of the university campus and its gradual transformation towards energy-efficient and sustainable operation.

The past year was also a period of strong growth in CEET's scientific performance. Our staff published a record number of scientific articles in prestigious international journals, and the high share of publications in first- and second-quartile journals confirms the quality and international relevance of the research carried out. We also successfully developed new interdisciplinary research directions, especially in hydrogen technologies, energy storage, advanced materials, the circular economy, digitalization of energy systems and the use of artificial intelligence in energy and environmental processes.

Cooperation with industry, public administration and international partners remains a very important part of our work. We continued to implement applied and contract research projects with a direct impact on the energy transition, emission reduction, energy efficiency and support for technological innovation. We were also strongly involved in international projects funded by Horizon Europe, the Research Fund for Coal and Steel, and European partnerships focused on supporting the transition to clean energy. This further strengthened our ability to play an active role in the European research area.

I greatly appreciate the work of all CEET employees, their expertise, commitment and ability to respond to new challenges. I would also like to thank our partners from academia, industry and the public sector for their trust and long-term cooperation. I am convinced that connecting high-quality research, open cooperation and shared responsibility for the future of energy and the environment is the right path for the long-term development of our centre and society as a whole.

Sincerely,

Stanislav Mišák
Director of CEET



STRATEGIC OBJECTIVE 5

MANAGEMENT OF CEET

TARGETED CHANGE

To establish and put into practice project steering and implementation teams for the most important projects of CEET's research areas and research groups. Leading international scientists who work with CEET and the university should also be invited and involved in these teams. Inspiration: Henry Mintzberg's model of the innovative organization.

SUCCESS INDICATORS

Successful result of all CEET quality management system audits in 2025

- ✓ Completed, as confirmed by the positive result of the external audit with no nonconformities and full compliance with the ČSN EN ISO 9001:2016 standard.

Effective operation of steering and implementation teams in the most important CEET projects

- ✓ Completed through the coordinated management of strategic projects, such as REFRESH, MATUR and NCE II, and through the further development of project management.

Active use of electronic personal development plans and employee evaluations as a management tool for inspiration, planning, management and performance assessment

- ✓ Completed, as shown by the systematic strengthening of human resource management tools and the practical use of feedback from employee meetings.

EFFECTIVE MANAGEMENT AND UTILISATION OF CEET'S CAPACITIES

The long-term competitiveness of a research organization depends not only on the quality of its infrastructure, but above all on how it can manage this infrastructure strategically and use it effectively. In the current environment, shaped by changes in national research support systems as well as by the development of European research policies, institutions need to be able to respond flexibly to new challenges while maintaining a stable long-term strategy.

The Centre for Energy and Environmental Technologies, therefore systematically develops a management model based on strategic planning, project management and transparent use of available resources. An important part of this approach is the coordination of research activities across the centre's individual workplaces and the targeted connection of infrastructure capacities, research groups and project activities.

Large strategic projects play an important role in organizing research activities, as they create a common framework for cooperation among individual research groups. Projects such as REFRESH, MATUR, intersectoral cooperation projects and the National Centre for Energy II (NCE II) make it possible to systematically connect the centre's research capacities, support interdisciplinary cooperation and create conditions for the effective use of available infrastructure and human resources.

At the same time, CEET is actively involved in international research projects funded by European programmes, especially the Horizon Europe programme, the Research Fund for Coal and Steel and other European research schemes. Participation in these projects contributes not only to strengthening international cooperation, but also to developing the centre's institutional capacities, transferring international know-how and improving CEET's position in the European Research Area.

In the management of infrastructure capacities, CEET is also gradually strengthening the use of data-driven management principles. These make it possible to systematically analyse the use of laboratory equipment, plan investments in instruments and optimize the operation of research facilities. This approach supports informed decision-making, is in line with the principles of open science and contributes to the long-term sustainability of the centre's research activities.

The development of organizational management also includes efforts to simplify administrative processes and strengthen support tools for managing human resources and project activities. The aim of these measures is to create an environment in which researchers can focus mainly on their scientific work, while support processes are managed efficiently and transparently.

EXTERNAL AUDIT OF THE QUALITY MANAGEMENT SYSTEM

In 2025, the CEET quality management system underwent an external audit. The audit confirmed that the system is functional and complies with the requirements of the ČSN EN ISO 9001:2016 standard, the centre's internal documentation and the internal regulations of VSB-TUO. No non-conformities were found during the audit. The audit report included two recommendations for improvement, which were accepted by the management and included in the implementation plan for strategic activities in 2025. The positive result of the external audit is an important indicator of the fulfilment of CEET's strategic goals and confirms the stability and effectiveness of the quality management system.

EVALUATION BY THE INTERNATIONAL EVALUATION PANEL

As part of the second comprehensive evaluation of research organizations in the higher education sector, carried out in the Czech Republic in 2025 under the new Methodology 2025+, a visit of the International Evaluation Panel (MEP) also took place at VSB-TUO. This visit included the evaluation of CEET. The process followed the preparation of self-evaluation reports and the field-specific evaluation of individual university units under Module 3. It focused on obtaining detailed information about the functioning of the university and our centre, and on assessing the progress achieved, especially in science and research. The evaluators appreciated that CEET has long achieved excellent results, which was reflected in the award of an A rating, the highest possible grade in this evaluation process.

CEET STAFF MEETING

In connection with the development of the centre, the Director of CEET organized a meeting with employees. The aim was to openly discuss the working environment at the centre and obtain direct feedback from staff. The meeting provided space not only for sharing experiences with the everyday operation of CEET, but also for asking questions and openly exchanging views. The discussion resulted in a number of suggestions and specific ideas for improvement in different areas of the centre's operation. These suggestions are being gradually assessed and put into practice with the aim of further improving working conditions and supporting the development of CEET as a modern and open research workplace.

APPOINTMENT OF A DATA STEWARD

In the past year, the position of data steward was newly filled at CEET. This significantly strengthened the centre's approach to research data management, support for open science and the implementation of FAIR principles: Findable, Accessible, Interoperable and Reusable. The newly appointed data steward immediately became involved in this agenda and began supporting research teams in research data management, the preparation of data management plans and orientation in the requirements of national and international grant calls. His activities also included training, through which a number of researchers at the centre were introduced to issues related to working with data and metadata, their long-term storage and access. This helped raise awareness of responsible research data management across CEET. In the context of CEET's activities, this role is especially important with regard to the centre's involvement in international projects, the requirements of Methodology 2025+, Horizon Europe programmes and the growing emphasis on the principles of open science.

TARGETED CHANGE

To increase the university's energy self-sufficiency and energy security, and to improve VSB-TUO's results in international evaluation rankings.

SUCCESS INDICATORS

In 2025, provide support to the Office of the Chief Energy Manager of VSB-TUO in the gradual integration of additional buildings on the Poruba campus into the system for effective energy consumption management using the EMA control software. The system is currently used for energy management in the CEETe building and the new Faculty of Economics building. It is suitable for the effective management of installed renewable electricity sources and battery storage systems operating in parallel with the distribution grid.

- ✓ Completed. CEET provided expert support for the development of energy management at the VSB-TUO campus, especially through its involvement in the Energy Committee, the use of experience gained from the CEETe building, and support for the integration of renewable energy sources and storage technologies into the energy consumption management system. The results of these activities are reflected in the university's improved position in international sustainability rankings. In the UI GreenMetric World University Rankings 2025, the university made significant progress, ranking 374th among 1,745 institutions from 105 countries and placing third nationally. This positive development is also confirmed by the QS World University Rankings: Sustainability, where the university ranked 878th out of 2,001 evaluated universities and ninth among Czech higher education institutions.

SUPPORT OF THE SUSTAINABLE DEVELOPMENT OF THE UNIVERSITY

The Centre for Energy and Environmental Technologies (CEET) has long been involved in activities aimed at supporting the sustainable development of VSB – Technical University of Ostrava. The centre's expertise contributes to the gradual transformation of the university campus towards energy-efficient and environmentally responsible operation. This reflects current technological and societal demands for reducing greenhouse gas emissions, using resources efficiently and applying modern energy solutions.

One of the main tools supporting these activities is the involvement of CEET representatives in the VSB-TUO Energy Committee, which focuses on the conceptual development of the university's energy system. Through this platform, the centre provides expert support in identifying technological solutions that help reduce the energy intensity of buildings, develop low-carbon energy sources and optimize energy management across the university campus.

The CEETe building plays an important role in this process, as it is already part of the campus energy management system. Thanks to its installed technologies and advanced systems for monitoring and controlling energy consumption, the building serves as a reference example of modern energy management in university buildings. The experience gained from the operation of the CEETe building is used in the preparation of further measures aimed at the efficient management of energy flows within the university campus.

CEET also supports the development of renewable energy sources on campus, especially the installation of new photovoltaic power plants on university buildings. The integration of these sources into the university's energy system is assessed not only in terms of technical installation options, but also in terms of their connection to the wider energy consumption management system and their potential use in combination with energy storage technologies.

Another important strategic project in the field of sustainable energy is the planned CEETe H₂ hydrogen research test site, which aims to create experimental infrastructure for testing and demonstrating hydrogen technologies. The project responds to the growing importance of hydrogen in the decarbonization of the energy sector and industry. At the same time, it expands the role of the university campus as a platform for testing innovative energy solutions in real operating conditions.

In addition to energy measures, CEET is also involved in initiatives focused on the sustainable management of water resources on campus, especially the support of systems for rainwater collection and use. These approaches help reduce drinking water consumption, increase the resilience of infrastructure to extreme climate events and support the principles of circular resource management.

Through these activities, CEET contributes to the gradual development of the VSB-TUO campus as a modern university environment that connects research, technological innovation and the practical implementation of sustainability principles. The campus is therefore also becoming a suitable platform for demonstrating new energy and environmental solutions and is strengthening its role in the regional transformation towards a low-carbon economy.



TARGETED CHANGE

A unique CEETe II test facility for materials engineering will be established, with a focus on materials for low-carbon and sustainable energy. The infrastructure will support excellent research in advanced materials. The project will also lead to a significant reduction in the energy demand of Building N, improve the working environment and staff facilities, and create better conditions for the effective use and operation of the building. Implementation period: 2025–2027.

SUCCESS INDICATORS

Successful completion of the tasks in the individual stages of preparation and implementation of the CEETe II investment project – the full modernization of Building N according to the approved plan.

- ✓ In 2025, the preparation and implementation of the CEETe II investment project – the comprehensive modernization of Building N – continued according to the approved plan and implementation schedule. This included moving out the existing facilities and temporarily relocating them to Krásnopolská Street, thereby fulfilling the tasks of the relevant stage of the project.

MODERNIZATION OF THE VSB-TUO CAMPUS CEET

The development of the campus of VSB – Technical University of Ostrava has long been connected with the gradual modernization of research infrastructure and the creation of a high-quality environment for advanced research, education and cooperation with industry and other practical partners. The Centre for Energy and Environmental Technologies (CEET) is actively involved in this process, mainly through the preparation and implementation of infrastructure projects that expand the university’s research capacities and support its technological development.

One of the main projects in this area is CEETe II, focused on the reconstruction of Building N. The aim of the project is to create modern laboratory and research facilities for materials engineering, with a focus on materials that can be used in energy and environmental technologies. The modernization of the building includes construction work and improvements to the technical condition of the facility, as well as the installation of new laboratory and analytical equipment. This will make it possible to carry out demanding research activities and expand cooperation with industrial partners.

Another important initiative is the preparation of the CEETe H₂ hydrogen research test site, which will create experimental infrastructure on campus for testing and demonstrating hydrogen technologies. The project responds to the growing importance of hydrogen in the energy transition. Its aim is to create a platform for re-

search, technological development and cooperation with industrial partners in the production, storage and use of hydrogen.

The development of these infrastructure projects also contributes to strengthening the research potential of the university campus and making it more attractive for international cooperation. Newly built or modernized laboratories provide space for demanding research projects funded by national and European programmes and support more effective involvement of research teams in international scientific networks.

The modernization of the campus is therefore not only an investment in the construction and technical development of the university. It is also an important step towards strengthening its role as a major research and innovation centre in energy, materials science and environmental technologies.

MATERIALS RESEARCH CENTRE

In 2025, the planned reconstruction of the former Business Centre building was completed. The aim was to transform the original office spaces into specialized laboratories needed for research in infrastructure focused on materials research. The reconstruction was funded by the REFRESH project and from the own resources of the Institute of Environmental Technologies. The newly created laboratory spaces are used in the REFRESH and EBEAM projects.

CONTINUING WORK ON THE RECONSTRUCTION OF BUILDING N – CEETe II

The aim of the reconstruction is the comprehensive modernization of the building, including the purchase and installation of equipment for materials science. The reconstruction of Building N, which will include the modernization of research and analytical facilities, is part of a wider plan to increase the capacity and efficiency of the research infrastructure. In the future, the building is expected to provide new laboratories, offices and facilities for research teams, creating better conditions for carrying out demanding research projects. During 2025, work on the reconstruction of Building N continued, including the relocation of existing facilities to temporary premises in the building on Krásnopolská Street, the building of

the Faculty of Civil Engineering, and the building of the Institute of Geonics of the Czech Academy of Sciences.

CONTINUING WORK ON THE CEETe H₂ HYDROGEN RESEARCH POLYGON

This project is an important strategic initiative not only for CEET and the whole university, but it is also included among the strategic projects of the Moravian-Silesian Region. Its purpose is to support the development and practical use of hydrogen technologies not only at the regional level, but also in other areas with strong industrial potential that are facing challenges related to the decarbonization of transport, industry and energy.

The implementation of these projects will significantly improve the technical and research equipment of the VSB-TUO campus. These are targeted investments in modern research infrastructure that will be fully comparable with the facilities of leading European research centres. At the same time, these activities will strengthen the reputation of CEET and the whole university at national and international levels, increase the institution's attractiveness for top researchers, students and strategic partners, and support VSB-TUO's ambition to become a major player in research and technology transfer in the European context.



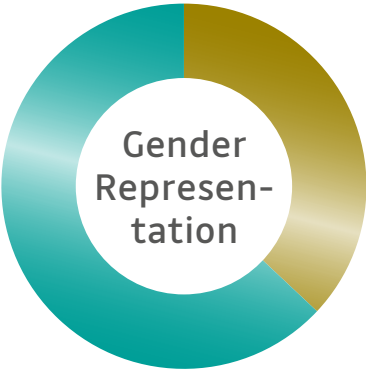
EMPLOYEES

Recent developments confirm the gradual growth of the Centre for Energy and Environmental Technologies, which is also reflected in staffing. In 2025, the centre had 356 employees, corresponding to an average full-time equivalent of 273.26 FTE. Compared with the previous period, this represents an increase of 12,3%, confirming the continued development of the centre and the growing scope of its research activities. The increasing number of employees reflects CEET's long-term ability to attract highly qualified experts and to respond to the growing number of projects in energy and environmental technologies. In terms of gender structure, women account for 37% and men for 63% of employees. In the context of the Czech research environment, the share of women can still be considered above average.

The age structure of employees at the Centre for Energy and Environmental Technologies is spread across several generations. The largest group is employees aged 30–39, who make up 34,5% of the total number of employees. Almost one third of employees belong to the 40–49 age group, which contributes to a balanced mix of professional experience and generational continuity. Employees under the age of 29 and those aged 50–59 are also well represented, supporting both the development and stability of the organization. In total, less than 10% of employees are in the age groups 60–69 and over 70. These employees bring extensive professional experience and long-term practice to the centre. The wide representation of age groups shows our openness and inclusiveness, in line with the values of our organization.

More than 69,1% of CEET employees are academic and research staff. The remaining 30,9% are colleagues classified as other employees.

