VSB TECHNICAL UNIVERSITY OF OSTRAVA | CENTRE FOR ENERGY AND ENVIRONMENTAL TECHNOLOGIES

ANNUAL REPORT 2024

A LETTER FROM THE DIRECTOR

Dear colleagues and partners,

The year 2024 was a period of dynamic growth, internal consolidation, and successful international expansion for the Centre for Energy and Environmental Technologies (CEET). In an evolving landscape shaped by pressing challenges in sustainability, energy system security, and the transformation of industrial technologies, we once again affirmed our position as a national leader and a respected partner within the European research area.

A major pillar of our activities over the past year was the strategic strengthening of our research capacities and infrastructure. The implementation of the CEETe H_2 and CEETe II projects represents a crucial investment in state-of-the-art facilities for hydrogen technology research and materials engineering. This modernization not only enhances our scientific competitiveness but also contributes to the attractiveness and energy self-sufficiency of our university campus.

We are also succeeding in fulfilling our vision of delivering excellent, application-oriented research with strong links to practice. The growing number of applied results, coupled with their effective dissemination through highly cited publications, intensive collaboration with industry, and the implementation of projects with direct societal impact, particularly in the fields of decarbonisation, energy efficiency, and circular economy, demonstrate that CEET is an institution with a clear mission and long-term relevance for regional and national development.

I would like to thank all colleagues and partners for their contributions and trust. I believe that together, we can not only respond to today's challenges, but also play an active role in shaping the future of sustainable energy.

With respect,

Stanislav Mišák
Director of CEET

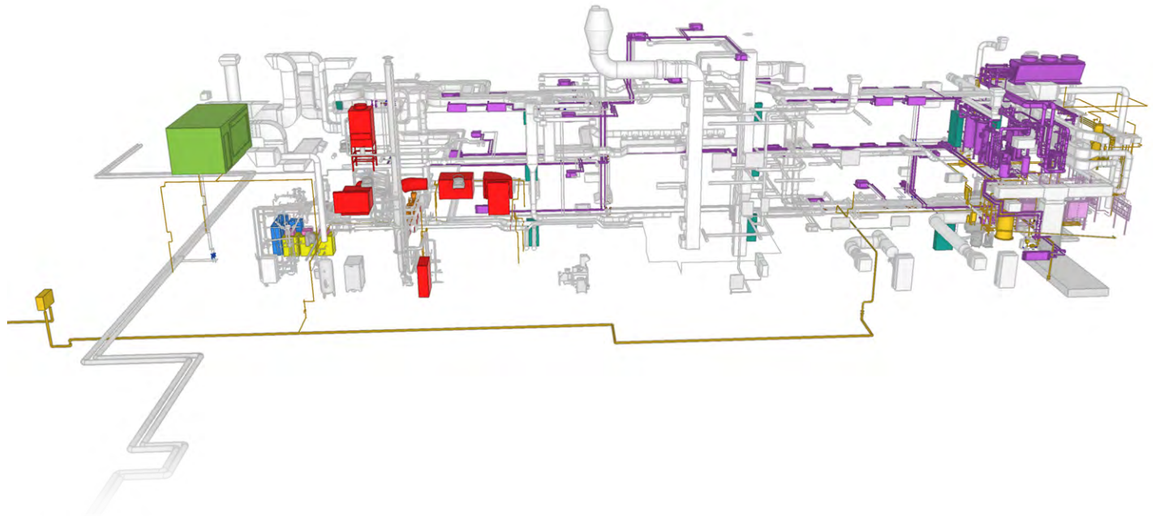
TO EFFECTIVELY MANAGE AND USE THE CAPACITIES OF THE CEET
RELATED TO THE OPERATIONAL OBJECTIVE OF VSB-TUO: C 5.1.

STRATEGIC OBJECTIVE 5

MANAGEMENT OF CEET

EFFECTIVE MANAGEMENT AND UTILISATION OF CEET'S CAPACITIES

Modern and high-quality infrastructure alone does not guarantee success. Ongoing external and internal shifts, from international uncertainties to developments in domestic public funding, pose significant challenges for the operation of academic and research institutions. These circumstances call for flexible and strategically grounded management, including the systematic streamlining of decision-making processes and the reduction of administrative burdens wherever feasible and meaningful.



ESTABLISHMENT AND APPROVAL OF THE BOARD OF EXPERTS

Getting feedback on our strategy and the way we approach research tasks is very important for the effective management of a university institute. Input from respected experts, both from the Czech Republic and abroad, helps us make better decisions and set the right direction. That's why the Board of Experts was established in 2023 as an advisory body to the CEET Director. Since 2024, this role has gradually been taken over by new forms of expert and managerial cooperation within the university's flagship project REFRESH. CEET researchers are involved in three of the project's four living labs, which means that all four of CEET's scientific areas are now fully integrated into the project. Their research agendas will be regularly discussed and reviewed by national and international experts.

Each scientific area is coordinated by a programme leader, who provides recommendations on the strategic direction of CEET's research. These recommendations aim to support excellence, ensure long-term sustainability, and strengthen CEET's position as a leader in sustainable energy – both in the Czech Republic and internationally.

INTERNAL AUDIT OF THE QUALITY MANAGEMENT SYSTEM

In December 2024, CEET's quality management system underwent an internal audit. The audit confirmed that the system is fully functional and compliant with the requirements of ČSN EN ISO 9001:2016, internal documentation, and the regulations of VSB–Technical University of Ostrava.

No nonconformities were identified. The audit report included two recommendations for improvement, both of which were accepted by the management and assigned for implementation. Achieving positive audit results continues to be an important indicator of the organisation's progress toward its strategic goals.

CEET
Recognised Centre of Oriented Research
Incubator for Promising Employees
Internationalization
Positive Perception of the CEET

SUPPORT OF THE SUSTAINABLE DEVELOPMENT OF THE UNIVERSITY
RELATED TO THE OPERATIONAL OBJECTIVE OF VSB-TUO: C 5.3.

SUPPORT OF THE SUSTAINABLE DEVELOPMENT OF THE UNIVERSITY

CEET has long been committed to the principles of sustainable development and actively contributes to the transformation of the VSB-TUO campus into an energy-efficient and environmentally responsible university environment. In 2024, a number of key initiatives continued to move this vision forward.

Among the strategic projects is the construction of the CEETe H_2 hydrogen research polygon. This facility will support research and development of technologies for hydrogen production, storage, and use — and it will also be fully integrated into the campus energy system. During the summer months, surplus energy from photovoltaic sources will be used to produce so-called “green hydrogen” via electrolysis. The project will thus contribute to greater use of renewable energy and emission reduction.

In 2024, design work also began on the renovation of Building N. After modernisation, the building will be equipped with a façade-integrated photovoltaic system and connected to the campus-wide energy management system, which is being developed and operated by CEET. This system enables active energy flow management between buildings, optimises consumption, and supports decentralised control of energy sources.

The development of renewable energy on campus has also been supported by the installation of new photovoltaic systems and preparations for expanding the battery storage facility, which will help balance electricity production and consumption. A key role in this system will be played by the CEETe H_2 polygon, which will serve as an active component in campus-wide energy balancing and storage.

Another sustainability measure is the installation of a green wall on the CEETe building. Designed to support biodiversity and improve the campus microclimate, the wall is an example of integrating natural elements into a technically oriented environment — a tangible step towards a healthier and more environmentally friendly university campus.

Through this comprehensive approach to energy infrastructure, renewable resources, and ecosystem support, CEET helps position VSB-TUO nationally and internationally as a leader committed to the purposeful modernisation of campus buildings and their sustainable operation at a high technical and environmental standard.