- Women (FTE) 37%
- Men (FTE) 63%



Age Category		Employee Type	Number of Employees	FTE
Under 29 years	13,8 %	Academic Staff	16	15.34
30–39 years	34,5 %	women		7.98
40–49 years	28,6 %	R&D	230	158.89
50–59 years	14,9 %	women		48.91
60–69 years	4,8 %	Others	110	99.03
Over 70 years	3,4 %	women		45.45
		Total	356	273.26
		women		102.34



INCREASING THE NUMBER OF
QUALITY PUBLICATION OUTPUTS
RELATED TO THE OPERATIONAL
OBJECTIVE OF VSB-TUO: B 3.1.

STRATEGIC OBJECTIVE 3



**TO BE A RECOGNIZED
CENTRE OF ORIENTED
RESEARCH**

TARGETED CHANGE

To increase CEET's scientific performance in high-quality publication outputs and outputs with international impact, together with an increase in citation response.

SUCCESS INDICATORS

Increase in scientific performance, measured as the number of publications per 1 FTE R&D/AP employee, in Q1 and Q2 journals, i.e. D1–D5, indexed in the Web of Science (WoS) database by at least 5% compared with 2024.

- ✓ The number of Q1/Q2 publications per 1 FTE R&D/AP employee increased by 10%, exceeding the required 5% increase compared with 2024.

PUBLICATION OUTPUTS

The systematic production of high-quality scientific publications, preferably with international impact, together with a related increase in citations, is an important basis for strengthening CEET's professional reputation and visibility. We assess the scientific performance of the centre's staff on an annual basis and present the achieved results in a targeted way to both the expert community and the wider public, with an emphasis on clarity and social relevance.

The past year was also very successful in terms of our publication activity. In 2025, our researchers published a total of 325 scientific articles indexed in the WoS/Scopus databases, which is 99 publications, or 43.8%, more than in 2024. It is an excellent result that we also managed to maintain the high quality of the published work: 303 articles, representing 93%, were published in journals ranked in the first and second subject quartiles. Of these, 85 publications, or 26%, appeared in journals belonging to the top 10% in their field, known as D1 journals. With a publication output of 1.91 publications per FTE, CEET ranked second within VSB-TUO in 2025.



"It is an excellent achievement that 93% of CEET articles were published in journals ranked in the first or second subject quartile."

prof. Ing. Lucie Obalová, Ph.D.
Director of IET and Director
for Science and Research

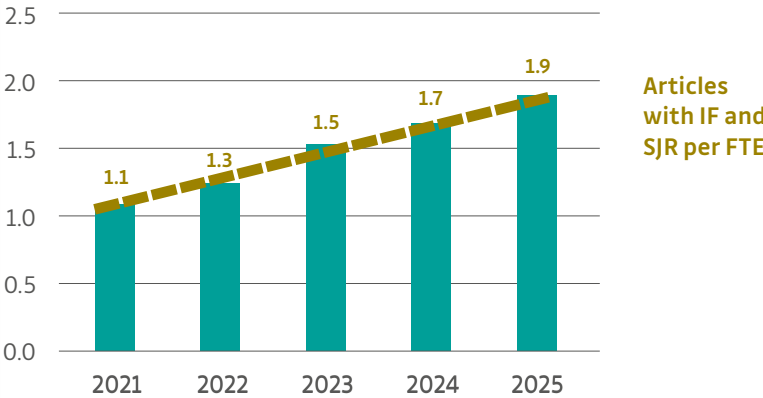
Science and Research Results

D1	85 (26%)
Q1	216 (66%)
Q2	87 (27%)
Q3	13 (4%)
Q4	9 (3%)
Total	325

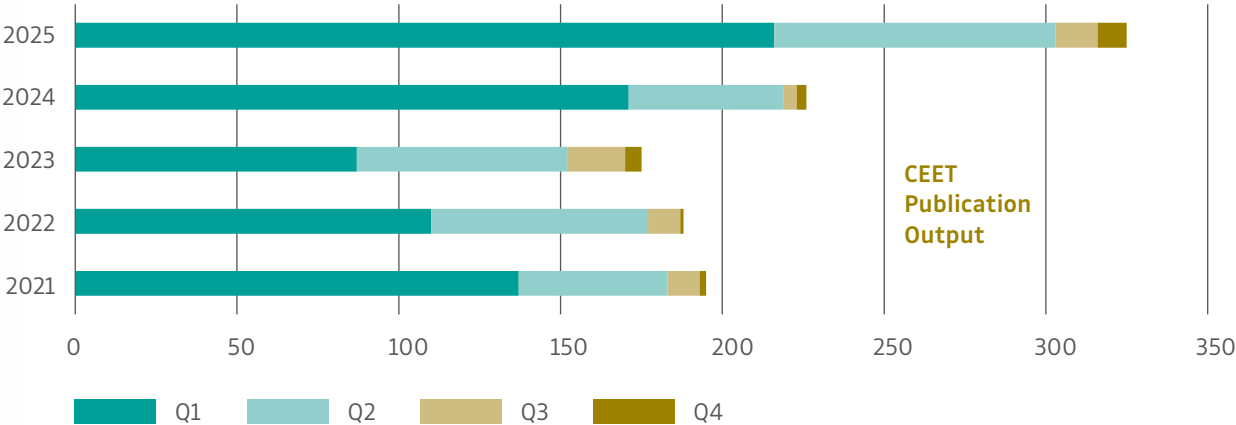
Note: Unique article-type publications reported in OBD for 2025 are included. Quartiles and deciles are calculated as the geometric mean of IF and SJR percentiles for the given year of publication. For 2025, when the percentiles have not yet been published, metrics from the previous year are used.

Source: Office of the Vice-Rector for R&D and Doctoral Studies, data from OBD as of 8 April 2026.

CEET Publication Output:
Number of Articles per FTE, 2021-2025



Number of publications by quartile in 2021-2025



PROFESSIONAL ARTICLES PUBLISHED IN JOURNALS IN THE 1ST FIELD DECILE

Authors	Title	Journal
Karthik Nagarajan, Arul Rajagopalan , Mohit Bajaj, Valliappan Raju, Vojtech Blazek	Enhanced wombat optimization algorithm for multi-objective optimal power flow in renewable energy and electric vehicle integrated systems	Results in Engineering, 2025, vol. 25, p. 103671.
Jana Růžicková, Michal Šafář, Karolina Slamová, Helena Raclavská, Marek Kucbel, Barbora Švédová, Dagmar Juchelková, Hana Brťková, Jarmila Drozdová	Production of gaseous VOC/ SVOC during softwood torrefaction under various technological conditions	Environmental Technology & Innovation, 2025, vol. 38, p. 104086.
Anna Gavlová, Piotr Jachimowicz, Petr Praus, Pavel Bednář	Environment changes everything. How relevant are laboratory studies of sorption of pollutants on microplastics? A critical review.	Journal of Environmental Chemical Engineering, 2025, vol. 13(2), p. 115655.
Tomáš Prostějovský, Lucie Spáčilová, Martin Reli, Radim Žebrák, Kamila Kočí	Highly effective technology for ammonia abatement from industry operations.	Separation and Purification Technology, 2025, vol. 376, p. 134017.
Valentina Pidlisnyuk, Robert Ato Newton, Sergey Ust'ak, Karim Suhail Al Souki, Hana Burdová, Josef Trögl, Barbora Grycová, Katerina Klemencová, Pavel Leštinsky, Aigerim Mamirova	Assessing the potential of different biochars to support Miscanthus x giganteus phytoremediation in petroleum hydrocarbons-contaminated soil	Industrial Crops and Products, 2025, vol. 229, p. 120971.

The following table presents a selection of 10 articles from the portfolio of research topics addressed at CEET that were published in journals ranked in the first subject decile (source: WoS).

Authors	Title	Journal
Oleksandr Molchanov, Kamil Krpec, Jiří Ryšavý	Electrostatic precipitation for NOx emission control in small-scale combustion: A predictive approach and experimental validation	Separation and Purification Technology, 2025, vol. 368, p. 133061.
Manpreet Kaur, Sourav Rej, Jan Navrátil, Eva Yazmin Santiago, Michal Otyepka, Stefano Livraghi, Lorenzo Mino, Štěpán Kment, Zhikang Xu, Haibo Zhu, Paolo Fornasiero, Alexander O. Govorov, Piotr Błoński & Alberto Naldoni	Near-infrared plasmonic activation of molecular oxygen for selective oxidation of biomass derivatives	Nature Catalysis, 2025, vol. 8, p. 1370-1381
Szymon Abrahamczyk, Ondřej Sakreida, Alicja Bachmatiuk, Grażina Simha Martynková, Mark H. Rummeli	Developments in Nanopatterning of Graphene; Toward Direct Writing.	Advanced Materials, 2025, vol. 38, p. e13264.
Jiri Rysavy, Jakub Cespiva, Thangavel Sangeetha, Christian Teicht, Matej Charvát, Wei-Mon Yan, Ricardo Chacartegui, Tadeas Ochodek	Optimisation of metastable supercooled liquid phase change material for long-term heat energy accumulation	Energy Conversion And Management-x, 2025, vol. 27, p. 101061.
Veronika Šedajová, Min-Bum Kim, Rostislav Langer, Gobbilla Sai Kumar, Lili Liu, Zdeněk Baďura, James V. Haag, Giorgio Zoppellaro, Radek Zbořil, Praveen K Thallapally, Kolleboyina Jayaramulu, Michal Otyepka	2D Nitrogen-Doped Graphene Materials for Noble Gas Separation	Small, 2025, vol. 21, p. 2408525.

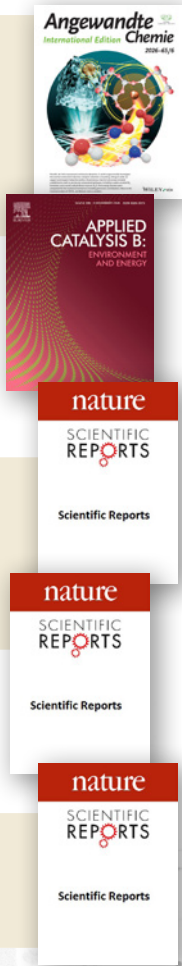
ARTICLES WITH CITATION RESPONSE OF 20TH OR MORE

Authors	Title	Journal	Citations
Deshmukh Megha Anantrao; Bakandritsos Aristeidis; Zbořil Radek	Bimetallic Single-Atom Catalysts for Water Splitting	Nano-Micro Letters, 2025, vol. 17, 1, p. no page numbers	80
Samanta I.S.; Mohanty S.; Parida S.M.; Rout P.K.; Panda S.; Bajaj Mohit; Blažek Vojtěch; Prokop Lukáš; Mišák Stanislav	Artificial intelligence and machine learning techniques for power quality event classification: a focused review and future insights	Results in Engineering, 2025, vol. 25, p. 103873.	51
Nagarajan Karthik; Rajagopalan Arul; Bajaj Mohit; Raju Valliappan; Blažek Vojtěch	Enhanced wombat optimization algorithm for multi-objective optimal power flow in renewable energy and electric vehicle integrated systems	Results in Engineering, 2025; vol. 25, p. 103671.	48
Kumar Pujari Harish; Alluraiah N. Chinna; Gopi Pasala; Bajaj Mohit; Kumar P. Sunil; Kalyan CH. Naga Sai; Blažek Vojtěch	Techno-economic optimization and sensitivity analysis of off-grid hybrid renewable energy systems: A case study for sustainable energy solutions in rural India	Results in Engineering, 2025; vol. 25, p. 103674.	41
Guo Hele; Zhou Yazhou; Chu Kaibin; Cao Xueying; Qin Jingjing; Zhang Nan; Roeffaers Maarten B. J.; Zbořil Radek; Hofkens Johan; Muellen Klaus; Lai Feili; Liu Tianxi	Improved Ammonia Synthesis and Energy Output from Zinc-Nitrate Batteries by Spin-State Regulation in Perovskite Oxides	Journal of the American Chemical Society, 2025, vol. 147(4), p. 3119-3128.	37, Highly Cited Paper

The following section lists scientific articles published in 2025 that received 20 or more citations. Citations are based on Scopus data as of 20 April 2026. Source: OBD.

Authors	Title	Journal	Citations
Tian C.; Zheng N.; Liu B.; Vereš Ján; Omran M.; Tang J.; Zhang F.; Chen G.	Pyrolytic reduction roasting of used ternary lithium-ion battery cathode powder using coconut shell powder for selective recovery of lithium	Fuel, 2025, vol. 386, p. 134327.	36 Highly Cited Paper
Sahoo Buddhadeva; Panda Subhasis; Rout Pravat Kumar; Bajaj Mohit; Blažek Vojtěch	Digital twin enabled smart microgrid system for complete automation: An overview	Results in Engineering, 2025, vol. 25, p. 1-16.	33
Zhang Leiqian; Luo Ke; Gong Jiaming; Zhou Yazhou; Guo Hele; Yu Yi; He Guanjie; Gohy Jean-Francois; Parkin Ivan P.; Hofkens Johan; He Qing; Liu Tianxi; Muellen Klaus; Lai Feili	Unlocking Durable and Sustainable Zinc-Iodine Batteries via Molecularly Engineered Polyiodide Reservoirs	Angewandte Chemie – International Edition, 2025, vol. 64, s.e202506822.	32 Highly Cited Paper
Manayil Parambil Ajith; Priyadarshini Eepsita; Paul Shounik; Bakandritsos Aristeidis; Sharma Virender K; Zbořil Radek	Emerging nanomaterials for the detection of per- and poly-fluorinated substances	Journal of Materials Chemistry A, 2025, vol. 13(12), p. 8246-8281.	32
Abdelmalek Ferial; Afghoul Hamza; Krim Fateh; Bajaj Mohit; Blažek Vojtěch	Experimental validation of novel hybrid Grey Wolf Equilibrium Optimization for MPPT to improve the efficiency of solar photovoltaic system	Results in Engineering, 2025, vol. 25, p. 103831.	30

Authors	Title	Journal	Citations
Sun Lijuan; Yan Weicheng; Wang Weikang; Wang Lele; Osella Silvio; Liang Guijie; Goddard William A; Zbořil Radek; Zhou Yazhou; Yang Juan; Liu Qinqin	Improving Mass Transport and Charge Transfer in COF-Based Photocatalysts With Three-Dimensional Ordered Macropores for Benzylamine Oxidation and Hydrogen Evolution	Angewandte Chemie – International Edition, 2025, vol. 64, p. 137.	28
Jaleh Babak; Nasri Atefeh; Eslamipناه Mahtab; Nasrollahzadeh Mahmoud; Daneshnazar Milad; Advani Jacky Harish; Fornasiero Paolo; Zbořil Radek; Antonietti Markus; Gawande Manoj Bhanudas	State-of-the-art and perspectives of nickel-based single-atom catalysts	Applied Catalysis B: Environmental, 2025, vol. 361, p. 124590.	27
Panda Subhasis; Samanta Indu Sekhar; Sahoo Buddhadeva; Rout Pravat Kumar; Sahu Binod Kumar; Bajaj Mohit; Blažek Vojtěch; Prokop Lukáš; Mišák Stanislav	Comprehensive framework for smart residential demand side management with electric vehicle integration and advanced optimization techniques	Scientific Reports, 2025, vol. 15(1), p.1-35.	25 Highly Cited Paper
Parida Shubhanshu Mohan; Pattanaik Vivekananda; Panda Subhasis; Rout Pravat Kumar; Sahu Binod Kumar; Bajaj Mohit; Blažek Vojtěch; Prokop Lukáš	Optimal parameter identification of photovoltaic systems based on enhanced differential evolution optimization technique	Scientific Reports, 2025, vol. 15(1), p. 1-33.	22
Izci Davut; Ekinci Serdar; Jabari Mostafa; Bajaj Mohit; Blažek Vojtěch; Prokop Lukáš; Yildiz Ali Riza; Mirjalili Seyedali	A new intelligent control strategy for CSTH temperature regulation based on the starfish optimization algorithm	Scientific Reports, 2025, vol. 15(1), p.1-22.	22



TARGETED CHANGE

In 2025, to work intensively and purposefully on already secured projects with the potential to achieve excellent results, such as REFRESH, EBEAM, MATUR, CirkArena, ExPEDite, MEET, MERGE, CoreH₂ Storage, INOVO!!! and others.