MODERNIZATION OF THE VSB-TUO CAMPUS

Ensuring high-quality infrastructure and laboratory facilities that support excellent research is one of CEET’s key priorities as a university research institute. This long-term commitment is deeply embedded in CEET’s mission and is reflected in the financial planning of all departments — down to the level of individual research groups. A major activity in 2024 in the area of research infrastructure modernisation was the preparation of an investment plan for the renovation of Building N and the redevelopment of the former Business Centre. Another important step was the launch of project planning for the CEETe H_2 hydrogen research polygon.

MATERIALS RESEARCH CENTRE

In 2024, the planned renovation of the former Business Centre building began, with the aim of converting office space into specialised laboratories for materials research infrastructure. The reconstruction is funded through the REFRESH project and the internal budget of the Institute of Environmental Technologies. The new laboratories will be used primarily for the implementation of the REFRESH and EBEAM projects.

RENOVATION OF BUILDING N – CEETe II

The goal of this renovation is the comprehensive modernisation of the facility, including advanced equipment for research in materials science. During 2024, an investment proposal was submitted which, if approved, will secure 50% of the renovation funding from external sources. The remaining costs will be covered by the university rectorate. Laboratory equipment will be financed both from the internal resources of the Nanotechnology Centre and the REFRESH project. The renovation of Building N (renamed CEETe II) will thus be complemented by high-quality laboratory facilities housed in the refurbished Business Centre building, equipped with cutting-edge technologies for advanced materials research.

LAUNCH OF THE CEETE H2 HYDROGEN RESEARCH POLYGON PROJECT

This project is a strategic initiative not only for CEET and the university, but also for the Moravian-Silesian Region, where it has been designated as one of its key development priorities. It aims to support the advancement and practical implementation of hydrogen technologies — both in the region and in other areas with strong industrial potential that are facing the challenges of decarbonising transport, industry, and energy.

The implementation of these major projects will significantly enhance the overall infrastructure of the VSB-TUO campus. These investments in state-of-the-art research facilities will make CEET's infrastructure fully comparable with leading European research centres. They will strengthen CEET's and the university's profile both nationally and internationally, improve our capacity to attract top scientists, students, and strategic partners, and support VSB-TUO's ambition to be a European leader in research and technology transfer.

EMPLOYEES

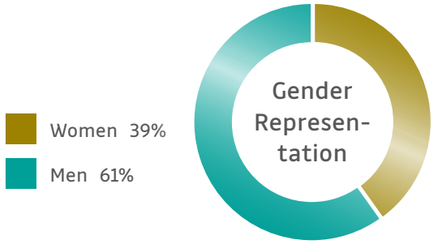
In recent years, the Centre for Energy and Environmental Technologies (CEET) has continued to grow and develop — a trend clearly reflected in the increasing number of staff. In 2024, the total number of employees rose to 317, corresponding to an average full-time equivalent (FTE) of 237.51. This 18.28% year-on-year increase highlights the centre's ongoing dynamic development and the growing significance of its research activities. The expansion also shows CEET's attractiveness to top experts and reflects its increasing involvement in key projects focused on sustainable energy and environmental technologies. Women currently make up 39% of CEET's employees, which is above average compared to the wider Czech research environment. The remaining 61% are men.

The largest age group within CEET's workforce is 30–39 years, representing 36% of employees. Just under 30% fall into the 40–49 age group, providing a well-balanced mix of experienced professionals and younger talent. A significant share also belongs to the under-29 and 50–59 age groups, contributing to the team's overall dynamism and stability. Around 10% of employees are aged 60–69 or over 70. These colleagues bring invaluable expertise, leadership, and practical experience. The wide age range among CEET staff reflects our inclusive and open working culture, fully aligned with the core values of our organisation.

Age Category	
Under 29 years	12,9%
30–39 years	36,0%
40–49 years	28,7%
50–59 years	13,6%
60–69 years	5,4%
Over 70 years	3,5%

Employee Type	Number of Employees	FTE
Academic Staff	19	18,3
R&D	187	118,5
Others	111	100,7

More than 64% of CEET employees are academic and research staff. The remaining 36% are classified as other employees supporting research and operations.



STRATEGIC OBJECTIVE 3

TO BE A RECOGNIZED CENTRE OF ORIENTED RESEARCH

PUBLICATION OUTPUTS

The publication of high-quality research outputs, ideally with international reach, and the resulting growth in citation impact are key factors in strengthening CEET's visibility and reputation. We evaluate the scientific performance of CEET staff annually and aim to present our results consistently and purposefully, both to the professional community and to the wider public.

In 2024, CEET's academic and research staff published a total of 226 peer-reviewed articles indexed in the WoS/Scopus databases. This represents an increase of 31 publications (+15.9%) compared to 2023. A particularly noteworthy result is that 219 articles (96.9%) were published in journals ranked in the first or second quartile (Q1/Q2) of their respective subject categories. Of these, 50 articles (22.1%) appeared in D1 journals — i.e. the top 10% of journals in their fields.

With a publication rate of 1.65 publications per 1 FTE, CEET ranked second among all institutes at VSB–TUO in 2024, just behind IT4.

Science and Research Results

D1	50 (22,1%)
Q1	171 (75,7%)
Q2	48 (21,2%)
Q3	4 (1,8%)
Q4	3 (1,3%)
Total	**226**

Source: Department of Strategic Analyses, data from the OBD system as of May 5, 2025. The journal quartile categorisation is based on the geometric mean of percentiles across all indexed subject areas of each journal, using Scopus (SJR) and Web of Science (Impact Factor) metrics. As the percentiles for 2024 have not yet been published, metrics from the previous year were used.

„An excellent result is that 96.9% of CEET's articles were published in journals ranked in the first and second quartiles of their respective fields."

prof. Ing. Lucie Obalová, Ph.D.

PROFESSIONAL ARTICLES PUBLISHED IN JOURNALS IN THE 1ST FIELD DECILE

Authors	Title	Journal
Zhou, Z., Zhu, J., Li, L., Wang, C., Zhang, C., Du, X., Wang, X., Zhao, G., Wang, R., Li, J., Lu, Z., Zong, Y., Sun, Y., Rümmeli, M. H., & Zou, G. .	Monomolecular membrane-assisted growth of antimony halide perovskite/MoS_2 van der Waals epitaxial heterojunctions with long-lived interlayer exciton.	ACS Nano, 18(26), 17282–17292.
Kment, Š., Bakandritsos, A., Tantis, I., Kmentová, H., Zuo, Y., Henrotte, O., Naldoni, A., Otyepka, M., Varma, R. S., & Zbořil, R. .	Single atom catalysts based on earth-abundant metals for energy-related applications.	Chemical Reviews, 124 (21), 11767–11847.
Szramowiat-Sala, K., Penkala, R., Horák, J., Krpec, K., Hopan, F., Ryšavý, J., Borovec, K., & Górecki, J. .	AI-based data mining approach to control the environmental impact of conventional energy technologies.	Journal of Cleaner Production, 472, Article in press.
Singh, A. R., Dashtdar, M., Bajaj, M., Garmsiri, R., Blažek, V., Prokop, L., & Mišák, S. .	AI-enhanced power quality management in distribution systems: Implementing a dual-phase UPQC control with adaptive neural networks and optimized PI controllers.	Artificial Intelligence Review, 57 (11), Article in press.
Štrbová, K., Motyka, O., Mikesková, G., Olšovská, E., & Seidlerová, J. .	Indoor moss biomonitoring proving construction-related pollution load from outdoors.	Building and Environment, 267 (Part A), 112198.
Krbečková, V., & Plachá, D. .	Raw biowaste conversion to high-value compounds for food, cosmetic and pharmaceutical industries.	Environmental Research, 263 (December), Article in press.
Prostějovský, T., Kulišťáková, A., Sauer, L., Pribyl, M., Reli, M., & Kočí, K. .	Improving reactor fluid dynamics enhances styrene degradation by advanced oxidation processes.	Separation and Purification Technology, 330 (February), Article in press.
Brťková, H., Růžičková, J., Slamová, K., Raclavská, H., Kucbel, M., Šafář, M., Petros, G., Juchelkova, D., Švédová, B., & Flodrová, Š. .	Plastic particles in urban compost and their grain size distribution.	Environmental Pollution, 351, 124025.
Vráblová, M., Smutná, K., Chamrádová, K., Vrábl, D., Koutník, I., Rusín, J., Bouchalová, M., Gavlová, A., Sezimová, H., Navrátil, M., Chalupa, R., Tenklová, B., & Pavlíková, J. .	Co-composting of sewage sludge as an effective technology for the production of substrates with reduced content of pharmaceutical residues.	Science of the Total Environment, 915 (March 10), Article in press.