To complete the equipment of new spaces for research activities related to the important REFRESH project. For the Energy Lab and Materials-Envi Lab living labs within the REFRESH project, to ensure and stabilize the necessary staff and operational research capacities.

To ensure the full involvement of contracted leading international experts in these projects, thereby increasing the quality of project implementation as well as CEET's publication and citation performance.

To continuously submit further applications to new funding calls in line with CEET's long-term strategy in all research areas where CEET has the potential to achieve excellent results.

SUCCESS INDICATORS

Fulfilment of the required monitoring indicators for all secured projects with the potential for excellence during the year.

- ✓ In 2025, the set work schedules, monitoring indicators and related administrative and reporting duties were continuously fulfilled for secured projects with the potential for excellence, especially REFRESH, EBEAM, MATUR, CirkArena, ExPEDite, MEET, MERGE, Core-H₂Storage, INOVO!!! and others.

STRENGTHENING EXCELLENCE
IN SELECTED RESEARCH AREAS

To achieve long-term success in the international research environment, it is necessary to continue the systematic development of expert capacities and to focus on achieving outstanding research results. In addition to the results already achieved in established research areas, especially in the use of advanced materials in environmental and energy technologies, other promising research topics were also identified in the past period. These topics show strong potential for the development of international cooperation and for achieving excellent outputs.

- Use of electron beams for the targeted synthesis of new materials with a precise structure for applications in energy, biomedicine, electronics and environmental protection.
- Environmentally friendly methods for hydrogen production, storage and safe use, including the analysis of impurities.
- Digital modelling of technologies for optimizing energy transmission, distribution and consumption.
- Photocatalytic conversion of CO₂ into usable products and photocatalytic water splitting.
- New materials and nanostructures for energy storage in batteries and supercapacitors, and for use in environmental technologies.
- Use of industrial recycled materials from metallurgy, nuclear energy and batteries to modify and improve conventional materials.
- Thermochemical processing of waste plastics using pyrolysis, catalytic and purification processes.
- Use of energy products within the circular economy.
- Technologies for the treatment of waste, process gases and water.

TARGETED CHANGE

To shift the focus towards applied research projects with higher added value for R&D. To actively seek new opportunities and fields for applied research services, not only in CEET's existing areas of activity, but also in new areas related to the expansion of research into newly addressed interdisciplinary topics.

SUCCESS INDICATORS

Maintain the current level of revenues while also seeking to expand research activities and services into new areas that support the growth of excellence in applied research contracts.

- ✓ In 2025, CEET maintained a significant volume of applied and contract research activities. This is documented by revenues from additional activities and commercial contracts amounting to CZK 82.458 million. At the same time, CEET expanded its research and expert services into new areas with higher professional value, especially in energy, hydrogen technologies, the circular economy, waste processing and AI-supported optimization of thermochemical processes.

DEVELOPMENT OF BUSINESS POTENTIAL

CEET builds its activities on the ability to keep pace with the dynamic development of the market and, at the same time, to anticipate new trends that are shaping the future of energy and industry. It actively connects science, innovation and practice, creating an environment where solutions with real impact can emerge. Thanks to long-term partnerships and active cooperation with new technology leaders, the centre systematically expands its portfolio of applied and contract research projects. This approach supports the stable growth of jointly implemented activities and strengthens the transfer of know-how to industry and the public sector.

An important part of this strategy is also intensive cooperation with VSB-TUO on major projects aimed at building a sustainable “green campus”. CEET brings its advanced expertise to this process and contributes to the development and integration of modern solutions for electricity generation from renewable sources. These solutions help move the university campus towards greater energy self-sufficiency and low-emission operation. Transparent communication of results, sharing of know-how and open cooperation with the expert community, companies and the public strengthen the position of the centre as an important driver of innovation in the region. CEET is therefore naturally entering new areas of application and connecting science with practice in a way that brings real value. The following chapter presents projects developed in cooperation with leading partners from industry, the public sector and state institutions. These projects show how innovation can change the future of energy and society as a whole.

APPLIED RESULTS

Patent/Application	4
Utility model/Application	14
Industrial pattern / Application	4
Implemented methodology	2
Software	4
Function sample	35
Verified technology	5
Pilot plant	1
Prototype	2
Research report*	20
Total	91

Source:
Internal materials of the Technology Transfer Centre – Intellectual Property Protection, 2025, as of 16 February 2026; *OBD as of 20 April 2026.

VERIFICATION OF A FUNCTIONAL TECHNOLOGY FOR WASTE BIOMASS PRE-TREATMENT

VERIFIED TECHNOLOGY
(002/25-11-2024_OT)

RACLAVSKÁ, Helena; RŮŽIČKOVÁ, Jana; ŠAFÁŘ, Michal; KUCBEL, Marek; RACLAVSKÝ, Konstantin; BIELESZ, David; KANTOR, Pavel; ŠTRBOVÁ, Kristína and KONEČNÁ, Eva.

The result of the technology is the use of waste paper and separated cellulose for purposes other than the production of new paper, which is limited by fibre damage. This required the development and verification of waste biomass pre-treatment technology in order to achieve the highest possible level of recyclability in line with the principles of the circular economy. The research focused on the preparation of fuel for energy use in accordance with current legislation, as well as on other possible uses, such as in agriculture as a carbon source and as a stabilizing element in engineering geology, due to its high water holding capacity (WHC), or for the production of nanocellulose.

METHODOLOGY FOR H₂ SAMPLING AT HIGH PRESSURES AND SUBSEQUENT ANALYSIS OF IMPURITIES FOR FURTHER EFFICIENT USE IN TRANSPORT AND ENERGY

APPLIED METHODOLOGY
(THETA4, TK05010184)

BOROVEC, Karel; BOROVEC, Milan; DURČÁK, Miroslav and KARÁSEK, Roman.

The main aim of the research project is to develop and subsequently accredit a methodology for H₂ sampling at high pressures and for the following analysis of its impurities. Impurities in H₂ gradually reduce the efficiency of fuel cells. The relevant impurity components are known, as are the laboratory methods used to analyse them. At present, there is no laboratory in the Czech Republic that has the equipment needed for high-pressure sampling together with such precise analytical instruments, let alone an accredited or mobile version of this method.

COMBINED MICRO-PARTICLE IMPACTOR (PM10, PM2.5 AND PM1)

PROTOTYPE, FUNCTIONAL SAMPLE
(001/27-01-2025_P)

The developed combined impactor responds to the current social need for accurate monitoring of airborne particulate matter. It represents an original technical solution that enables the simultaneous separation and sampling of three particle size fractions — PM10, PM2.5 and PM1

— in one compact device. Unlike commonly used impactors and cyclone separators, it uses a new design principle based on direct installation behind the sampling nozzle inside the measured pipeline. This eliminates the need for external heating and minimizes the risk of sample loss. The device received a silver medal at the international INTARG 2025 exhibition in Katowice, confirming its innovative contribution and international relevance.



COMPLEMENTARY ACTIVITY

CEET's supplementary activities are based on cooperation with industrial partners, municipalities, universities and other organizations. In their implementation, the scientific potential of research teams is systematically used together with accredited and authorized procedures, which make it possible to use the centre's instrument and technology capacities effectively.

In the past year, despite a slight year-on-year decrease in the volume of contracts by several percent, the planned financial volume of supplementary activities was achieved. This development was mainly influenced by the gradual completion of long-term contract research in the field of DeHg technology testing. This closed a period of more than ten years focused on mercury emission monitoring, validation of the accredited KMEHg method and the development of sorbents for reducing mercury emissions. At the same time, capacities were used for the preparation and development of technological procedures and processes supporting the decarbonization of energy systems and the optimization of energy savings in VSB-TUO buildings, contributing to the so-called "Green Campus".

During the period, contract research again focused mainly on experimental testing and measurement of technologies related to the environmental improvement and decarbonization of energy operations. A significant part of these activities

took place directly on real operating facilities. An integral part of the supplementary activities was also the work of the accredited laboratory, as well as design, consulting and expert services. A certified methodology for sampling and analysing the purity of H₂ at high pressures was newly implemented at the site of a contract partner in Poland, and similar contractual activities are also being prepared in the Czech Republic.

Thanks to the unique equipment of its research and testing laboratories, the centre has long maintained a strong interest from external partners in contract research. A major competitive advantage is the broad range of disciplines covered and the mutual complementarity of individual research capacities, which is unique in the Czech higher education environment. Supplementary activities are carried out in a highly competitive market environment, and the achieved results confirm the centre's stable and respected position in its areas of activity.

Last year, as in the previous three years, the most important activities of the individual centres in contract research included projects focused on the application of hydrogen technologies, heat and electricity generation technologies including renewable energy sources, emission reduction from energy sources, development of technologies for the energy and material use of waste, thermochemical conversion of biomass and alternative fuels, use of waste heat in industry, and other related areas.

In materials research, contract research again included, for example, testing the lifetime of materials in a hydrogen atmosphere, testing new materials for electrolyser membranes, using reagents to reduce emissions of mercury and other heavy metals from the combustion of fossil and alternative fuels, including municipal waste, using waste paper and separated cellulose for purposes other than the production of new paper, co-composting sewage sludge, up to 40% wet weight, with green and woody biowaste, developing new materials such as metal hydrides and nanostructures for energy storage in batteries and supercapacitors and for environmental technologies, using industrial recycled materials from metallurgy, nuclear energy and batteries to modify and improve conventional materials, processing waste plastics through pyrolysis, catalytic and purification processes, and using energy products within the circular economy.

Compared with the previous year, following the merger of the two original laboratories, CEET now operates one accredited laboratory. Its activities focus on analyses of fuels, waste and emissions, building materials, testing the explosion properties of gases, liquids and their mixtures, and determining impurities in hydrogen used in fuel cells for vehicles. Through effective reorganization and increased activity, this laboratory provides significant support for the contract activities of all centres.

Cooperation with municipalities is carried out through technical studies, as well as consulting and expert activities. Cooperation with the National Development Bank has been significantly expanded, and we are now among the 35 expert guarantors of EPC projects. Cooperation with municipalities and regions also remains very extensive, especially in the conceptual development of their energy systems. In this area, the centre's activities are further complemented by options for using hydrogen in transport, including hydrogen quality testing using accredited procedures according to European standards, and by increasing the use of renewable energy sources in heat and electricity production.

The year 2025 was again a successful year for CEET's supplementary activities. We managed to match the financial volume, including the profit achieved in 2024, while further expanding the activities of the research centres into new appli-

cation areas. CEET therefore continues to strengthen its position as an important workplace in the field of contract research.

In addition to traditional activities in applied research, experimental testing, consulting and cooperation with industry and the public sector, activities related to the energy transformation of the VSB-TUO campus were significantly strengthened in 2025. Attention was focused mainly on the design and implementation of measures aimed at increasing energy efficiency, optimizing the operation of energy systems and reducing building operating costs.

“The achieved results confirm the high professional level of the centre and its ability to respond flexibly to current challenges in energy, decarbonization and the cost-effective operation of infrastructure.”

Ing. Karel Borovec, Ph.D.
Director of ERC



More specifically, these activities included the preparation and implementation of EPC projects, proposals for the modernization of energy sources and heat distribution systems, the implementation of advanced measurement and control systems, the introduction of smart energy consumption management elements, and building operation analyses using data support. Studies focused on the integration of renewable energy sources, energy storage and the assessment of decarbonization options for the campus energy system also played an important role. The activities also included the evaluation of the economic benefits of individual measures, with the aim of achieving long-term sustainable savings in operating costs.

These activities represent an important step towards fulfilling the principles of sustainability and, at the same time, create a model environment for applying innovative solutions in practice, which can also be used by other industrial and municipal partners.



EXAMPLES OF THE MOST
SIGNIFICANT COOPERATION

INDUSTRY

Veolia Energie ČR, a.s.

A major operator of energy sources with which we cooperated on the energy transformation, especially in reducing emissions of particulate matter and heavy metals, increasing equipment efficiency and optimizing technologies using fossil and alternative fuels for energy production. As part of energy services, we took part in the joint preparation and design of decarbonization technologies, testing of solid alternative fuels used for heat and electricity generation in a new multi-fuel boiler, and performance guarantee measurements on cogeneration units and gas boilers.

ČEZ, a.s.

An industrial partner operating fossil fuel-based energy sources. The main focus of cooperation was project work related to the energy transformation, preparation and technical supervision of the construction of new energy sources, and operational DeHg tests using equipment for accredited continuous mercury measurement installed at two points in the flue gas cleaning system. The aim was to determine the efficiency of the DeHg technology and to verify compliance with the emission limit set according to BAT.

Václav Havel Airport Prague

Václav Havel Airport Prague is an important institutional and business partner with a leading role in transport infrastructure, logistics processes and technological innovation. During the project, the cooperation was further developed through specific engineering and project activities reflecting the practical needs of critical infrastructure operation.

The completed output consisted of project design work for the “Central Boiler House of Václav Havel Airport Prague” project, focused on the design and optimization of an energy source within the airport area. These activities included the preparation of detailed design documentation, with an emphasis on operational reliability, energy efficiency and compliance with current technical and legislative requirements.

The project contributed to the modernization of an essential energy hub and supported the long-term stability and efficiency of airport infrastructure operation. It also makes an important contribution to strengthening energy security, reducing emissions and modernizing major infrastructure, while creating conditions for the further development of low-emission energy solutions in the Czech Republic.

PUBLIC ADMINISTRATION

National Development Bank

Analysis of EPC — Energy Performance Contracting — projects

The analysis was carried out in the cities of Liberec, Opava and Mariánské Lázně. It focused on the technical, economic and operational aspects of the implemented measures, including the evaluation of achieved energy savings, return on investment and impacts on municipal budgets. The assessment also included the suitability of the applied technological solutions, contractual models and their possible use in other cities.

The project has a significant multiplier effect, as it combines high investment potential with immediate energy savings, without the need to place a direct burden on public budgets in the initial phase. At the same time, it contributes to increasing the economic efficiency of the public sector, reducing operating costs and improving the systematic management of energy consumption.

In a wider context, it supports long-term sustainability and the decarbonization of urban infrastructure. It also represents a practically tested tool for the energy transformation of Czech cities, with potential for wider use at the regional and national level.

CITIES AND MUNICIPALITIES

Analysis of disconnection from the district heating system in the City of Havířov

The analysis focused on a comprehensive assessment of the technical, economic and environmental impacts of a possible transition to individual or decentralized heat sources. It included an evaluation of the existing infrastructure, future development scenarios, investment costs, operating costs and impacts on end users, including households and public buildings.

The project provides an important analytical basis for strategic decision-making on the future of heat supply in the city. It takes into account not only short-term economic effects, but also long-term impacts on the environment, greenhouse gas emissions and air quality. At the same time, it contributes to the assessment of energy security and the stability of the area in the context of changing energy conditions.

The results of the analysis may also serve as a reference framework for similar decisions in other cities dealing with the transformation of district heating systems.

TARGETED CHANGE

To ensure high-quality implementation of secured projects and fulfil their work schedules and monitoring indicators. At the same time, to seek new opportunities for submitting project proposals to high-quality interdisciplinary funding schemes with international participation.

SUCCESS INDICATORS

In 2025, secure support for at least one additional major interdisciplinary project with international participation.

- ✓ In 2025, support was secured for additional major projects with international participation, including the AEM-DRIVE project and the project “Research on New Sustainable Approaches for the Synthesis of Zeolites and Hybrid Zeolite-Carbon Structures for Catalytic and Sorption Applications”, supported under the Barrande Mobility programme.

DEVELOPMENT OF INTERDISCIPLINARY AND INTERNATIONAL COOPERATION

The strategic objectives set in the area of international and interdisciplinary project cooperation were successfully achieved. The team systematically strengthened its involvement in international structures and actively participated in the preparation of project proposals responding to current European priorities in energy and raw material self-sufficiency, the energy transition, and the resilience of technical and social systems. Thanks to long-term partnerships with international institutions, high-quality research facilities and institutional support in project preparation, it was possible not only to maintain the continuity of cooperation, but also to expand it into new thematic and disciplinary areas.

The defined success indicator was fulfilled, as support was again secured in 2025 for another important interdisciplinary project with international participation. This result confirms the team's ability to prepare competitive project proposals that meet the high standards of international evaluation processes. It also demonstrates the team's professional relevance within the European research area.

international partners. In parallel, new calls and opportunities for submitting further proposals to high-quality international funding schemes are being systematically identified. This creates good conditions for maintaining and further strengthening the team's international position in the coming period.

At the same time, we managed to maintain a high level of quality in the implementation of all supported projects. The project teams are continuously fulfilling the set work schedules, monitoring indicators and related administrative and reporting duties. Emphasis is placed on transparent project management, interdisciplinary coordination and effective communication with

**EBEAM – ELECTRON BEAM EMERGENT
ADDITIVE MANUFACTURING**

Project No. 101087143
Provider European Union, Horizon Europe
Duration 2024–2028
Principal investigator
Prof. Dr. Mark H. Rummeli

**SAN4FUEL – SINGLE ATOM-BASED
NANOHYBRID PHOTOCATALYSTS FOR
GREEN FUELS**

Project No. 101079384
Provider European Union, HORIZON –
WIDERA-2021-ACCESS-03-01
Duration 2022–2025
Principal investigator
Prof. Radek Zbořil, Ph.D.

Project partners
University of Trieste / Università
degli Studi di Trieste, Friedrich-
Alexander-Universität Erlangen-
Nürnberg.

**GLAS-A-FUELS – SINGLE-ATOM
PHOTOCATALYSTS ENHANCED BY A SELF-
POWERED PHOTONIC GLASS REACTOR TO
PRODUCE ADVANCED BIOFUELS**

Project No. 101130717
Provider European Union, Horizon Europe
Duration 2024–2027

Principal investigator
Mgr. Aristeidis Bakandritsos, Ph.D.
Project partners
Foundation for
Research and Technology – Hellas,
Leibniz-Institut für Polymer
forschung Dresden e.V., CORE
Innovation Centre, University of
Trieste / Università degli Studi di
Trieste.

**MERGE – TWINNING EXCELLENCE IN
MANAGEMENT AND RESEARCH FOR GREEN
ENERGY AND CHEMICALS THROUGH
SINGLE-ATOM CATALYSIS**

Project No. 101159582
Provider European Union, HORIZON-
WIDERA-2023-ACCESS-02
Duration 2024–2027
Principal investigator
Mgr. Aristeidis Bakandritsos, Ph.D.

Project partners
Politecnico di Milano,
Rijksuniversiteit Groningen /
University of Groningen, Q-PLAN
International Advisors PC.

**EXPEDITE – ENABLING POSITIVE ENERGY
DISTRICTS THROUGH A PLANNING AND
MANAGEMENT DIGITAL TWIN**

Project No. 101139527
Provider European Union, Horizon Europe
Duration 2024–2026
Principal investigator
Prof. Stanislav Mišák, Ph.D.

Project partners
Riga Technical University, National
Technical University of Athens,
University of Padua, Universidade
Católica Portuguesa, Laurea
University of Applied Sciences,
EXUS Software, ATOS IT Solutions
and Services Iberia, Plegma Labs,
Fundación Tecnalia Research
& Innovation, UPCOM Cyprus,
Deloitte Consulting SRL Società
Benefit, Technologická platforma
Energetická bezpečnost ČR, z.s.,
Riga City Municipality, Riga Energy
Agency, The Lisbon Council for
Economic Competitiveness, Open
& Agile Smart Cities, SIA Dati Group,
Sweco UK Limited.

**H2GEO – NEW TECHNOLOGY FOR
HYDROGEN AND GEOPOLYMER
COMPOSITES PRODUCTION FROM POST-
MINING WASTE**

Project No. 101112386
Provider European Union,
Research Fund for Coal and Steel
(RFCS) 2027, RFCS-2022 call
Duration 2023–2026
Principal investigator
Prof. Silvie Heviánková, Ph.D.
Co-principal investigator for CEET
Ing. Jan Najser, Ph.D.

Project partners
Instytut Techniki Górniczej KOMAG,
Główny Instytut Górnictwa
Państwowy Instytut Badawczy,
Ústav stavebníctva a architektúry
Slovenskej akadémie vied, Instytut
Technologii Paliw i Energii,
Politechnika Wrocławska, Haldex
S.A.

**HESS – HYBRID ENERGY STORAGE SYSTEM
USING POST-MINING INFRASTRUCTURE**

Project No. 101112380
Provider European Union,
Research Fund for Coal and Steel
(RFCS) 2027, RFCS-2022 call
Duration 2023–2026
Principal investigator
Prof. Stanislav Honus, Ph.D.

Co-principal investigator for CEET

Ing. Jan Najser, Ph.D.; Ing. Jaroslav
Frantík, Ph.D.

Project partners

Institute of Fuel and Energy
Technology, KOMAG Institute
of Mining Technology, Silesian
University of Technology,
Premogovnik Velenje d.o.o.

DOCTORAL PROGRAM OF SCIENCE WITH A
MENTION IN PHYSICS, FINANCIAL SCHEME
“ALLIANCES FOR DOCTORAL PROGRAMS”

Project No. E033-2023-01 – BM

Provider Peru, CONCYTEC — National
Council of Science, Technology and
Technological Innovation

Duration 2024–2027

Principal investigator

Universidad Nacional de Ingeniería,
Peru

Co-principal investigator for CEET

Ing. Lenka Matějová, Ph.D.

Project partners

Universidad Nacional de
Ingeniería, Universidad Nacional
de Tumbes, Universidad Nacional
Toribio Rodríguez de Mendoza de
Amazonas, Universidad Nacional
de Trujillo, Universidad Nacional
de San Agustín de Arequipa,
Universidad Nacional de Moquegua,
Universidad Nacional Jorge Basadre
Grohmann, SENAMHI, INGEMMET,
CONIDA, Statkraft UNIENERGIA ABC

S.A.C.; Cía. Minera Poderosa S.A.;
Compañía de Minas Buenaventura
S.A.A.; Centro de Investigación
Geotérmica para el Desarrollo,
Universidad Nacional Autónoma
de México, Universidade de São
Paulo, Universidad Nacional de San
Martín, Instituto de Investigaciones
en Energía No Convencional,
Pennsylvania State University,
University of Oulu, Université Paris
Est Créteil, Universidad de Jaén,
Catalan Institute of Nanoscience
and Nanotechnology, Inha
University, Queensland University
of Technology, Uppsala University,
Technische Universiteit Eindhoven.

AEM-DRIVE – ADVANCED AEM MEMBRANE
TECHNOLOGIES: DEVELOPMENT, REAL-
TIME DATA INTEGRATION, TESTING AND
PREDICTIVE MODELLING FOR IMPROVED
PERFORMANCE

Project No. TQ16000070

Provider Technology Agency of the Czech
Republic, SIGMA DC4

Duration 2025–2027

Principal investigator

Ing. Jiří Ryšavý, Ph.D.

Project partners

LEANCAT s.r.o., National Sun
Yat-sen University, Industrial
Technology Research Institute.

CORE-H₂STORAGE

Project No. TQ06000002

Provider Clean Energy Transition
Partnership, TRI1 – CM2023-02

Duration 2024–2027

Principal investigator

Fraunhofer-Gesellschaft zur
Förderung der angewandten
Forschung e.V.

Co-principal investigator for CEET

Ing. Karel Borovec, Ph.D.

Project partners Fraunhofer UMSICHT,
AMAZEMET Sp. z o.o., Faculty of
Sciences, University of Monastir,
Institute for Non-Classical
Chemistry at Leipzig University, JA-
Gastechnology, Warsaw University
of Technology.

FOODCIRCUS – CIRCULAR SOLUTIONS FOR
KEEPING FOOD WASTE OUT OF CENTRAL
EUROPE’S SCHOOLS

Project No. CE0200718

Provider Ministry of Regional Development,
Interreg Central Europe

Duration 2024–2026

Principal investigator

Assoc. Prof. Lucie Jezerská, Ph.D.

Project partners

University of Natural Resources and
Life Sciences, Wrocław University
of Environmental and Life Sciences,
Prague University of Economics
and Business, Save the Food, z.s.,
Wrocław University of Science
and Technology, Municipality of
Wrocław, University of Veterinary
Medicine Budapest, Alma Mater
Studiorum – University of Bologna,
Reploid Value Solutions GmbH.

RESEARCH ON NEW SUSTAINABLE
APPROACHES FOR THE SYNTHESIS OF
ZEOLITES AND HYBRID ZEOLITE-CARBON
STRUCTURES FOR CATALYTIC AND
SORPTION APPLICATIONS

Project No. 8J25FR017

Provider Ministry of Education, Youth
and Sports, Barrande Mobility
Programme

Duration 2025–2026

Principal investigator

Ing. Lenka Matějová, Ph.D.

Project partners

Institut de Chimie et Procédés
pour l’Energie, l’Environnement
et la Santé (ICPEES), University of
Strasbourg.

**GENIUSFUEL – A NEW CONNECTION
BETWEEN GASIFICATION AND
ELECTROLYSIS FOR THE PRODUCTION OF
SUSTAINABLE FUELS**

Project No. TQ06000004
Provider Technology Agency of the Czech Republic, Clean Energy Transition
Duration 12/2024–11/2027
Principal investigator Assoc. Prof. Pavel Leštinský, Ph.D.
Project partners Alma Mater Studiorum – University of Bologna, Centre National de la Recherche Scientifique / CNRS – ICPEES, University of Strasbourg, Consiglio Nazionale delle Ricerche / CNR-ISSMC, Hulteberg Chemistry & Engineering AB, Iridenergy Srl, Itálie; SolydEra SpA, ENI SpA.

**ADVANCED TREATMENT OF CONDENSATE
FROM COMBUSTION OF GASEOUS FUELS
WITH INCREASED HYDROGEN CONTENT**

Project No. TQ26000025
Provider Technology Agency of the Czech Republic, SIGMA DC4
Duration 2026–2028
Principal investigator Ing. Jiří Ryšavý, Ph.D.
Project partners ALMEVA EAST EUROPE a.s., Česko; National Science and Technology Council / NSTC, Tchaj-wan.

SIGNIFICANT SCIENCE AND RESEARCH PROJECTS

In the past period, we focused not only on the implementation of already approved projects, but also on the systematic preparation and successful submission of new project proposals. These results confirm the high professional level of the workplace, as well as its long-term ambition to succeed in the international research environment.



**Overview of All
Research and
Development
Projects**



NATIONAL CENTRE FOR ENERGY II

Project No.	TN02000025
Provider	Technology Agency of the Czech Republic (TA CR)
Duration	2023-2028
Principal investigator	prof. Ing. Stanislav Mišák, Ph.D.

The project aims to strengthen long-term cooperation between top research institutions and key industrial partners operating in the field of sustainable energy. Through applied research and the development of new technologies, materials, and methods, the project focuses on improving the efficiency, safety, and operational reliability of current energy systems. It also addresses the resilience and security of energy networks, the effective integration of decentralised energy sources, and the use of alternative fuels to enhance the Czech Republic's resource and energy self-sufficiency. The intended output is a comprehensive strategic framework for transforming the Czech energy sector into a modern, low-carbon, and sustainable system that reflects current geopolitical and socio-economic challenges. In this way, the project contributes to fulfilling the Czech Republic's climate commitments, including the goal of achieving carbon neutrality by 2050. The project National Centre for Energy II (NCE II) is led by prof. Ing. Stanislav Mišák, Ph.D.



EXPEDITE

ENABLING POSITIVE ENERGY DISTRICTS THROUGH DIGITAL TWINS

Project No.	TN101139527
Provider	European Union, Horizon Europe
Duration	2024-2026
Principal investigator	prof. Ing. Stanislav Mišák, Ph.D.

The project is being implemented by the Smart Grids Research Group under the leadership of Assoc. Prof. Ing. Lukáš Prokop, Ph.D., who specialises in the digitalisation of energy technologies. The team is developing mathematical models in the form of Digital Twins (DT) for near real-time monitoring, visualisation, and control of energy flows at the level of positive energy districts. The research focuses on areas where minimising energy losses and achieving higher operational efficiency and sustainability are key priorities.



REFRESH PROJECT

RESEARCH EXCELLENCE FOR REGION
SUSTAINABILITY AND HIGH-TECH
INDUSTRIES

Project No. CZ.10.03.01/00/22_003/0000048
Provider State Environmental Fund
of the Czech Republic
Duration 2023-2027
Principal investigator
prof. Ing. Igor Ivan, Ph.D.
Co-principal investigator for CEET
prof. Ing. Stanislav Mišák, Ph.D.,
prof. RNDr. Radek Zbořil, Ph.D.

The project serves as a key instrument for implementing the SMARAGD vision, which aims to build a unique European research infrastructure focused on technology transfer and innovation in the fields of sustainable energy, industrial digitalisation, transport automation, environmental technologies, and smart material solutions. The project currently includes four fully operational living laboratories: Energy Lab, led by prof. Ing. Stanislav Mišák, Ph.D., Materials & Environment Lab, led by prof. RNDr. Radek Zbořil, Ph.D., Industry 4.0 & Automotive Lab, led by Assoc. prof. Ing. Petr Šimoník, Ph.D. Social Lab, led by Mgr. Ondřej Slach, Ph.D.



EBEAM

ELECTRON BEAM EMERGENT ADDITIVE MANUFACTURING

Project No.	ERA CHAIRS HORIZON EUROPE 101087143
Provider	European Union, Horizon Europe
Duration	2024-2028
Principal investigator	prof. Mark Hermann Rummeli

This ongoing project focuses on building a new international research team led by renowned materials scientist Prof. Dr. Mark H. Rümmeli. The team is pioneering the use of electron beams for the targeted synthesis of novel materials with precisely defined atomic structures. The project aims not only to push the boundaries of contemporary materials research and develop advanced materials with improved properties for applications in energy, biomedicine, electronics, and environmental protection, but also to promote the internationalisation of the university, create conditions for the professional development of young researchers, and initiate structural changes in research management at VSB-Technical University of Ostrava.



GLAS-A-FUELS

SINGLE-ATOM PHOTOCATALYSTS ENHANCED BY A SELF-POWERED PHOTONIC GLASS REACTOR TO PRODUCE ADVANCED BIOFUELS

Project No. HORIZON-EIC-2023 -PATHFINDEROPEN -01 101130717
Provider European Union, HORIZON -EIC-2023- PATHFINDEROPEN-01
Duration 2024-2027
Principal investigator Mgr. Aristeidis Bakandritsos, Ph.D.

The project addresses the growing energy demand and the EU’s ambition to achieve climate neutrality by 2050. It focuses on converting non-food biological waste, such as lignocellulosic residues, into advanced biofuels — primarily butanol and hydrogen — through bioethanol reforming. To achieve this, the project uses recyclable single-atom catalysts composed of earth-abundant elements, integrated into an innovative photonic glass reactor designed to maximise the use of light energy. The aim is to increase the efficiency and selectivity of biofuel production through a synergistic interplay between the catalyst’s active sites, the support material, and controlled energy transfer. This approach promotes the formation of key intermediates and improves the overall output of the process.



SAN4FUEL

SINGLE ATOM-BASED NANOHYBRID PHOTOCATALYSTS FOR GREEN FUELS

Project No. HORIZON-WIDERA -2021-ACCESS-03 -01 101079384
Provider European Union, HORIZON -WIDERA-2021- ACCESS-03-01
Duration 2022-2025
Principal investigator prof. RNDr. Radek Zbořil, Ph.D.