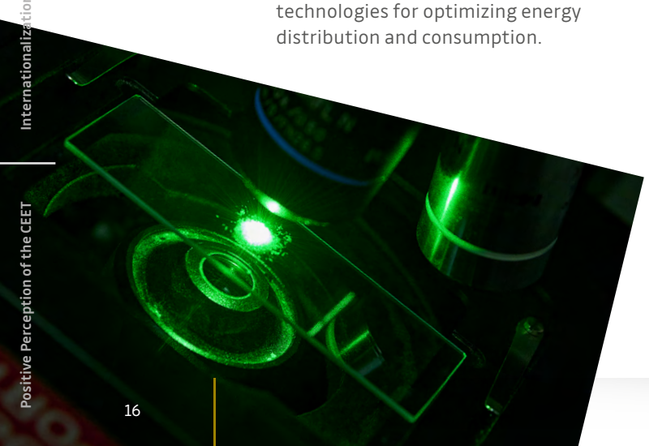
ARTICLES WITH CITATION RESPONSE OF 20TH OR MORE

Nagarajan, K., Rajagopalan, A., Bajaj, M., Sitharthan, R., Dost Mohammadi, S. A., & Blažek, V. .	Optimizing dynamic economic dispatch through an enhanced Cheetah-inspired algorithm for integrated renewable energy and demand-side management.	Scientific Reports, 14(1), Article in press.
Rajagopalan, A., Swaminathan, D., Bajaj, M., Damaj, I., Rathore, R. S., Singh, A. R., Blažek, V., & Prokop, L. .	Empowering power distribution: Unleashing the synergy of IoT and cloud computing for sustainable and efficient energy systems.	Results in Engineering, 21 (March 2024), Article in press.

STRENGTHENING EXCELLENCE IN SELECTED RESEARCH AREAS

To achieve long-term success in the international research environment, it is essential to continuously develop expertise and strive for excellence. In addition to our established strengths in key research domains — such as the application of advanced materials in environmental and energy technologies — we have recently identified several promising new directions. These thematic areas offer strong potential for international collaboration and high-impact scientific outcomes.

- Utilization of electron beams for targeted synthesis of new materials with precise structures for applications in energy, biomedicine, electronics, and environmental protection.
- Methods for environmentally friendly production, storage, and safe use of hydrogen.
- Digital modeling of energy network technologies for optimizing energy distribution and consumption.
- Photocatalytic conversion of CO_2 into usable products and photocatalytic water splitting.
- New materials and nanostructures for energy storage in batteries and supercapacitors, as well as in environmental technologies.
- Utilization of recyclates from industries (metallurgical, nuclear, and batteries) for modification and improvement of conventional materials.
- Thermochemical treatment of plastic waste through pyrolysis, catalytic processes, and purification techniques.
- Utilisation of energy-rich products within the framework of the circular economy.



DEVELOPMENT OF THE CENTRE'S BUSINESS POTENTIAL

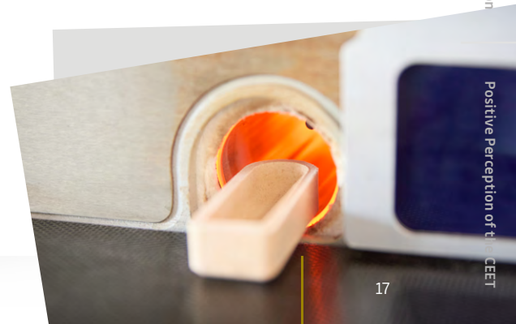
Keeping pace with rapid developments and changes in both the industrial and public sectors and being able to actively respond to current and future challenges, is a key pillar of our long-term strategy. We continuously seek new opportunities to expand collaboration in the field of applied and contract research, working with both existing and new partners. Through this approach, we contribute to the growth of partnership-based projects and actively support the transfer of knowledge and innovative technologies. Our activities and results are communicated not only within the expert community, but also to the wider public, through professional events, science popularisation activities, and cooperation with other institutions. This proactive engagement allows us to expand into new application areas. The following section highlights selected projects involving significant collaboration with partners from industry, the public sector, and government institutions.

PLANT GROWTH SUBSTRATE CONTAINING SEWAGE SLUDGE

By co-composting sewage sludge (up to 40% of wet weight) with green and woody biowaste, fertilising substrates were developed and stabilised either alone or mixed with soil. The substrates were prepared in laboratory conditions (13 kg) and subsequently tested at a pilot scale (10 tonnes). They are suitable for land reclamation, forestry, and cultivation of both ornamental and energy crops. Their nutrient content and the presence of potentially hazardous substances were analysed. Tests confirmed high water retention capacity and a positive impact on the growth of barley, beech, oak, pine, and larch.

INJECTION DEVICE FOR LIQUID WASTE DISPOSAL BY PLASMA GASIFICATION

This technical solution concerns an injection system designed for the disposal of liquid waste by plasma gasification. The device is intended for the delivery of liquid waste containing persistent organic pollutants (POPs) into a plasma reactor for effective destruction.



PRE-TREATMENT OF WASTE BIOMASS

The reuse of waste paper and separated cellulose for purposes other than paper production is limited due to fibre degradation. Our research focuses on testing a pre-treatment technology for waste biomass, aiming to maximise recyclability in line with circular economy principles. The project explores the potential for producing fuel for energy recovery (in compliance with current legislation), agricultural use (as a carbon source or stabilising agent due to high water-holding capacity), or for nanocellulose production.

METHODOLOGY FOR MAPPING RAILWAY LINES FOR TRAINS WITH ALTERNATIVE PROPULSION

This methodology defines procedures for optimising decisions on the deployment of alternative propulsion systems on selected non-electrified railway lines. It offers tools for identifying suitable lines and assessing the technical and operational parameters of modern low-emission train units (e.g. battery- or hydrogen-powered), which could replace current diesel units in regional transport. It also allows for technical and economic assessment of the transition to alternative propulsion and includes preparation of related documentation, including infrastructure modification requirements.

HYDROGEN PURITY ANALYSIS FOR VEHICLE PROPULSION INCLUDING HIGH-PRESSURE H_2 SAMPLING

Hydrogen purity is a key parameter for its use in transportation. To ensure efficient conversion of hydrogen from renewable sources into electricity, the highest possible purity must be maintained. For this purpose, a dedicated system for hydrogen sampling and analysis was designed and constructed. The result is an accredited methodology for continuous purity analysis of hydrogen from PEM electrolysers, including accredited high-pressure H_2 sampling and gravimetric purity determination.

APPLIED RESULTS

2024 Was Also a Successful Year for Applied Research Outcomes. In 2024, CEET achieved strong results in the field of applied research, as evidenced by the registration of 57 applied outcomes. In addition to these accomplishments, 3 patent applications were submitted and accepted during the year.

Patent/Application	3
Utility model/Application	9
Industrial pattern / Application	3
Implemented methodology	3
Software	4
Function sample	19
Verified technology	3
Pilot plant	2
Prototype	4
Audiovisual work	10
Total	**60**

Source: Internal materials of the R&D Commercialisation Unit – Intellectual Property Protection, 2024, as of March 17, 2025.