The main objective of this Twinning-funded project is to establish a high-level educational and research programme to strengthen the scientific profile and international relevance of the participating institutions in the field of sustainable and clean energy. This area forms one of the key pillars of the Horizon 2020 work programme Secure, Clean and Efficient Energy and supports the goals of the Twinning initiative within the Spreading Excellence and Widening Participation framework. The project will support the development of expertise and research capacity, bringing together experienced and early-career researchers. It focuses on two main areas: (i) photocatalytic water splitting and (ii) photoinduced CO₂ reduction, through the joint development of a new generation of hybrid single-atom photocatalysts based on earth-abundant transition metals such as Co, Cu, Ni, Fe, and others.



MATUR

MATERIALS AND TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT

Project No. CZ.02.01.01/00/22 _008/0004631
Provider Ministry of Education, Youth and Sports of the Czech Republic
Duration 2023-2028
Principal investigator prof. Ing. Bohumír Strnadel, DrSc.
Co-principal investigator for CEET prof. Ing. Gražyna Simha Martynková, Ph.D.

The project aims to establish the Centre for Advanced Research in Materials and Technologies for Sustainable Development (MATUR). The aim is to conduct interdisciplinary research with high potential for creating applicable research outcomes that extend into various fields of human society, both nationally and internationally. The solution will involve major Czech and international workplaces, which will decisively influence the directions of development in sectoral scientific research and development activities. Effective communication and infrastructure connections among the involved institutions will enable the efficient acquisition of new knowledge and the development of interdisciplinary approaches in materials engineering.



CIRKARENA

Project No. CZ.10.03.01/00/22 _003/0000045
Provider Ministry of the Environment of the Czech Republic
Duration 2023-2027
Principal investigator prof. Ing. Kamila Janovská, Ph.D.
Co-principal investigator for CEET Ing. Karla Čech Barabaszová, Ph.D.

CirkArena is a planned modern centre supporting the development of the circular economy in the Moravian-Silesian Region. Its main objective is to transform the region into a model of sustainable development, focusing on research and the efficient utilisation of industrial waste such as slags, dust, biowaste, and construction materials. The project will contribute to the region’s transformation by maximising the use of secondary raw materials, promoting sustainability, modernising businesses, and interconnecting industrial sectors. These efforts aim to reduce waste generation and support the transition to a circular economy. CirkArena is part of the broader SMART And Green District (SMARAGD) initiative, which integrates the fields of materials, energy, environment, and IT to ensure a sustainable future for the region.

The aim of the project is to develop cost- and resource-efficient hydrogen storage technologies for a wide range of applications. The planned technological developments are intended to serve as a driver for sustainable hydrogen storage and contribute significantly to the responsible use of renewable energy sources. The core objective is to enable hydrogen storage at ambient temperature and pressures up to 3.5 MPa in scalable solutions. To achieve this, the project explores solid-phase sorbents, particularly high-entropy alloys and silica aerogels, as alternatives to conventional high-pressure or cryogenic hydrogen storage methods. This approach enables significant energy savings and supports the development of two distinct systems for flexible hydrogen storage.

Project No.	LM2023056
Provider	Ministry of Education, Youth and Sports of the Czech Republic
Duration	2023-2026
Principal investigator	prof. Ing. Lucie Obalová, Ph.D.

The Large Research Infrastructure ENREGAT (LRI ENREGAT) provides access to advanced facilities and technological units focused on waste-to-energy conversion and waste gas treatment. It serves as a unique research base for comprehensive studies in combustion, thermochemical processes, and anaerobic digestion of waste materials, as well as catalytic, sorption, photocatalytic gas purification, and membrane separation technologies. In addition to these areas, ENREGAT supports research in related fields and offers a full range of analytical services. Its uniqueness lies in the ability to conduct both fundamental and applied research across various waste-to-energy technologies, from laboratory to pilot scale. This allows researchers to assess the suitability of specific technologies for different waste types. ENREGAT also enables research on technologies aimed at reducing emissions of gaseous pollutants, such as nitrogen oxides, carbon dioxide, and organic compounds from laboratory experiments to verification in a pilot-scale was

te incineration plant, which is part of the infrastructure. Since January 2019, ENREGAT has been listed on the Czech Roadmap of Large Research Infrastructures. Thanks to targeted support from the Ministry of Education, Youth and Sports (project No. LM2023056), the infrastructure is freely available under open access to the broader research community. Companies and commercial users can access ENREGAT through collaborative or contract research schemes.

Project No.	CZ.02.01.01/00/23_015/0008195
Provider	Ministry of Education, Youth and Sports of the Czech Republic
Duration	2024-2026
Principal investigator	prof. Ing. Lucie Obalová, Ph.D.

With financial support from the European Structural and Investment Funds, the Institute of Environmental Technologies at VSB-Technical University of Ostrava is implementing the project titled Modernisation of the ENREGAT Infrastructure (registration no. CZ.02.01.01/00/23_015/0008195) during the period 1 January 2024 – 31 December 2026. The project has been supported under the Operational Programme Jan Amos Komenský with funding of CZK 59,964,793. The Modernisation of the ENREGAT Infrastructure (Infra-ENREGAT) project aims to strengthen the national research, develop-

ment and innovation infrastructure by upgrading the ENREGAT Large Research Infrastructure (LRI) – Energy Recovery from Waste and Gas Cleaning. The project complements institutional funding provided by the Ministry of Education (project LM2023056). ENREGAT, a single-site large-scale research infrastructure, is operated by the Institute of Environmental Technologies and has been openly accessible to the research community free of charge since January 2019, when it was included in the Czech Roadmap for Large Research Infrastructures. As many of the existing devices are over 10 years old, and due to new strategic priorities at both the national and EU level – along with growing user demand – the project will procure 13 investment units (comprising 33 pieces of equipment) to support expansion, modernisation, and renewal of the infrastructure. The equipment selection is based on identified user needs and current developments in energy and related research fields. The new infrastructure will significantly enhance scientific potential, improve service quality and capacity, and increase the number of users. The project plans to introduce 26 new services and upgrade existing ones. It is expected that 270 users from research organisations will benefit from the modernised infrastructure via open access during and beyond the project implementation period. The planned upgrades align with national and international strategic priorities (e.g. RIS3, the European Green Deal, Fit for 55) in the areas of sustainable energy, decarbonisation, air pollution reduction, and achieving carbon neutrality through greenhouse gas emissions mitigation.

MERGE

TWINNING EXCELLENCE
IN MANAGEMENT AND RESEARCH
FOR GREEN ENERGY AND CHEMICALS
USING SINGLE-ATOM CATALYSIS

Project No. HORIZON-WIDERA-2023-ACCESS-02 101159582
Provider European Union, HORIZON -WIDERA-2023-ACCESS-02
Duration 2024-2027
Principal investigator Mgr. Aristeidis Bakandritsos, Ph.D.

The MERGE project is currently focused on the valorisation of renewable carbon-based feedstocks that do not compete with food or soil resources, such as derivatives of waste lignocellulose. This valorisation is carried out through electro- and

photocatalytic reforming processes aimed at producing industrially important chemicals and fuels. The project addresses this research challenge by developing environmentally friendly, recyclable, economically accessible, and highly efficient cooperative or single-atom catalysts tailored to specific processes. A key aspect of the project is the intensive transfer of know-how between the research unit in the Czech Republic and leading partners within the consortium. MERGE is thus contributing to strengthening a culture of excellence in research, strategic planning, management, and technology transfer in developing countries. At the same time, the project helps to consolidate the role of the coordinating institution and the twinning partners as important players in European research on advanced and sustainable catalysis for environmentally and technologically critical chemical products. This is achieved through a deep structural alliance centred on scientific excellence at every stage of the project.

FOODCIRCUS

CIRCULAR SOLUTIONS
FOR KEEPING FOOD WASTE OUT
OF CENTRAL EUROPE'S SCHOOLS

Project No. CE0200718
Provider Ministry of Regional Development – Interreg Central Europe
Duration 2024-2026
Principal investigator Assoc. prof. Ing. Lucie Jezerská, Ph.D.

The project focuses on cooperation aimed at making Central Europe more environmentally friendly by strengthening the principles of the circular economy. The consortium, consisting of ten partners, will address the prevention of food waste in schools in the partner countries. Based on measurements of food waste levels in schools, tools will be developed to help prevent waste, together with thermal and biochemical technologies for processing the waste that is generated. The project activities are divided into three work packages: WP1 – Food Waste Prevention, including monitoring, prevention measures, redistribution and tool development; WP2 – Food Waste Processing, including the use of insects, biorefinery and biochemical processes, and torrefaction as a follow-up treatment; WP3 – Evaluation and Recommendations for Policy-Making.

ADVANCED TREATMENT OF CONDENSATE
FROM COMBUSTION OF GASEOUS FUELS
WITH INCREASED HYDROGEN CONTENT

Project No. TQ26000025
Provider Technology Agency of the Czech Republic, SIGMA DC4
Duration 2026-2028
Principal investigator Ing. Jiří Ryšavý, Ph.D.

The project proposal focuses on waste management through the energy use of waste. Its aim is to improve thermochemical processes and optimize operating conditions for the energy and material use of waste by means of an advanced AI-supported prediction model designed to increase process efficiency. The proposal will take into account the operation of facilities with different working principles, such as combustion, gasification and pyrolysis; different levels of technological readiness, from TRL 4 to TRL 8; different scales, from 6 kW to 6 MW; and different monitored outputs, including heat, flue gas purity, syngas quality, solid residue, pyrolysis oil and others. The main goal of the project is to develop controllable and transferable software carrying an interconnected neural network capable of predicting the outputs of thermochemical processes and optimizing their operation.

TRANS-HYLAB

INNOVATIVE TRANSFER OF KNOWLEDGE
ON HYDRIDE MIXTURES FROM THE
LABORATORY TO INDUSTRY

Project No. TQ26000122
Provider Technology Agency of the Czech Republic, SIGMA Programme – DC4
Duration 2026–2028
Principal investigator Ing. Jiří Ryšavý, Ph.D.

The main goal of the project is to create a systematic framework for assessing the safety and classifying the hazards of metal hydrides intended for hydrogen storage. Due to their pyrophoric properties and the growing risk of explosion caused by repeated hydrogenation and dehydrogenation cycles, it is necessary to develop reliable methods for assessing their safety. At present, these requirements cannot be fully met in Korea because of regulatory limitations and the lack of equipment for high-pressure explosion testing. The Czech team, on the other hand, has the necessary infrastructure, but does not have access to sample production. The project, therefore connects Korean partners, Wonil T&I and KIST, who will provide material synthesis and characterization, with Czech partners, VSB-TUO and IHAS, who specialize in flammability and explosiveness testing. This synergy will lead to the creation of the first comprehensive dataset on the risk levels of different metal hydride compositions. This will

make it possible to design safer materials adapted to specific operating conditions and support their commercial use in sectors such as energy, defence and construction machinery.

POLYENVI 21

NATIONAL CENTRE OF COMPETENCE –
POLYMER MATERIALS AND TECHNOLOGIES
FOR THE 21ST CENTURY

Project No. TN02000051
Provider Technology Agency of the Czech Republic
Duration 2023–2028
Principal investigator Assoc. prof. Ing. Pavel Leštinský, Ph.D., Assoc. prof. Ing. Karla Čech Barabaszová, Ph.D.

The National Centre of Competence for Polymer Materials and Technologies for the 21st Century, the PolyEnvi21 Competence Centre, focuses on the development of new polymer systems that take into account sustainable development goals, practical use and economic competitiveness. The main competence of PolyEnvi21 is in the field of mechanical, chemical and biological recycling of polymer materials, including related follow-up processes. Significant attention is given to a comprehensive approach to the developed solutions in order to support the principles of the circular economy.

MEET

ADVANCED MATERIALS FOR ENERGY AND
ENVIRONMENTAL TECHNOLOGIES

Project No. CZ.02.01.01/00/23_021/0008592
Provider Ministry of Education, Youth and Sports of the Czech Republic
Duration 2024–2028
Principal investigator prof. Ing. Gražyna Simha Martynková, Ph.D.

The project carries out targeted and industrial research focused on advanced materials, nanomaterials and nanocomposites intended for applications in energy and related environmental technologies. This technically oriented research is complemented by social science research, which focuses on developing a conceptual framework for understanding the spread and adoption of new technologies based on modern materials in public administration and the business sector in old industrial regions. The project identifies the main barriers to the spread of new technologies and to the transformation of traditional industrial activities in these regions. At the same time, it formulates recommendations and examples of good practice for important stakeholders.

INOVO!!!

INNOVATIVE TECHNOLOGIES FOR A
CLEANER OSTRAVA REGION!!!

Project No. CZ.02.01.01/00/23_021/0008588
Provider Ministry of Education, Youth and Sports of the Czech Republic
Duration 2025–2028
Principal investigator prof. Ing. Lucie Obalová, Ph.D.

The project aims to continue and deepen long-term cooperation between research organizations, namely VSB – Technical University of Ostrava and the University of Ostrava, and seven partners from the application sector

DEKONTA, a.s.; Nano4people, s.r.o.; RANIDO, s.r.o.; BENEKOVterm, s.r.o.; Veolia Energie ČR, a.s.; RPG Recycling, s.r.o.; and the Moravian-Silesian Innovation Centre, a.s. The cooperation will focus on the mutual transfer of information, knowledge and know-how within joint research addressing current environmental topics initiated by the industrial partners. An integral part of the research will also be the study of socioeconomic and geographical aspects related to the implementation of the achieved results and innovations in the context of a sustainable transition. The Moravian-Silesian Innovation Centre Ostrava, a.s. (MSIC) is also involved in the project as an organization responsible for coordinating the development of the dynamic innovation ecosystem in the Mora-

vian-Silesian Region and for implementing the RIS3 strategy of the region. The joint research will be carried out in two research areas. The first focuses on technologies for reducing air pollution caused by solid and gaseous pollutants, including particulate matter, heavy metals, volatile organic compounds, carbon dioxide, ammonia and nitrogen oxides, generated in energy production and other industrial processes. The second focuses on technologies for the treatment and purification of wastewater from the energy sector, including the reduction of emerging pollutants such as microplastics, pharmaceuticals, pesticides, perfluorinated and polyfluorinated substances, and other contaminants in water.

WASTE AS AN ALTERNATIVE ENERGY SOURCE

Project No. EH23_021/0008590
Provider Ministry of Education, Youth and Sports of the Czech Republic
Duration 2025–2028
Principal investigator prof. Ing. Helena Raclavská, CSc.

The objectives of the project Waste as an Alternative Energy Source are: To establish and develop cooperation between research organizations and the application sector. The project will involve a research partner, the University of Ostrava,

partners from the application sector, international universities, as well as partners active in business development, innovation support and public administration. During the project, cooperation with industry will be expanded to include further organizations from both the research and application sectors. To implement the planned research areas in cooperation with partners from the application sector. Five research areas will be carried out, focusing on energy security related to the availability of suitable fuels, the optimization of operating conditions in energy facilities, and the best possible use of energy by-products, while taking into account environmental and socioeconomic aspects: Optimization of the composition of solid alternative fuels; Stabilization of changes in the mechanical and physical

properties of bulk materials during alternative fuel production processes; Plasma gasification of waste for the production of synthesis gas; Capture, separation and catalytic transformation of CO₂ for the production of hydrogen and other chemicals; Social acceptance and human capital as factors influencing the energy transition. The project outputs will include joint publications, patent applications and other non-publication results. To prepare and submit jointly developed project proposals with partners from the application sector. National and international project proposals will be prepared together with project partners from the application sector and research organizations. To acquire the instrument and infrastructure equipment necessary for the implementation of the research areas.



STRATEGIC OBJECTIVE 4

TO BE AN INCUBATOR FOR PROMISING EMPLOYEES

TARGETED CHANGE

To increase the effectiveness of research activities carried out by young staff members of the centre and to expand their knowledge and skills in the required areas of R&D.
To adopt and use the HR process for recruiting and onboarding new employees.

SUCCESS INDICATORS

In 2025, organize lectures for CEET staff and other interested university members given by leading experts and inspiring figures from R&D or practice in the main research areas of CEET: (a) materials for energy and environmental technologies, (b) use of secondary raw materials and alternative energy sources, (c) energy storage, transformation and management, and (d) environmental aspects and technologies.

- ✓ Support for the careers of students, doctoral students and early-career researchers is provided through targeted courses and training, both at the university and in external institutions. CEET is aware of the demands of succeeding in a competitive scientific environment and therefore seeks to create conditions that support the professional growth of young researchers. This support includes the development of expert skills, strengthening scientific knowledge and practical help with publication activities, including the payment of publication fees in prestigious Q1 journals indexed in WoS.
- ✓ In 2025, CEET organized a number of expert lectures, seminars, workshops and training events for the centre's staff and other interested university members. These activities covered all main CEET research areas, including materials for energy and environmental technologies, the use of secondary raw materials and alternative energy sources, energy storage, transformation and management, and environmental aspects and technologies.

SUPPORT FOR THE DEVELOPMENT OF THE R&D POTENTIAL OF CEET EMPLOYEES

CEET brings together a balanced team of young researchers and doctoral students, as well as experienced Czech and international scientists who share their expert knowledge and professional experience. This environment creates conditions for student development at a high professional level and contributes to above-standard study and research results. In addition to modern infrastructure and advanced technical facilities, CEET also places emphasis on supporting the professional growth and further education of young talents. This is reflected, among other things, in the many awards and professional recognitions that students receive for their final theses. Thanks to cooperation with renowned international experts, they also build international contacts and expand their professional and practical competencies.

We support their professional growth through various courses and training activities, organized both at the university and externally. We are aware that succeeding in the scientific environment is demanding, and therefore, we strive to create the best possible conditions for the further development of young researchers and doctoral students.

We help them deepen their professional competencies and scientific knowledge so that they are well prepared to succeed in a highly competitive environment. This support also includes, among other things, covering publication fees for articles published in prestigious journals ranked in Q1 according to WoS.

“Supporting young researchers is one of CEET’s main priorities.”

prof. Ing. Lucie Obalová, Ph.D.
Director of IET and Director
for Science and Research



INSPIRATIONAL LECTURES AND EDUCATIONAL EVENTS

CEET staff are also strongly involved in educational activities that go beyond standard teaching. They take part in the preparation and delivery of expert courses, seminars and lectures aimed at the wider public. Over the past year, several inspiring meetings were organized with renowned experts and figures from various professional fields. These events helped popularize scientific topics and also supported the development of expert discussion.

SELECTED LECTURES BY INTERNATIONAL SCIENTISTS AND OTHER GUESTS RELEVANT TO R&D&I

Defect Engineering of 2D Materials – Advances in Hybrid Porous Materials and Defect Engineering

14th January 2025

Yayaramulu Kolleboyina

Defect Engineering in Hybrid Porous Materials
for Enhanced Energy Technologies.

CEET, Nanotechnology Centre

Science Meetup MATUR 2025

27th–28th January 2025

prof. Marcin Basiaga

Modification and processing technology
of polymer nanocomposite materials for
biomedical applications.

CEET, Nanotechnology Centre

13th Czech–Polish Catalysis Seminar CzePoCat

7th February 2025

Ondřej Drábek

Aluminum great material for catalysis
– dark side of the story.

Jiří Dědeček

Green Deal as an Energy Frame of the Future of
the Czech Chemical Industry.

CEET, Institute of Environmental Technology

International Delegation: Cooperation on the ExPEDite Project

4th March 2025

Emilia Risu

ExPEDite Project Cooperation: Connecting
International Research Communities.

CEET, ENET Centre

CirkArena Project

25th and 26th March 2025

Ing. Jakub Švrček, Ph.D.

CirkArena – A Unique Centre for the Development of the Circular Economy. in the Moravian-Silesian Region.

CEET, Nanotechnology Centre

The 2nd Czech-German Business Meeting

11th April 2025

Ing. Tomáš Kubina

Challenges in Battery Recycling and Second-Life Applications.

CEET, Nanotechnology Centre

NanoOstrava 2025

19th–22nd May 2025

Martin Foldyna

Silicon nanowires devices and optical methods to characterize them.

Hatem Akbulut

Effect of Laser Power on Friction and Wear Performance of 316L Stainless Steel-Based Composite Coating Manufactured by Laser Cladding on Brake Disc.

Robert Kosydar

Pd nanoparticles supported on cellulose as catalyst.

CEET, Nanotechnology Centre

Training in Electromobility for the Czech Representative Office of Peugeot

23rd May 2025

Viktor Němec

Electromobility: Technological Trends and Service Readiness.

CEET, ENET Centre

EU-ASIA Workshop on Sustainable Technologies

8th–12th September 2025

Rauf Razzaq

Green Methanol and Hydrogen Economy.

Akimitsu Narita

Synthesis and Unique Photophysical Properties of Functionalized Nanographene Molecules.

CEET, Nanotechnology Centre

Energy and Environment Conference 2025

8th–10th September 2025

Prof. Luca Fiori

Biowaste and the circular economy: some significant examples based on hydrothermal, biochemical and extraction processes.

Prof. Tomasz Wejrzanowski

Advanced Materials for Chemical and Electrochemical Energy Conversion and Storage.

Prof. Jenn-Kun Kuo

Performance analysis of mixed fuels in low and medium-temperature SOFC.

CEET, Energy Research Centre

THE MOST IMPORTANT INVITED LECTURES DELIVERED BY THE ACADEMIC STAFF AT DOMESTIC AND FOREIGN INSTITUTIONS

International conference on Transcending Frontiers in Chemical and Material Science. NMKRV College

23rd–24th January 2025

Prof. Jagadeesh Rajenahally

Catalysis for sustainable and circular chemistry.

CEET, Nanotechnology Centre

ACS Spring 2025 - Organic Synthesis in the Era of Sustainability

26th March 2025

Indrajid Ghosh

General cross-coupling reactions with adaptive dynamic homogeneous catalysis (AD-HoC).

CEET, Nanotechnology Centre

NanoOstrava 2025

19th–22nd May 2025

Indrajid Ghosh

Photoredox catalysis with one or two photons & an electron transfer.

CEET, Nanotechnology Centre

The 51st Conference of the Slovak Society of Chemical Engineering

27th–30th May 2025

prof. Ing. Lucie Obalová, Ph.D.

Replacement of trichloroethylene in the extraction of crude caprolactam.

CEET, Institute of Environmental Technology

International Hydrogen Technologies Congress

25th–28th May 2025

Ing. Ján Vereš, Ph.D.

Innovations on Hydrogen-based Processes & Technologies.

CEET, Energy Research Centre

DLS 2025 23-27 JUNE 2025

23rd–27th June 2025

prof. Ing. Gražyna Simha Martynková, Ph.D.

Evaluation of Battery Separators Using Microscopy and Diffraction Methods.

dr hab. inż. Alicja Bachmatiuk

Exploring Bottom-Up Synthesis and Characterization of 2d Transition Metal Carbides

CEET, Nanotechnology Centre

12th International Conference on Sustainable Solid Waste Management

25th–28th June 2025

Ing. Jiří Ryšavý, Ph.D.

3D Printed Neutralization Modules for Gas Boiler Condensate: A Scalable Approach to pH Control.

CEET, Energy Research Centre

11th International Conference on Antennas and Electromagnetic Systems (AES 2025)

1st–4th July 2025

doc. Ing. Štěpán Kment, Ph.D.

Plasmonic Titanium Nitride Nanomaterials for Solar-Thermal Conversion.

CEET, Nanotechnology Centre

FisMat2025

7th–11th July 2025

Yazhou Zhou

Single-Atom Catalysts for Suitability.

CEET, Nanotechnology Centre

NANOSMAT 2025 — International Conference on Surfaces, Coatings and Nanostructured Materials

6th–10th July 2025

Ing. Ján Vereš, Ph.D.

Separation of Hydrogen from Biomass-Derived Syngas Using Polymer Membranes.

CEET, Energy Research Centre

16th Biennial CzWA Conference

19th September 2025

Ing. Kateřina Smutná, Ph.D.

Mgr. Anna Gavlová

Methodology for Determining Microplastic Contamination in Ice from an Ice Hockey Stadium.

CEET, Institute of Environmental Technology

NanoBalkan International Conference,

26th–30th October 2025

Mgr. Aristeidis Bakandritsos, Ph.D.

Low-Dimensional Functional Materials for Catalysis and Energy Storage.

CEET, Nanotechnology Centre

International Conference on Carbon Science and Technology

10th–12th November 2025

Ing. Lenka Matějová, Ph.D.

Utilization of theoretical approach in carbon engineering.

CEET, Institute of Environmental Technology

International Conference on Multifunctional Framework Materials

15th–16th November 2025

Yazhou Zhou

MOF-Derived Single-Atom Catalyst.

CEET, Nanotechnology Centre

COOPERATION WITH FACULTIES

In the CEET CENET laboratories, students from study programmes accredited at the Faculty of Mechanical Engineering worked on 7 doctoral theses and 5 master's theses. In addition, students from study programmes accredited at the Faculty of Electrical Engineering and Computer Science of VSB-TUO worked on 3 doctoral theses and 2 master's theses.

Involvement of CEET CENET in teaching: Helena Raclavská, FMG; Marek Kucbel, FMG; Stanislav Mišák, FEECS; Lukáš Prokop, FEECS; Jan Fulneček, FEECS; Zdeněk Slanina, FEECS; David Seidl, FEECS; Ondřej Kabot, FEECS; René Záruba, FEECS; Ondřej Podivínský, FEECS; Lucie Jezerská, FCE; Martin Žídek, FCE; Veronika Sýkorová, FCE; Stanislav Honus, FCE.

In the CEET CNT laboratories, students from study programmes accredited at the Faculty of Materials Science and Technology of VSB-TUO worked on 16 doctoral theses, 3 master's theses and 3 bachelor's theses in 2025.

Involvement of CEET CNT in teaching: Gražyna Simha Martynková, FMST; Karla Čech Barabasová, FMST; Marianna Hundáková, FMST; Gabriela Kratošová, FMST; Ladislav Svoboda, FMST; Zuzana Vilamová, FMST; Kateřina Mamulová Kutláková,

FMST; Miroslav Vaculík, FMST; Pavlína Peikertová, FMST; Michal Lesňák, FMST; Lukáš Halagačka, FMST; Robin Silber, FMST; Tibor Fördös, FMST; Kamil Postava, FMST; Tomáš Kohut, FMST; Štěpán Kment, FMST; Tomáš Malina, FMST; Zdeněk Baďura, FMST; Lukáš Zdražil, FMST.

In the CEET ERC laboratories, students from study programmes accredited at the Faculty of Mechanical Engineering and the Faculty of Safety Engineering of VSB-TUO worked on 4 doctoral theses, 3 master's theses and 3 bachelor's theses.

Involvement of CEET ERC in teaching: Jiří Ryšavý, FCE; Jakub Čespiva, FCE; David Kupka, FCE; Tadeáš Ochodek, FCE; Jan Skřínský, FSE.

In the CEET IET laboratories, students from study programmes accredited at the Faculty of Mechanical Engineering and the Faculty of Safety Engineering of VSB-TUO worked on 15 doctoral theses, 13 master's theses and 12 bachelor's theses.

Involvement of CEET IET in teaching: Lenka Matějová, FMST; Pavel Leštinský, FMST; Lucie Obalová, FMST; Michal Vaštyl, FMG.

The Number of CEET Employees Involved in Teaching and Supervising Students' Theses

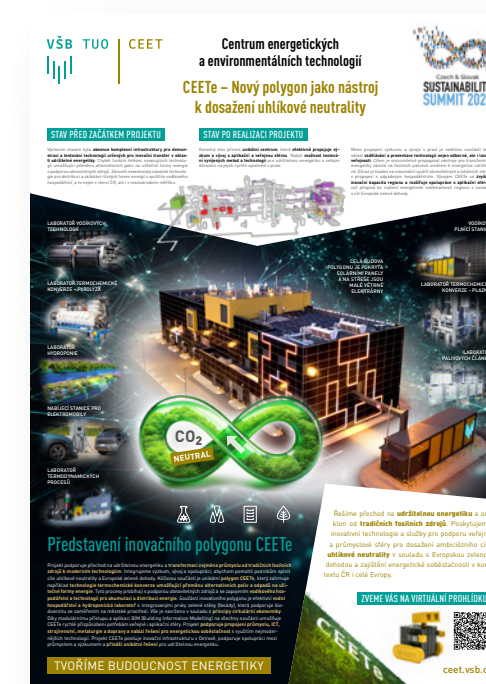
Faculties of VSB-TUO	CEET Employees Involved in Teaching	CEET Employees Supervising Final Theses
FEECS	9	5
FMST	21	16
FCE	10	9
FMG	3	2
FSE	1	1
Total	44	33

Overview of the Total Number of Students Working at CEET in 2023

CEET research centre / Faculty	FEECS	FMST	FCE	FMG	Total
CENET	7	0	12	0	19
CNT	0	22	0	0	22
IET	0	33	1	2	36
ERC	0	0	10	0	10
Total	7	55	23	2	87

AWARDS

In 2025, significant achievements were made in research activities, reflected in a number of prestigious national and international awards. These results demonstrate the high professional quality of the research carried out, the innovation potential of the developed technologies, and the ability to communicate results effectively to both expert audiences and the wider public. The awards also confirm the growing international visibility and quality of research teams across different fields, especially in the context of sustainable energy and applied research.



**BEST POSTER AT SUSTAINABILITY
SUMMIT 2025**

The award for the best poster at Sustainability Summit 2025 confirms the high professional quality of the presented research and its relevance in the field of sustainability. This success also reflects the ability to communicate complex topics clearly and present them effectively to the international expert community.

INTERNATIONAL EXHIBITION
INTARG® 2025

At the international innovation exhibition IN-TARG® 2025, results of applied research focused on energy and environmental technologies were awarded, confirming both their innovation potential and practical use.

The platinum award was given to the patent Pulse Jet Engine and Unit for the Energy Use of Biogas by Ferdinand Madry, David Riemel, Tomáš Výtisk and Jiří Rusín. The award reflects the technological level of the solution, which focuses on the efficient conversion of the energy potential of biogas, with an emphasis on innovative design principles and possible practical use in decentralized energy systems.

The silver medal was awarded for the prototype Combined Micro-Particle Impactor (PM10, PM2.5 and PM1) by Libor Obal and Jakub Korpas. This is an advanced device for monitoring air quality. The solution enables more accurate separation and analysis of particle fractions, which is very important for assessing environmental impacts and protecting public health.

The awards confirm the high level of research and development activities in applied technologies and their ability to succeed in international competition.

UNIVERSITY PHOTO OF THE YEAR – CZECH INDUSTRY CHALLENGE

The University Photo of the Year award in the CZECH INDUSTRY CHALLENGE for Vojtěch Blažek is in recognition of the high-quality visual presentation of a research topic and its contribution to connecting the academic environment. The photo was taken during Researchers' Night at the Institute of Environmental Technology.

SUCCESS IN THE RESEARCH.COM RANKING

Radek Zbořil, Aristeidis Bakandritsos, Giorgio Zoppelaro and Manoj Gawande were included in the prestigious international **Research.com ranking**, which evaluates scientists based on bibliometric indicators, especially citation response and the field-specific H-index. This ranking reflects long-term scientific contribution and the international visibility of research work, and is based on large databases of publications and citations. Being included among the best-rated scientists in their field confirms the importance of their research in the international context and its impact on the development of the relevant scientific discipline.