METHOD OF SURFACE PRE-TREATMENT OF STEEL COMPONENTS

PATENT CZ 309976 (2024)

ZABLOUDIL, A., POKORNÝ, P., TEJ, P., ČECH BARABASZOVÁ, K., KOLÍSKO, J.

The method involves specific procedures for modifying the surface of steel components in order to enhance their properties, such as corrosion resistance or coating adhesion. The pre-treatment process consists of immersing the steel components in an activation bath containing microstructured zinc phosphate dihydrate dispersed in a mechanically stirred solution of distilled water at a concentration of 0.2–0.3 wt.%. The activation time is 2–3 minutes at a bath temperature of 20–40 °C. The method is particularly applicable in the field of steel–concrete structures, anti-corrosion protection for transport infrastructure, and in the production of metal–composite systems where strong and durable bonding between metallic and non-metallic materials is essential.

COMPLEMENTARY ACTIVITY

CEET's supporting activities are built on cooperation with industry, municipalities, universities, and other organisations. These collaborations draw on the scientific expertise of our research teams as well as accredited and authorised procedures. Through them, we successfully and efficiently utilise the full potential of our instrumentation and technological facilities.

In 2024, despite a slight decrease in the total number of contracts (by a few percent), we managed to maintain the expected financial volume. This figure was affected by the gradual conclusion of long-term contract research in the field of DeHg technology testing – marking the completion of a decade of work focused on monitoring, validating the accredited KMEHg method, and developing mercury-reducing sorbents.

Contract research in 2024 focused on a wide range of experimental tests and measurements on technologies related to the greening and decarbonisation of energy systems, many of which were conducted on real-world equipment. Accredited laboratories, design, consulting and expert services also formed a significant part of these activities. Thanks to our unique research and testing infrastructure, we continue to attract strong interest from external partners. The diversity of our research centres remains a significant advantage that is virtually unmatched within the Czech higher education system.

These activities take place in a competitive, market-driven environment with many established players, which makes our long-standing strong results all the more valuable and confirms CEET's success in applied science and technology transfer.

As in previous years, the most important areas of contract research included hydrogen technology applications, heat and power generation technologies (including renewable energy sources), emission reduction in energy systems, development of technologies for energy and material recovery from waste, thermochemical conversion of biomass and alternative fuels, industrial waste heat utilisation, and more.

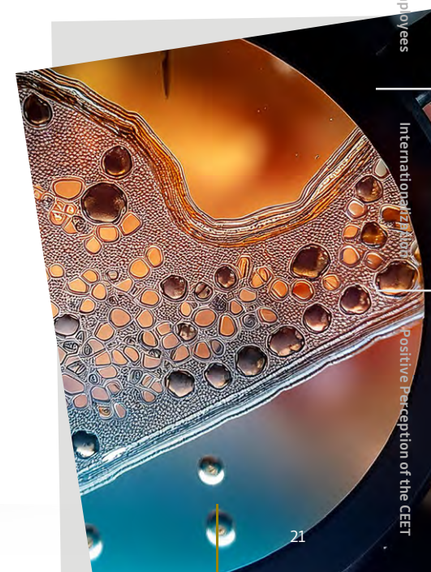
In the field of materials research, contract research included, testing of material durability in hydrogen atmospheres, application of reagents to reduce mercury emissions from fossil fuel combustion, use of waste paper and separated cellulose for purposes other than new paper production, co-composting of sewage sludge (up to 40% wet matter) with green and woody biowaste, development of new materials and nanostructures for energy storage in batteries and supercapacitors, and in environmental technologies, use of recycled materials from metallurgy, nuclear industries, and battery waste to enhance conventional materials, processing of plastic waste through pyrolysis, catalytic, and purification techniques, use of energy-rich by-products in the circular economy.

CEET operates two accredited laboratories focusing on the analysis of fuels, waste, and emissions; testing of construction materials; explosion characteristics of gases, liquids and their mixtures; and impurity analysis in hydrogen for fuel cells. These laboratories significantly support contract research across all CEET units.

Cooperation with municipalities includes technical studies as well as consulting and expert services. Collaboration with the National Development Bank was significantly expanded, with CEET now among the five expert guarantors of EPC (Energy Performance Contracting) projects. We also maintain extensive cooperation with municipalities and regional governments on energy management concepts — including the use of hydrogen in transport (with quality testing based on accredited methods and EU standards) and increased deployment of renewable sources for heat and electricity production.

"The year 2024 was another successful one for CEET's supporting activities. We maintained the increased financial volume and profit achieved in 2023, expanded our research centres into new areas, and strengthened CEET's position as a leading provider of contract research. Our achievements in applied research, testing, consulting, and cooperation with both industry and the public sector confirm the high professional level of the entire centre."

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



EXAMPLES OF THE MOST SIGNIFICANT COOPERATION

Industry Partners

Veolia Energie ČR, a.s.

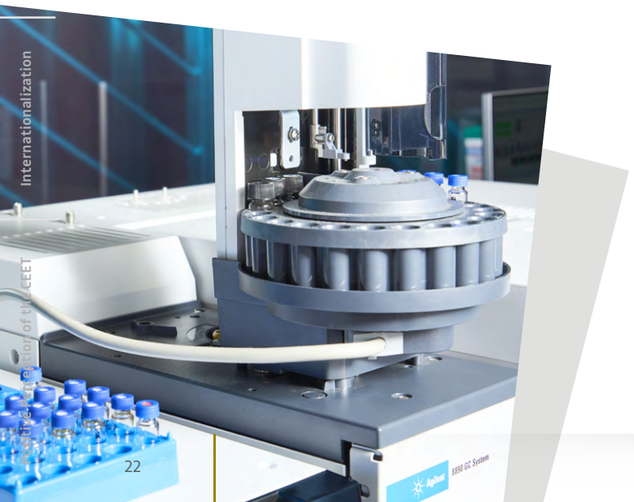
A major operator of energy systems. Our collaboration focused on reducing emissions (especially particulate matter and heavy metals), improving plant efficiency, and optimising technologies for the use of fossil and alternative fuels in energy production. Within the scope of energy services, we contributed to the development and testing of decarbonisation technologies and solid alternative fuels (SAF) used in a new multi-fuel boiler for combined heat and power generation.

Sev.en Engineering s.r.o.

An industrial partner operating fossil-fuel-based energy sources. The collaboration centred on the design and testing of DeHg technologies using an accredited methodology for continuous mercury measurement, which was applied to evaluate the efficiency of DeHg technology and compliance with BAT-based emission limits.

ČEZ, a.s.

A major Czech energy provider operating fossil-fuel-based sources. Our cooperation involved quantifying pollutant emissions, particularly mercury (Hg), through accredited continuous monitoring. We contributed to the design and testing of DeHg technologies using accredited mercury measurement methodologies at two different flue gas sampling points, helping assess technology performance and compliance with BAT emission limits.



Public Administration

Moravian-Silesian Region

Energy Security and Self-Sufficiency Impact Study

This study assessed the current state of energy security and self-sufficiency in the Moravian-Silesian Region (MSK), outlining two primary scenarios for its development up to and beyond 2030. The goal was to evaluate the region's energy sources, needs and supply, identify key challenges, and propose measures to ensure a balanced electricity supply–demand ratio.

Renewable Energy Potential Study – Photovoltaics and Wind Power

This analysis evaluated the potential of renewable energy sources (RES) in the MSK, focusing on photovoltaic (PV) and wind power plants (WPP). It identified suitable locations, estimated installed capacity and production potential, and analysed the technical and legislative conditions for deployment. The study supports the region's climate targets and its goal of achieving carbon neutrality by 2050.

Municipalities

Energy-saving projects using the EPC method (Energy Performance Contracting)

These projects aim to significantly reduce energy consumption and related costs. The Energy and Environmental Centre (VEC) of CEET collaborates closely with the National Development Bank, particularly under the ELENA programme. One of the largest EPC projects implemented in recent years is projected to generate over CZK 100 million in savings over its lifetime.

While the joule is the standard energy unit for professionals, in everyday terms, every saved unit of energy translates into cost savings. We are currently involved in the New ELENA programmes for the public and business sectors. These collaborative efforts result in large-scale and comprehensive energy-saving projects that not only reduce energy consumption, but also support strategic goals — such as CO_2 emission reduction. Reducing CO_2 emissions is one of the European Union's key priorities, addressed through the National Emission Reduction Programme (NERP) in the Czech Republic, which falls under the responsibility of the Ministry of the Environment and is currently defined for the period up to 2030.

DEVELOPMENT OF INTERDISCIPLINARY AND INTERNATIO-NAL COOPERATION

We strive to position our team at the forefront of innovation in science and research. A key prerequisite for achieving international success is the intensive development of international cooperation. That is why we focus systematically on preparing ambitious, interdisciplinary projects that respond to major European challenges. In the context of rapidly evolving European policies aimed at increasing energy and raw material independence and enhancing the overall resilience of energy systems, we closely monitor current trends and actively seek opportunities for international engagement. Cooperation with leading foreign institutions, combined with strong institutional support and university backing for project proposals, helps us move closer to fulfilling the long-term vision of CEET.

In 2024, we secured funding for several important interdisciplinary projects involving international partners.

EBEAM - Electron Beam Emergent Additive Manufacturing

Project number	101087143
Provider	European Union, Horizon Europe
Duration	2024-2028
Principal Investigator	Prof. Dr. Mark H. Rümmeli

GlaS-A-Fuels – Single-Atom Photocatalysts Enhanced by a Self-Powered Photonic Glass Reactor to Produce Advanced Biofuels

Project number	101130717
Provider	European Union, HORIZON-EIC--2023-PATHFINDEROPEN-01
Duration	2024-2027
Principal Investigator	Mgr. Aristeidis Bakandritsos, Ph.D.

MERGE – Twinning Excellence in Management and Research for Green Energy and Chemicals Using Single-atom Catalysis

Project number	101159582
Provider	European Union, HORIZON-WIDE-RA-2023-ACCESS-02
Duration	2024-2027
Principal Investigator	Mgr. Aristeidis Bakandritsos, Ph.D.

SAN4fuel – Single Atom-Based Nanohybrid Photocatalysts for Green Fuels

Project number	101079384
Provider	European Union, HORIZON -WIDERA-2021-ACCESS-03-01
Duration	2022-2025
Principal Investigator	prof. RNDr. Radek Zbořil, Ph.D.

SAFER – Self-Healing Ceramic Fiber Ceramic Matrix Composite

Project number	TH82020004
Provider	Technology Agency of the Czech Republic (TA CR), EPSILON
Duration	2023-2026
Principal Investigator	prof. Ing. Daniela Plachá, Ph.D.

ExPEDite – Enabling Positive Energy Districts through a Planning and Management Digital Twin

Project number	101139527
Provider	European Union, Horizon Europe
Duration	2024–2026
Principal Investigator	prof. Ing. Stanislav Mišák, Ph.D.

H2GEO – New technology for hydrogen and geopolymer composites production from post-mining waste

Project number	101112386
Provider	European Union, Research Fund for Coal and Steel (RFCS) 2027, call RFCS-2022
Duration	2023–2026
Principal Investigator	prof. Ing. Silvie Heviánková, Ph.D.,
Co-principal investigator for CEET	Ing. Jan Najser, Ph.D.

Long-term heat energy storage in a supercooled substance

Project number	TM04000021
Provider	Technology Agency of the Czech Republic (TA CR), DELTA 2
Duration	2023–2024
Principal Investigator	doc. Dr. Ing. Tadeáš Ochodek

HESS – Hybrid energy storage system using post--mining infrastructure

Project number	101112380
Provider	European Union, Research Fund for Coal and Steel (RFCS) 2027, call RFCS-2022
Duration	2023–2026
Principal Investigator	prof. Ing. Stanislav Honus, Ph.D.
Co-principal investigator for CEET	Ing. Jan Najser, Ph.D. a Ing. Jaroslav Frantík, Ph.D

Doctoral Program of Science with a mention in Physics, call for Financial Scheme „Alliances for doctoral programs“

Project number	E033-2023-01 – BM
Provider	Peru, CONCYTEC (Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica)
Duration	2024-2027
Principal Investigator	Universidad nacional de Ingeniería (Peru)
Co-principal investigator for CEET	Ing. Lenka Matějová, Ph.D.

AEM-DRIVE – Pokročilé technologie membrán AEM: Vývoj, integrace dat v reálném čase, testování a prediktivní modelování pro zvýšení výkonu

Project number	TQ16000070
Provider	Technology Agency of the Czech Republic (TA CR), SIGMA DC4
Duration	2025-2027
Principal Investigator	Ing. Jiří Ryšavý, Ph.D.

Core – H2storage

Project number	TQ06000002
Provider	The 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.

SIGNIFICANT SCIENCE AND RESEARCH PROJECTS

Over the past year, we have continued the implementation of previously awarded projects while also preparing and successfully securing a number of new and exciting initiatives. This demonstrates our expertise and determination to remain a leading research centre, not only in the Czech Republic but also at the international level.

Overview of All Ongoing Science and Research Projects in 2024

NATIONAL CENTRE FOR ENERGY II

Project number
TN02000025

Provider
Technology Agency of the Czech Republic (TA CR)

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 number
TN101139527

Provider
European Union, Horizon Europe

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
RESEARCH EXCELLENCE FOR REGION SUSTAINABILITY AND HIGH-TECH INDUSTRIES

Project number
CZ.10.03.01/00/22 _003/0000048

Provider
State Environmental Fund of the Czech Republic

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 number
ERA CHAIRS HORIZON EUROPE 101087143

Provider
European Union, Horizon Europe

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 number
HORIZON-EIC-2023-PATHFINDEROPEN-01 101130717

Provider
European Union, HORIZON-EIC-2023-PATHFINDEROPEN-01

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 number
HORIZON-WIDERA-2021-ACCESS-03-01 101079384

Provider
European Union, HORIZON-WIDERA-2021-ACCESS-03-01

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 CO_2 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.

SAFER
SELF-HEALING FIBER CERAMIC MATRIX COMPOSITE

Project number
TH82020004

Provider
Technology Agency of the Czech Republic (TA CR), EPSILON

A project focused on the development of materials arising from a combination of ceramics and carbon fibers, led by Prof. Dr. Ing. Daisy Nestler from Chemnitz University of Technology. The project also involves collaboration with scientists from one of the most important universities in Brazil, the University of Sao Paulo, and experts from the domestic company Diafrikt Components. Scientists plan to produce the material using large-scale injection moulding, followed by pyrolysis and the Laser Shock Induced Fracture (LSI) process. This is an advanced technique used for manipulating and modifying materials using laser pulses. Another objective is the recycling of the prepared material to reduce the carbon footprint of the manufacturing process and production costs. Experts will also focus on assessing the impact of the material and its production on the environment to be able to prevent undesirable effects if necessary.

MATUR
MATERIALS AND TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT

Project number
CZ.02.01.01/00/22
_008/0004631

MATUR

Provider
Ministry of Education,
Youth and Sports of the Czech Republic

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 number
CZ.10.03.01/00/22
_003/0000045

Provider
Ministry
of the Environment
of the Czech Republic

Cirk Arena

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.

CORE-H2STORAGE

Project number
TQ06000002

Provider
The Clean Energy
Transiton Partnership,
TRI1 - CM2023-02

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.