PRESTIGIOUS SUSTAINABILITY AWARD IN THE CZECH INDUSTRY CHALLENGE

Stanislav Mišák received an award in the national **Czech Industry Challenge** competition, which supports modern industry, innovation and a responsible approach to business. The sustainability award reflects systematic efforts to reduce environmental impacts, use resources efficiently and integrate the principles of sustainable development into research and applied activities. The award confirms the importance of the activities carried out in the field of sustainability and their relevance to current industrial and social challenges.

SUCCESS IN THE NATIONAL FINAL OF FALLING WALLS LAB

Tomáš Malina succeeded in the national final of the international **Falling Walls Lab** competition, which focuses on presenting innovative scientific ideas with the potential to help address current global challenges. His success in the national round confirms the high quality of the presented research and its innovation potential, as well as the ability to communicate science effectively in an international context. Falling Walls Lab is also an important platform for the development of young scientists and their involvement in the international scientific community.

BEST PUBLISHING YOUNG FEMALE SCIENTIST AND YOUNG MALE SCIENTIST

Zuzana Vilamová and Vojtěch Blažek were awarded as **the best publishing young female scientist and young male scientist**. This is recognition of their above-standard publication activity and citation response within the expert community. The award reflects the quality of their scientific work, especially in relation to publications in international peer-reviewed journals and their impact measured by bibliometric indicators, such as the number of citations and field-relevant indices. The award confirms the high professional level of both recipients and their growing importance within the scientific community. At the

same time, it highlights their potential for further research development and for strengthening the international visibility of the workplace.

PRESTIGIOUS GREEN PHOENIX AWARD FOR CONTRIBUTION TO LOW-CARBON ENERGY

Stanislav Mišák received **the Green Phoenix Award** for his contribution to low-carbon energy. The award recognizes his long-term activities focused on the development of sustainable energy solutions and the reduction of the emission intensity of energy systems. It confirms the importance of the activities carried out in low-carbon energy and their relevance to current challenges related to the transformation of the energy sector.



STRATEGIC OBJECTIVE 8

INTERNATIONALIZATION

TARGETED CHANGE

To increase scientific performance and the citation impact of publications presenting achieved results, to cooperate on international projects, to strengthen the existing network of contacts with partners and institutions abroad, and especially to build new contacts in the fields of our research activity.

SUCCESS INDICATORS

- ✓ In 2025, CEET clearly strengthened its scientific performance and the citation impact of its publications. It was actively involved in international projects and further developed its network of international partnerships through Horizon Europe, RFCS, INTERREG, CETP and other international schemes, including mobility activities, internships and expert presentations by centre staff abroad.

INTERNATIONALIZATION PROGRAMME

The international dimension of research activities is supported mainly through the development of human capital, with a focus on young researchers and doctoral students. The centre actively creates conditions for their participation in educational and research activities at an international level, including programmes funded by the European Union. This helps expand cooperation with international institutions and strengthen the centre's professional position.

In 2025, we supported five students in taking part in international stays. At the same time, we welcomed four students from partner institutions to our workplaces, where they actively joined common research activities. A total of 103 CEET researchers took part in expert internships, research stays and business trips during the year. These mobility activities contributed both to the development of their professional competences and to the strengthening of institutional links within international research structures. In parallel, we hosted 23 international experts, whose involvement in research supported knowledge exchange and the development of long-term international cooperation.

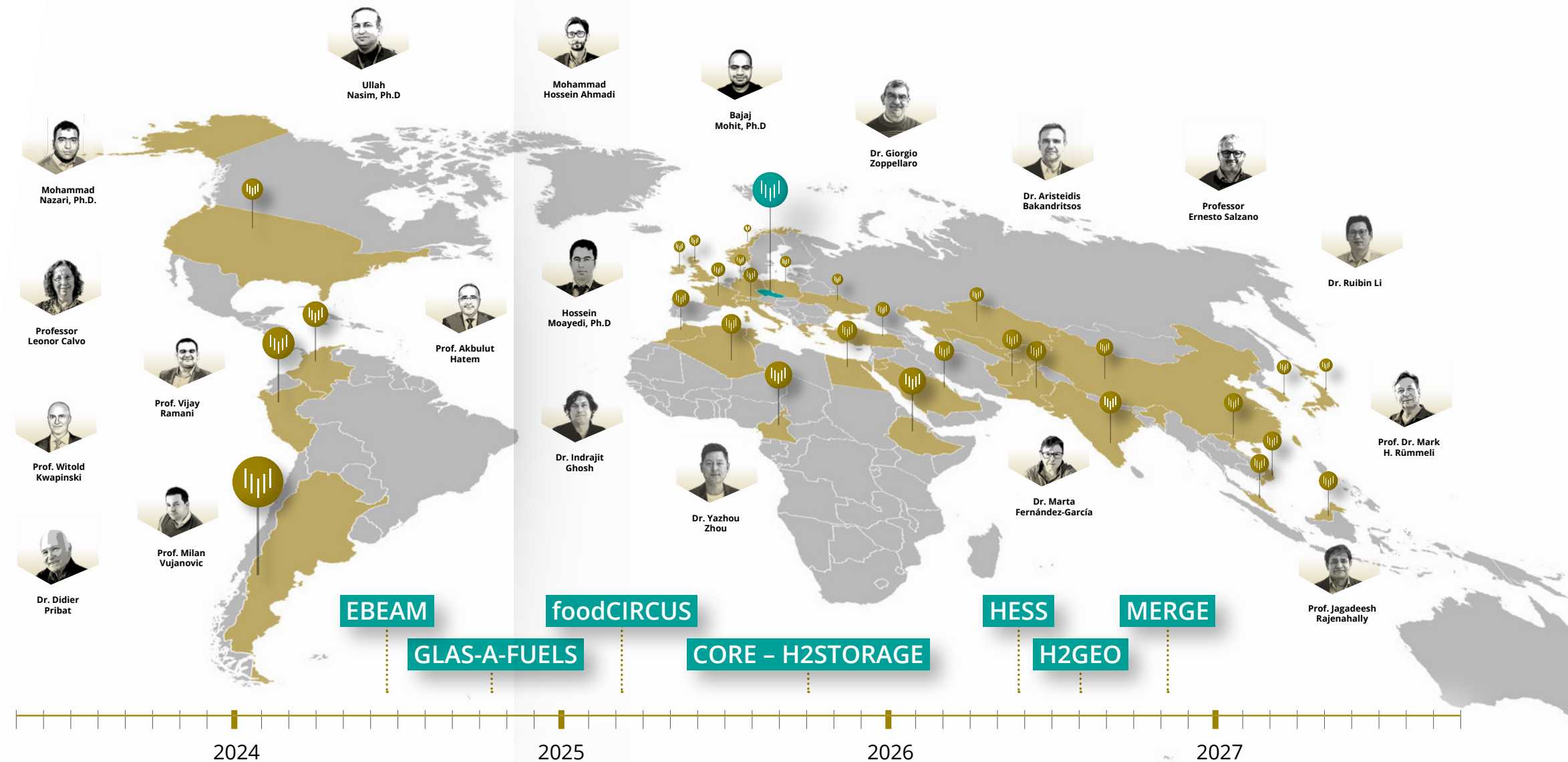
In 2025, we also systematically supported the development of language skills among employees. Foreign language courses were used by staff across the centre. At the Energy Research Centre (VEC), two language courses were held. At the Institute of Environmental Technology (IET), employees received a financial contribution for individual English lessons, enabling targeted improvement of language skills according to the specific needs of individual researchers and their involvement in international activities.

Internships and mobility

Number of researchers and other staff sent abroad	103
Number of students sent abroad	5
Number of students hosted	4

Countries and partner universities

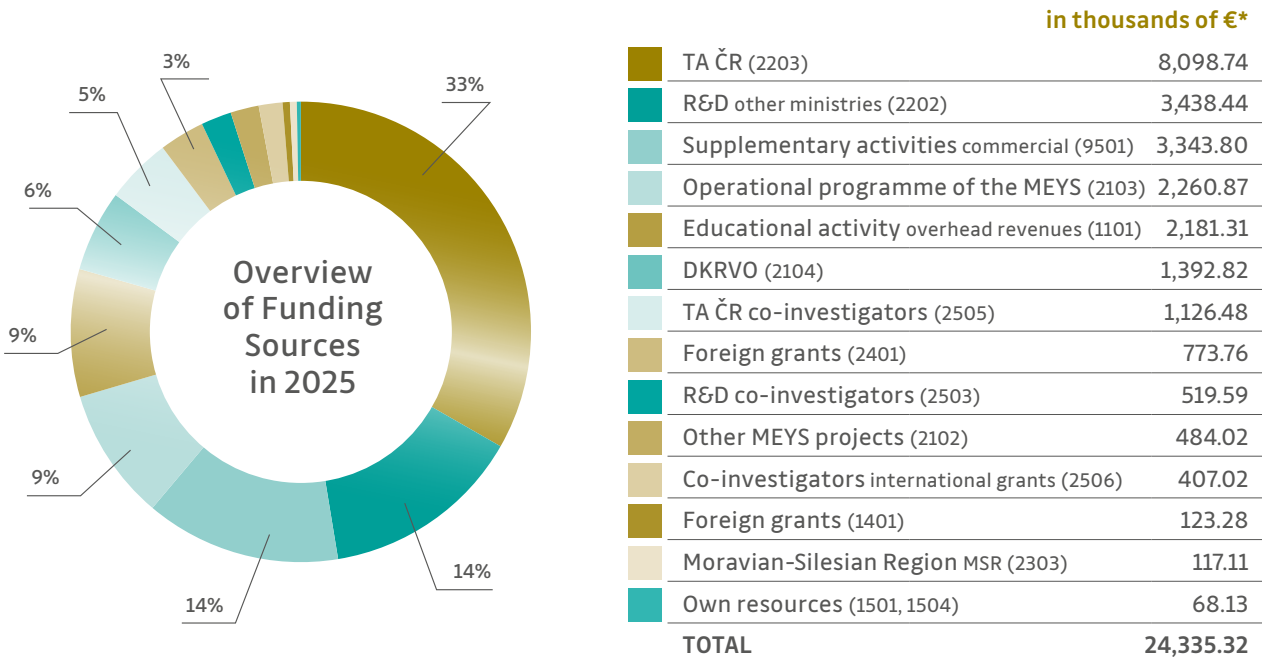
Afghanistan, Algeria, Argentina, China, Egypt, Ethiopia, France, Ireland, India, Iran, Italy, Japan, South Korea, Jordan, Cameroon, Kazakhstan, Colombia, Malaysia, Morocco, Germany, Norway, Pakistan, Peru, Poland, Greece, Saudi Arabia, Singapore, Slovenia, United Kingdom, United States of America, Switzerland, Tunisia, Turkey, Ukraine, Uzbekistan, Vietnam.



FINANCIAL OVERVIEW

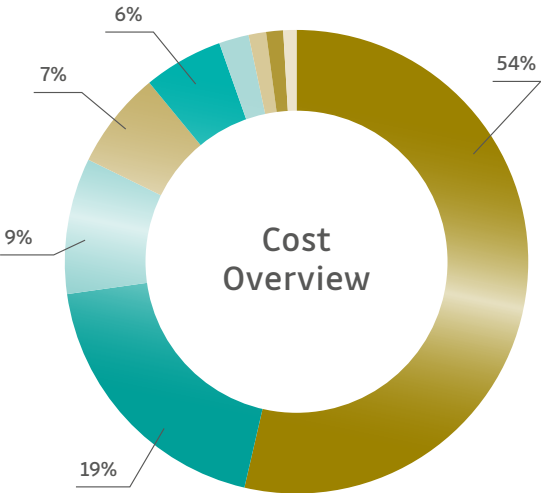
The Centre for Energy and Environmental Technologies of VSB-TUO managed financial resources totalling approximately 24.33 million EUR in 2025 and closed the year with a positive financial result of approximately 0.58 million EUR. Profit after tax amounted to approximately 0.50 million EUR. The main sources of funding included income from national and international research projects and grants, funds for the long-term conceptual development of the research organization DKRVO (reduced by the university’s mandatory expenses), income from contract research and supplementary activities, and own revenues.

CEET’s Revenues in 2025



CEET’s Costs in 2025

	in thousands of €*
Personnel costs and scholarships	12,906.76
Transfers of subsidies to co-investigators	4,611.58
Transfers to FÚUP and FPP	2,282.37
Other services and unfinished production	1,636.36
Consumption of materials and energy	1,335.79
Other costs	501.79
Travel expenses	294.23
Overhead costs	284.33
Repairs and maintenance	221.16
Total	24,074.37



* A single exchange rate in partial years was used for the calculation.

Total costs in 2025 amounted to EUR 23.76 million. The largest item was personnel costs and scholarships paid, which accounted for 54% of total expenditure. This was followed by transfers of subsidies to co-investigators, with a share of 19%. Other major cost items included other services, accounting for 7%, and consumption of materials and energy, accounting for 6%.

STRATEGIC OBJECTIVE 7

SYSTEMATIC STRENGTHENING OF THE CEET BRAND

TARGETED CHANGE

Strengthening the visibility and perception of CEET as an important research and innovation partner;

More intensive and professionally prepared media presentation of CEET's activities and achievements;

Building the image of CEET, including its media image, as a partner of first choice in science, research and business-oriented cooperation;

Using communication across several platforms through traditional and digital media, scientific formats and popular science formats;

Presenting specific examples of successful cooperation with industry;

Strengthening our position as an important actor in research and innovation infrastructure at the national and European levels;

Increasing prestige, while also creating new projects, research and commercial opportunities.

SUCCESS INDICATORS

Number of published PR articles and media outputs:
annual increase of at least 15% compared with the previous year.
This includes online articles, social media, and television and radio appearances.

- ✓ In 2025, a total of 695 CEET media outputs were recorded, compared with 597 outputs in the previous year. This represents a year-on-year increase of 16.42%, exceeding the required threshold of at least 15%.požadované hranice alespoň 15%.

SYSTEMATIC STRENGTHENING OF THE CEET BRAND

In the area of strategic communication and presentation of research results, we have long aimed to systematically share scientific, research and applied outputs with both the expert community and the wider public. Communicating results with wider social relevance is a main part of building the CEET brand and strengthening the positive perception of our research institute. This approach also helps strengthen the centre's reputation at national and international level and supports the development of cooperation with research institutions, universities and industrial partners.

We carried out activities that helped achieve the defined targeted changes. CEET's visibility was clearly strengthened, and its position as an important research and innovation partner was further confirmed. The media presentation of the centre's activities was carried out systematically and at a professional level, with an emphasis on presenting specific research results and examples of successful cooperation with the application sector. Communication took place through several channels, including print and online media, social networks, television and radio appearances, and popular science formats, which made it possible to reach the target groups.

At the same time, we managed to strengthen the image of CEET as a partner of first choice in science, research and business-oriented cooperation. Intensive media activity helped strengthen the centre's position as an important actor in research and innovation infrastructure at national

and European level, and created conditions for gaining new project, research and commercial opportunities. In the past year, a total of 695 media outputs were recorded, compared with 597 in the previous year. This represents a year-on-year increase of 16.42%. The required annual growth of at least 15% was therefore not only achieved, but exceeded. This result confirms the effectiveness of the communication strategy and its direct impact on strengthening the visibility and reputation of the centre.