ENREGAT
ENERGY RECOVERY FROM WASTE AND GAS CLEANING

Project number
LM2023056

VELKÉ VÝZKUMNÉ INFRASTRUKTURY

Provider
Ministry of Education,
Youth and Sports of the Czech Republic

The ENREGAT Large Research Infrastructure (ENREGAT LRI) 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 waste 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.

MODERNISATION OF THE **ENREGAT** INFRASTRUCTURE

Project number
CZ.02.01.01/00/23
_015/0008195

Provider
Ministry of Education,
Youth and Sports of the Czech Republic

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, development 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 number
HORIZON-WIDERA-2023
-ACCESS-02 101159582

Provider
European Union, HORIZON
-WIDERA-2023-ACCESS-02

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 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.

STRATEGIC OBJECTIVE 4

TO BE AN INCUBATOR FOR PROMISING EMPLOYEES

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

At CEET, we bring together young researchers and PhD students with experienced Czech and international scientists who share their knowledge and expertise. This mentoring environment enables students to learn and grow under high-level guidance, helping them achieve outstanding results. In addition to providing modern facilities and top-quality equipment, we also actively support their professional development and education. Many of our students have received recognition and awards for their final theses, and through collaboration with leading experts from around the world, they are building valuable networks and expanding their knowledge and skills.

We support their professional journey through various courses and training programmes, both on campus and externally. We understand that succeeding in the scientific world is challenging, and we strive to make the path to knowledge more accessible for young researchers and doctoral candidates. We help them develop their technical skills and strengthen their scientific capabilities to succeed in a competitive environment. This support also includes, for example, covering publication fees in prestigious Q1-ranked journals (WoS).

“Supporting young researchers is one of CEET’s key 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 actively involved in educational activities beyond formal teaching. They contribute to the organisation of specialised courses, seminars, and lectures aimed at the broader public.

Over the past year, we had the opportunity to host several inspiring events featuring leading experts and prominent figures from various fields. These events helped promote science and deepen professional dialogue across disciplines.

7th Student Catalysis Seminar

25th January 2024

prof. Ing. Kamila Kočí, Ph.D.

CEET IET

12th Czech-Polish Catalysis Seminar (CzePoCat)

12th February 2024

prof. Ing. Kamila Kočí, Ph.D.

CEET IET

Study of Materials and Surface Characterisation

22nd February 2024

Ing. Michal Dudák, Ph.D. and Ing. Karla Čech Barabaszová, Ph.D. Paed. IGIP

CEET CNT

Project Preparation for Applied Research and Grant Applications

27th March 2024

Ing. Arnošt Matlafus

CEET CENET

Visit from the Polish Academy of Sciences

27th March 2024

Discussion on joint research topics and proposal preparation

NanoLumCat Ostrava – Revealing the Future of Light Transformation

8th April 2024

Organised under the SAN4Fuel project and the Global Experts programme

VSB-TUO, CEET CNT, Palacký University, CATRIN

Scientific Writing Camp

23rd–24th April 2024

Supporting interdisciplinarity in publishing, space for learning and collaboration

Energy Storage Materials Workshop

24th April 2024

Prof. Akbulut Hatem, Prof. Vijay Ramani, Prof. Tugrul Cetinkaya

CEET CNT

Visit from the University of West Bohemia

30th May 2024

Strengthening mutual collaboration

Kick-off Meeting – foodCIRCUS Project

6th–7th June 2024

Circular solutions for keeping food waste out of Central Europe's schools

MBA-H2 Programme (Poland)

8th–9th June 2024

CEET presented hydrogen-related activities at an MBA seminar at Silesian University of Technology, Gliwice

Lecture: Building a Networking Hub for Units Interested in Lakes Protection in Baltic Sea Tourist Regions (Lakes Connect)

18th June 2024

Dr. Piotr Jachimowicz

CEET IET

Lecture: Additive Manufacturing by Welding – 3D Print of Metal

15th August 2024

Dr. Krzysztof Pancikewicz

CEET IET

76th Congress of Chemists

26th–29th August 2024

prof. Ing. Kamila Kočí, Ph.D.

CEET IET

27th Conference on Energy and the Environment

9th–11th September 2024

CEET VEC, VSB-TUO Department of Power Engineering

MERGE Kick-off Meeting

25th September 2024

CEET CNT

Nanocon

15th–17th October 2024

A series of lectures
by international
and Czech experts

Thermal Energy Storage and Energetic Materials

30th October 2024

prof. Ing. Daniela Plachá, Ph.D.

CEET CNT

Lecture: Dry Reforming of Methane over NiCo Catalyst

4th November 2024

Dr. Subhasis Das

CEET IET

Workshop: Innovative Solutions for Sustainable Energy

19th November 2024

prof. Ing. Helena Raclavská, CSc.

CEET CENET

MES ITI Kick-off Meeting – Advanced Materials for Energy and Environmental Technologies

25th November 2024

CEET CNT

Lecture: Biodiversity in Dry-Forest and Agricultural Waste Material Use for Ammonia Adsorption; Heterogeneous Catalysis in Carbon Recycling and Utilization

20th November 2024

José Antonio Moscol Ortiz, Dr. Haripal Singh Malhi

CEET IET

Workshop: Materials & Environment Lab

27th November 2024

CEET CNT

Workshop: Rheological Characterisation of Powder Samples

4th December 2024

Ing. Karla Čech Barabaszová, Ph.D. Paed. IGIP and Jiří Špringer

CEET CNT

COOPERATION WITH FACULTIES

Teaching and working with students are an essential part of CEET's activities. In cooperation with all faculties of VSB – Technical University of Ostrava, our experts are actively involved in bachelor's, master's, and doctoral degree programmes. They teach and coordinate specialised courses that incorporate the latest research findings and supervise final theses closely linked to ongoing research projects.

In the laboratories of CEET IET, a total of 11 doctoral, 9 master's, and 11 bachelor's theses were completed, all within study programmes accredited by the Faculty of Materials Science and Technology (FMST).

CEET IET teaching staff involvement: Ing. Lenka Matějová, Ph.D., FMST, Ing. Tereza Bílková, Ph.D., FMST, Ing. Pavel Leštinský, Ph.D., FMST, prof. Ing. Lucie Obalová, Ph.D., FMST, Ing. Michal Vaštyl, Ph.D., FMG, prof. Ing. Kamila Kočí, Ph.D., FCE

In the laboratories of CEET CENET, 3 doctoral, 6 master's, and 2 bachelor's theses were supervised within programmes accredited by the Faculty of Electrical Engineering and Computer Science (FEECS).

CEET CENET teaching staff involvement: prof. Ing. Stanislav Mišák, Ph.D., FEECS, Assoc. Prof. Ing. Lukáš Prokop, Ph.D., FEECS, Ing. Zdeněk Slanina, Ph.D., FEECS, Ing. David Seidl, Ph.D., FEECS, Assoc. Prof. Ing. Jan Fulneček, Ph.D., FEECS, Ing. Lukáš Klein, FEECS, Ing. Ondřej Kabot, Ph.D., FEECS, Ing. Vojtěch Blažek, Ph.D., FEECS, Ing. Jan Najser, Ph.D., FCE, prof. Ing. Stanislav Honus, Ph.D., FCE, Ing. Ondřej Němček, Ph.D., FCE, prof. Ing. Helena Raclavská, CSc., FMG, Ing. Lucie Jezerská, Ph.D., FCE

In the laboratories of CEET ERC, 1 doctoral, 1 master's, and 1 bachelor's thesis were supervised. In addition, collaboration with the Faculty of Economics was established through contract research.

CEET VEC teaching staff involvement: Ing. Jiří Ryšavý, Ph.D., FCE, Ing. Kamil Krpec, Ph.D., FCE, Assoc. prof. Dr. Ing. Tadeáš Ochodek, FCE, Ing. Jan Koloničný, Ph.D., FCE

In the laboratories of CEET CNT, 13 doctoral, 7 master's, and 2 bachelor's theses were supervised.

CEET CNT teaching staff involvement: prof. Ing. Gražyna Simha Martynková, Ph.D., FMST, prof. RNDr. Radek Zbořil, Ph.D., FMST, prof. Ing. Jana Seidlerová, CSc., FMST, Assoc. prof. Mgr. Kateřina Mamulová Kutláková, Ph.D., FMST, Assoc. prof. Ing. Štěpán Kment, Ph.D., FMST, prof. Ing. Daniela Plachá, Ph.D., FMST, Ing. Karla Čech Barabaszová, Ph.D. Paed.IGIP, FMST, Ing. Sylva Holešová, Ph.D., FMST, Ing. Gabriela Kratošová, Ph.D., FMST, Ing. Miroslav Vaculík, Ph.D., FMST, Ing. Marianna Hundáková, Ph.D., FMST, Ing. Jana Kupková, Ph.D., FMST, Ing. Ladislav Svoboda, Ph.D., FMST, Ing. Jiří Bednář, Ph.D., FMST, Ing. Pavlína Peikertová, Ph.D., FMST, Ing. Michaela Tokarčíková, Ph.D., FMST

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	8	6
FMST	20	17
FCE	9	1
FMG	3	1
Total	**40**	**25**

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

CEET research centre / Faculty	FEECS	FMST	FCE	FMG	Total
CENET	7	0	0	0	7
CNT	0	22	0	0	22
IET	0	31	0	0	31
ERC	0	0	7	1	8
Total	**7**	**53**	**7**	**1**	**68**

AWARDS

In 2024, our employees, as well as the CEETe Innovation Polygon, received several awards and recognitions. These included the following achievements:

SILVER MEDAL – INVENT ARENA 2024

INVENT ARENA is a unique exhibition of innovations, inventions, and technical trends, held for the third time at the WERK ARENA in Třinec. The event brought together representatives of Czech and international universities (including VSB-TUO, CTU, BUT, UCT, TUL, TUKE, University of Žilina), industrial companies, patent offices, investors, and the general public. The silver medal was awarded to a team of authors led by prof. Ing. Jozef Vlček, Ph.D.

PRINCE SULTAN BIN ABDULAZIZ INTERNATIONAL PRIZE FOR WATER (PSIPW), VIENNA

For the first time, this prestigious international award came to the Czech Republic. The PSIPW is awarded every two years in five categories to promote sustainable water technologies and water resource management. Among past laureates are several Nobel Prize winners. The awarded team in the Alternative Water Resources category was led by Prof. Virender K. Sharma (Texas A&M University), with long-standing collaboration from prof. RNDr. Radek Zbořil, Ph.D. from CEET.

AWARD FOR SCIENTIFIC EXCELLENCE – MERGE PROJECT

Aristeidis Bakandritsos from the CEET Nanotechnology Centre received the Award for Outstanding Scientific Results during the ceremonial session of the Scientific Council of VSB–TUO. He is the coordinator of the three-year Horizon Europe project MERGE, focused on developing eco-friendly, recyclable, cost-effective and efficient atomically dispersed catalysts for the transformation of waste biomass into green chemicals and biofuels. The project is coordinated by VSB-TUO and involves partners from Politecnico di Milano (Italy), Rijksuniversiteit Groningen (Netherlands), and Q-PLAN International Advisors PC (Greece). Dr. Bakandritsos joined CEET through the REFRESH project.

CEETe INNOVATION POLYGON RECOGNISED AS A LEADING DECARBONISATION PROJECT

The CEETe scientific centre was recognised by Schneider Electric in the Sustainability Impact Awards, which highlight projects that significantly contribute to decarbonisation and sustai-

nable development. The award recognised the polygon's scientific and practical contribution to the decarbonisation agenda.

DOUBLE AWARD FOR CEETE IN THE MSK BUILDING OF THE YEAR 2023 COMPETITION

The CEETe facility received two awards in the Moravian-Silesian Region Building of the Year 2023 competition: The Governor's Award of the Moravian-Silesian Region, and The Award of the Ministry of Industry and Trade. It was the only project to receive two awards at the ceremony.

CEETe WINS BUILDING OF THE YEAR 2024

CEETe was awarded the National Centre for Construction 4.0 Award in the Building of the Year 2024 competition. Among more than 100 nominated projects, the CEETe Innovation Polygon stood out thanks to its high-level technological and sustainable solutions. The award confirms CEETe's position as a model for innovative infrastructure and a source of inspiration for the entire sector.

INVITED LECTURES

05th International Conference on Materials Science, Engineering and Technology

Photocatalytic Reduction of Carbon Dioxide in the Presence of Mesoporous TiO_2 Photocatalysts

26th–28th February 2024

prof. Ing. Kamila Kočí, Ph.D.

Singapore

Hydrogen Production by Plasma Technologies

21st May 2024

prof. Ing. Stanislav Mišák, Ph.D.

University of Lisboa, CERENA – Centro de Recursos Naturais e Ambiente, Lisbon, Portugal

Towards Precise Manufacturing with Electron Microscopes

5th–7th June 2024

Prof. Dr. Mark Hermann Rümmeli

ATAM & MASCA 2024, Wrocław, Poland

Low-Dimensional Materials in Advanced Catalytic Applications

19th–21st November 2024

prof. RNDr. Radek Zbořil, Ph.D.

Adam Mickiewicz University, Poznań, Poland

SAN4Fuel Summer School

23rd–27th June 2024

prof. RNDr. Radek Zbořil, Ph.D.

University of Trieste, Italy

CEET
Recognised Centre of Oriented Research
Incubator for Promising Employees
Internationalization
Positive Perception of the CEET

STRATEGIC OBJECTIVE 8

INTERNATIONALIZATION

INCREASING THE NUMBER OF STUDY ABROAD TRIPS AND PRACTICAL INTERNSHIPS AVAILABLE TO STUDENTS OUTSIDE EUROPE
RELATED TO THE OPERATIONAL OBJECTIVE OF VSB-TUO: C 8.1.

INTERNATIONALIZATION PROGRAMME

We place long-term emphasis on the development of international cooperation and the professional growth of our staff, especially early-stage researchers and PhD students. That is why we actively support their participation in specialised courses, international conferences, and research internships carried out under university programmes and EU co-funded initiatives. These activities contribute to building new contacts and deepening cooperation with international partners, thereby strengthening the international standing of the Centre for Energy and Environmental Technologies (CEET).

In 2024, we supported international mobility for 9 students, enabling them to complete research stays abroad. At the same time, we welcomed 6 students from partner institutions who actively participated in joint research activities at our facilities.

In total, 22 CEET researchers took part in internships, research visits, or business trips abroad over the past year. These activities contributed not only to strengthening individual expertise, but also to the development of institutional ties within international research networks.

In addition, we hosted 27 international experts at CEET, who were actively involved in joint research efforts and contributed to knowledge exchange and the further development of long-term collaboration.

CEET
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Prof. Dr. Mark H. Rümmeli

Dr. Marta Fernández-García

Prof. Akbulut Hatem

Mohammad Hossein Ahmadi

Mohammad Nazari, Ph.D.