MEDIA OUTPUTS OF CEET IN 2025

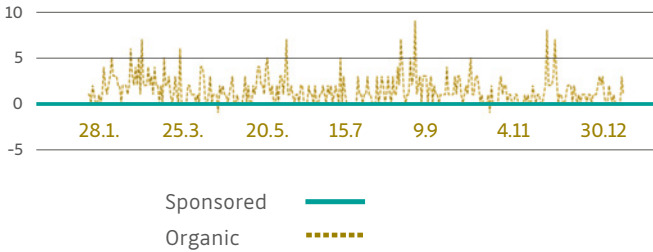
Online articles	421
Print media	156
TV	24
Social media	89
Radio	5
Total	695

ACTIVITY ON SOCIAL MEDIA

For online communication and the presentation of the centre's activities, the professional network LinkedIn was chosen as the main communication channel. This choice reflects the centre's focus on research, development and cooperation with partners from academia, industry and the public sector. The platform makes it possible to reach the expert community in a targeted way, systematically expand professional contacts and effectively share the results of research activities. Over the past year, the centre's online visibility increased significantly, with the number of followers exceeding 1,600, which shows growing interest in the topics presented.

Follower growth

Sponsored	0
Organic	1660



Professional Background of Followers

Field	Share
Research	33.4%
Business Development	14.3%
Education	11.5%
Information Technology	6.6%
Programme and Project Management	3.7%
Administration	3.6%
Marketing	3.2%
Operations	2.9%
Other	20.8%



POPULARISATION OF SCIENCE AND RESEARCH

MAIN ACTIVITIES IN THE POPULARIZATION OF RESEARCH, DEVELOPMENT AND INNOVATION AND COMMUNICATION WITH THE PUBLIC

In the past period, CEET staff took part in a number of conferences, workshops and other expert events, where they actively presented the centre and the results of their research. These events provided space not only for sharing expert knowledge and experience, but also for discussing current challenges in the field and building new professional contacts. Through these activities, CEET continues to increase its visibility and strengthen its position among both expert audiences and the wider public.



MAJOR EVENTS WITH CEET PARTICIPATION

SCIENCE OUTREACH EVENTS

Educational Roadshow “Smokeman Teaches” in Czech Cities

January–December 2025

The educational show aims to explain to the general public the principles of proper combustion in local heating systems and to offer practical advice on how to operate and maintain boilers, stoves and fireplaces effectively. Participants can learn about the basic types of combustion equipment, their characteristics, and can also try to estimate their operating efficiency themselves. The programme has a clear and interactive form, helping people better understand correct heating practices and increase heating efficiency.

International Trade Fair Infotherma 2025

20th–23rd January 2025

As in previous years, we also took part in the 30th edition of the international INFOTHERMA exhibition in 2025. The exhibition focused on current topics in construction and technical building systems, including current legislation, energy price developments, building energy performance requirements, inspections and replacement

of heat sources, and practical experience with subsidy programmes. The accompanying programme also included the traditional appearances of Jiří Horák, known as SMOKEMAN, who presented his popular educational show “SMOKEMAN’s Ten Rules for Proper Heating”.

Improve Your Technical Skills Day

24th April 2025

On this day, the doors of the VSB-TUO auditorium opened for the traditional annual event “Improve Your Technical Skills”. The event was attended by pupils and students from all years of primary and secondary schools, teachers and enthusiasts interested in technology and science. The aim of the event was to show young people that studying technical fields or working in technical professions can be exciting and fun.

Earth Day with VSB – Technical University of Ostrava

30th April 2025

The annual Earth Day event at Alšovo Square in Ostrava-Poruba once again attracted hundreds of children and adults. VSB – Technical University of Ostrava was again among the regular partici-

pants and prepared a varied programme full of interesting experiments and fun learning activities. Experiments with liquid nitrogen, prepared by the Institute of Environmental Technology of CEET VSB-TUO, were especially popular. Another part of the programme focused on playful chromatography teaching, and there was also an educational game on proper waste sorting. The event was a success. Science entertained both children and adults and showed that chemistry, astronomy and recycling can be playful, practical and, above all, fun.

Colours of Ostrava – Meltingpot

16th July 2025

Visitors to the multi-genre Colours of Ostrava festival could again visit the UniverCity Stage Ostrava last year. A varied and expert programme was prepared for them in cooperation with the University of Ostrava and the City of Ostrava. The stage provided space for meetings between academia and the public and presented current topics from research, development and social challenges in an accessible way. The programme also included a discussion entitled “Cool at Home, Hot on the Bills”, which focused on energy, housing costs and ways to optimize them in the current situation. The discussion featured Jan Klusáček and Stanislav Mišák and was moderated by Ondřej Slach. The audience had the opportunity to take part in the debate and gain a deeper insight into current challenges and possible solutions in energy management.

Art & Science 2025

4th September 2025

In the past year, CEET also took part in the Art & Science festival. Through this event, the university presents itself to the public every year from an unusual perspective — not only as an institution focused on education, science and research, but also as a place of creative thinking with links to art and creativity. The festival programme has long combined expert and artistic elements, which naturally overlap and complement each other.

Czech European Researchers' Night

26th September 2025

As part of the annual Researchers' Night event, visitors had the opportunity to come to our centre on the VSB-TUO campus. The prepared programme offered a unique insight into the world of modern science and technology, with a focus on sustainability and innovation in energy and environmental protection. Last year's edition, held under the theme “Wealth”, opened hundreds of research workplaces that are normally closed to the public for one evening, giving visitors direct contact with current research.



MAJOR EVENTS ORGANIZED BY CEET

OUTREACH EVENTS

CLIENTS OF ČTYŘLÍSTEK OSTRAVA VISITED THE IET LABORATORIES

11th March 2025

The clients were welcomed by the Director of the Institute, Lucie Obalová, and by Kamila Kočí, who organizes a Christmas auction every year in support of Čtyřlístek. The event was held as part of citizen science activities. The meeting was not only inspiring, but also full of joy and enthusiasm. We are pleased that we could offer the clients of Čtyřlístek an experience that brought them enjoyment and new knowledge.

VISIT OF BULHARSKÁ PRIMARY SCHOOL AS PART OF THE FOODCIRCUS PROJECT

20th May 2025

At the Institute of Environmental Technology, we welcomed pupils and teachers from Bulharská Primary School. They visited us as part of citizen science activities within the foodCIRCUS project and the project Innovative Technologies for a Cleaner Ostrava!!!, which focuses on raising awareness of food waste, waste management and a sustainable approach to the environment.

During the interactive excursion, the pupils had the opportunity to look behind the scenes of research work that is usually not open to the public. In the laboratories, we introduced them to modern methods of electron microscopy, which allow us to observe the structure of materials at the micro- to nanometre scale. These methods make it possible to study the fine structure of surfaces, particle morphology in water pollution, and the arrangement of individual layers with very high precision.

SCIENTIFIC EVENTS

CZEPOCAT 2025 – 13TH CZECH-POLISH CATALY- SIS SEMINAR

7th February 2025

The 13th edition of the traditional Czech-Polish Catalysis Seminar CzePoCat took place on this day, with more than 60 Czech and international scientists in attendance. The seminar has long served as a platform for meetings between young researchers and experienced experts in catalysis, as well as for sharing the latest scientific knowledge. The programme consisted mainly of student presentations, in which doctoral stu-

dents and young scientists presented their results and current trends in catalysis. Participants came from Jagiellonian University in Kraków, Comenius University in Bratislava, Poznań University of Technology, AGH University of Kraków, the J. Heyrovský Institute of Physical Chemistry of the Czech Academy of Sciences, and VSB – Technical University of Ostrava. The main topics included new catalytic materials, their characterization and their application in various chemical processes. Lively discussion and exchange of experience among participants were also an important part of the programme. The seminar was held as part of the INOVO!!! project and the ENREGAT large research infrastructure. The event partners were SIAD S.p.A. and Ostravar.

KICK-OFF MEETING OF THE INOVO PROJECT

18th March 2025

In March, the official launch of the new research project Innovative Technologies for a Cleaner Ostrava!!! (INOVO) took place in the VSB-TUO auditorium. The project connects academia with industry and aims to find innovative technological solutions for improving the environment in the Ostrava region. The meeting was attended by important guests from both academia and industry. An important element of the project is its strong connection with industrial partners. The companies involved include Dekonta, a.s., Nano4people s.r.o., BENEKOVterm, RPGrecycling, Ranido, Veolia and the Moravian-Silesian Innova-

tion Centre (MSIC). The academic base consists of the Institute of Environmental Technology, CEET, VSB-TUO; the Energy Research Centre, CEET, VSB-TUO; and the University of Ostrava.

NanoOstrava 2025

19th–22nd May 2025

In May 2025, the ninth edition of the international conference NanoOstrava 2025: From Nanoparticles to the Energies of Tomorrow was held in the VSB-TUO auditorium. The event was organized by the CEET Nanotechnology Centre in cooperation with the Institute of Geonics of the Czech Academy of Sciences. The conference welcomed leading international experts and offered a rich programme of lectures, workshops and presentations focused on current knowledge in nanotechnology, materials for sustainable energy and environmental technologies. It served as a platform for sharing experiences, discussing challenges in the field and building interdisciplinary and international contacts.

ENERGY AND ENVIRONMENT CONFERENCE 2025

8th–10th September 2025

Energy and Environment 2025 was an international expert conference organized in cooperation between the Department of Energy Engineering of the Faculty of Mechanical Engineering, VSB-TUO, and the Energy Research Centre. The conference has a long tradition, with approximately

28 editions held so far, and serves as a platform for meetings between experts from research, industry, academia and public administration. The programme focuses on current topics in energy and environmental technologies, such as new energy technologies and trends, the environmental impacts of energy production, innovation in industrial energy, presentation of research and development results, and discussion between industry and academia. Last year's edition was attended by more than 120 participants. A new feature of this year's programme was its division into two sections, scientific and industrial, in order to better present both research results and practical solutions from the energy sector. The scientific section was attended by 30 academics, including 20 promising PhD students, who presented results from ongoing or completed research projects and cooperation with practice.

MONITORING AND REMOVAL OF MICROPOLLUTANTS FROM THE ENVIRONMENT

4th-5th November 2025

In November, the Institute of Environmental Technology hosted the expert workshop Monitoring and Removal of Micropollutants from the Environment. The workshop was organized as part of the project Innovative Technologies for a Cleaner Ostrava!!! (CZ.02.01.01/00/23_021/000 8588), funded by the Ministry of Education, Youth and Sports and co-financed by the European Union. The workshop welcomed almost 30 partici-

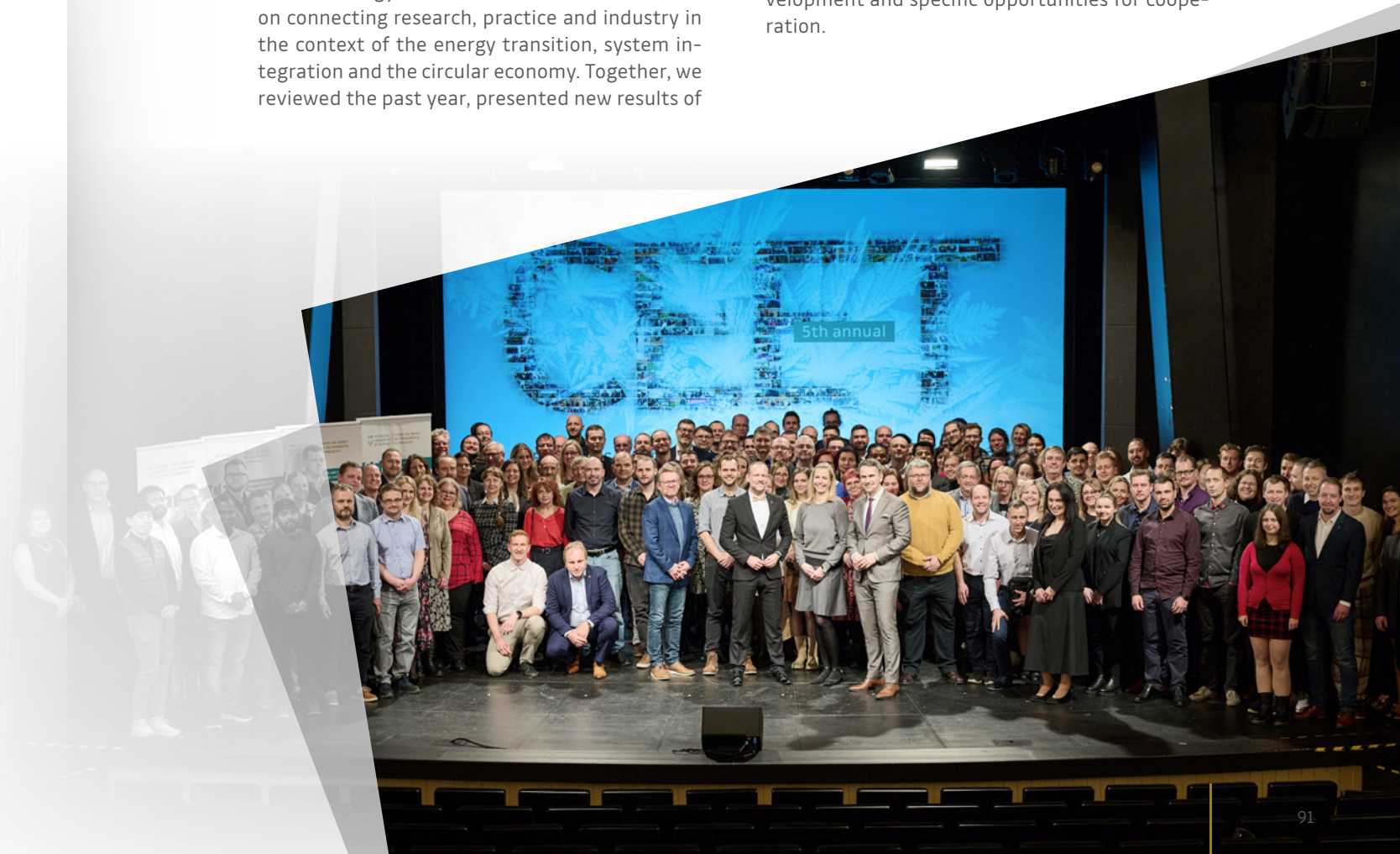
pants from academia and industry and offered an expert programme focused on the monitoring and removal of micropollutants from the environment. During the two-day meeting, 9 expert lectures were delivered by specialists from the Institute of Environmental Technology, Dekonta, a.s., and international universities, including the University of Warmia and Mazury in Olsztyn, the University of Warsaw and the Norwegian University of Life Sciences (NMBU). The programme addressed current topics such as innovative methods for removing micropollutants from water, the effects of PFAS substances on water quality, antibiotic resistance, pyrolysis of sewage sludge, photoreforming of microplastics and analysis of microplastics from ice surfaces. The workshop provided space for discussion, sharing experience and building new cooperation among participants. The second day included an expert excursion to a wastewater treatment plant, where participants learned about the operation of the facility, laboratory facilities and practical procedures used in wastewater treatment. The programme also included a tour of the IET laboratories, including a presentation of the equipment of the ENREGAT large research infrastructure. The workshop contributed to strengthening international cooperation, knowledge exchange and a deeper understanding of current challenges in the protection of the aquatic environment.

CEET STAFF CHRISTMAS GATHERING

10th December 2025

The fifth edition of the CEET Staff Christmas Meeting was held on Thursday, 11th December 2025, at DK Poklad. The traditional meeting of the Centre for Energy and Environmental Technologies (CEET) of VSB-TUO was held under the motto "Energy in a New Balance" and focused on connecting research, practice and industry in the context of the energy transition, system integration and the circular economy. Together, we reviewed the past year, presented new results of

our research in energy and environmental technologies, and opened space for discussion on future directions in these areas. As in the previous year, panel discussions were prepared for participants, featuring experts from academia, representatives from industry and the public sector. They offered their views on the current state of energy and industry, emerging directions of development and specific opportunities for cooperation.



ANNUAL REPORT 2025

VSB - Technical University of Ostrava

CENTRE FOR ENERGY
AND ENVIRONMENTAL
TECHNOLOGIES

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The Annual Report of CEET for the year 2025 was approved
by the Scientific Council of CEET on June 9th, 2026
and is available electronically on the website

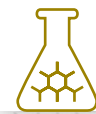
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