Dr. Didier Pribat

Hossein Moayedi, Ph.D

Professor Ernesto Salzano

Prof. Milan Vujanovic

Prof. Witold Kwapinski

Prof. Vijay Ramani

Bajaj Mohit, Ph.D

Professor Leonor Calvo

Ullah Nasim, Ph.D

Overview of Students Travelling Abroad and Coming From Foreign Countries

CEET Research Centres	Number of Students Travelling Abroad	Number of Students Coming from Foreign Countries
CENET	0	1
CNT	6	3
IET	3	2
ERC	0	0
Total	**9**	**6**

Countries and Universities with Which Cooperation Was Established

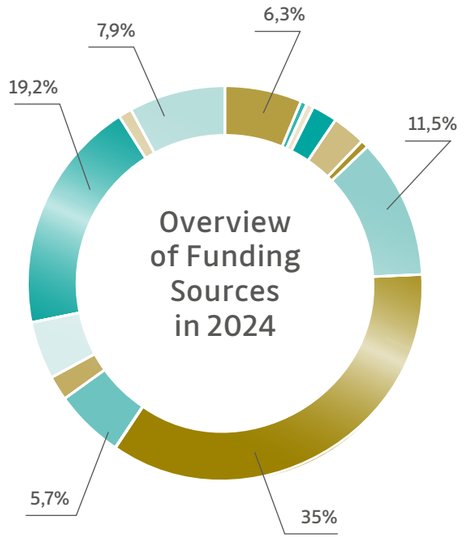
Afghanistan, Algeria, Argentina, China, Egypt, Ethiopia, France, Ireland, India, Iran, Italy, Japan, South Korea, Jordan, Cameroon, Kazakhstan, Colombia, Malaysia, Morocco, Germany, Norway, Pakistan, Peru, Poland, Greece, Saudi Arabia, Singapore, Slovenia, United Kingdom, United States of America, Switzerland,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

Overview of Outgoing and Incoming Researchers

CEET Research Centres	Number of Outgoing Researchers	Number of Incoming Researchers from Abroad
CENET	1	13
CNT	7	9
IET	10	4
ERC	4	1
Total	**22**	**27**

FINANCIAL OVERVIEW

The Centre for Energy and Environmental Technologies (CEET) at VSB – Technical University of Ostrava managed a total budget of 21.75 million EUR in 2024 and closed the year with a positive economic result of 1.10 million EUR. After tax, the net profit amounted to 0.93 million EUR. The main sources of funding included revenues from national and international research projects and grants, institutional support for the long-term conceptual development of the research organisation (DKRVO) (adjusted for university-wide mandatory expenses), contract research and supporting activities, as well as own income.

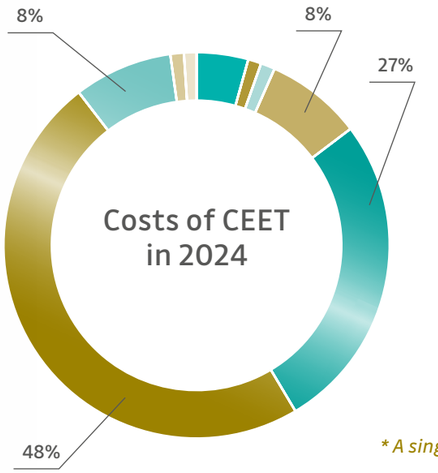


	in thousands of €*
Technology Agency of the Czech Republic – TA ČR (2203)	7621,7
Contracted research – commercial agreements (9501)	4173,6
R&D – other ministries (2202)	2492,3
Development of the Research Organisation – DKRVO (2104)	1716
Educational activity – overhead revenues (1101)	1369,9
Foreign grants (2401)	1238,9
TA ČR co-investigators (2505)	1032,4
Operational programme of the MEYS (2103)	593,7
Other MEYS projects (2102)	449
R&D co-investigators (2503)	436,1
Own resources – non-commercial activities (1501)	236,6
GAČR (2201)	135,4
Foreign grants (1401)	127,7
MEYS – wage cohesion (1105) (1105)	112,6
Moravian-Silesian Region – MSR (2303)	7,6
OP MEYS (1114)	0,4
TOTAL	**21743,8**

CEET's Revenues in 2024

	in millions of €*
Contributions, Subsidies and Grants	15,6
Commercial Activities and Own Resources	4,4
Institutional Support	1,7

Total expenditures in 2024 reached 20.64 million EUR. The largest share was made up of personnel costs and paid scholarships, accounting for 48.1% of total expenses. This was followed by the transfer of grants to project co-investigators, which represented 26.7%. Other significant cost items included other services (8.1%) and the consumption of materials and energy (4.3%).



	in thousands of €*
Personal costs and scholarships	9933,5
Transfers of grants to co-investigators	5522,8
Transfers to FÚUP and FPP	1707,6
Other services and unfinished production	1667,5
Consumption of materials and energy	892,2
Travel expenses	246,4
Overhead costs	232,4
Repairs and maintenance	227,3
Other costs	217,6
Total	**20647,2**

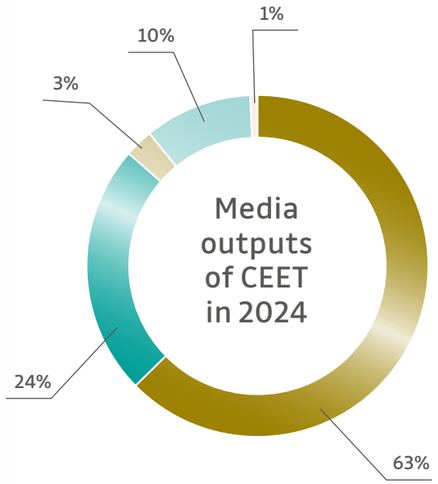
** A single exchange rate in partial years was used for the calculation.*

STRATEGIC OBJECTIVE 7

TO CHANGE THE PERCEPTION OF THE CEET BRAND INTERNALLY AND EXTERNALLY

SYSTEMATIC STRENGTHENING OF THE CEET BRAND

Our goal is to share and promote both scientific research and applied results to professional and general audiences. Media coverage of outcomes with societal relevance is an essential part of building our brand and strengthening public awareness of our institution. We are proud that our reputation is growing not only within the Czech Republic but also internationally. Cooperation with scientific and industrial partners, as well as universities, is crucial for us. Only through these partnerships can we deliver results that respond to current challenges and societal needs. In the past year, CEET was mentioned in the media 597 times – ranging from printed and online articles, through social media, to television and radio appearances. This helped us raise awareness of our work and strengthen our visibility in the public space.



Number of Outputs	
Online articles	374
Print media	142
TV	16
Social media	61
Radio	4
Total	**597**

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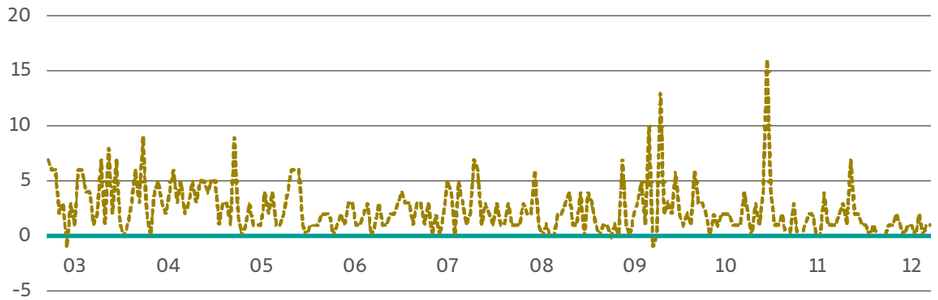
ACTIVITY ON SOCIAL MEDIA

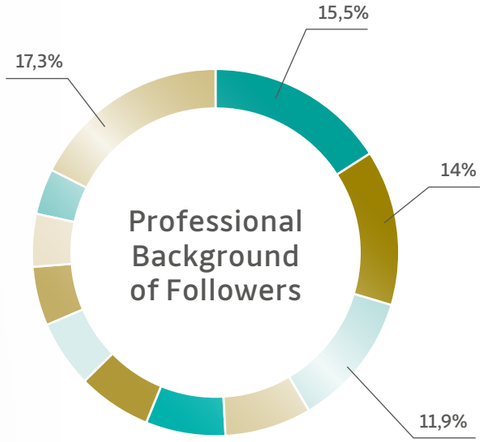
Our main platform for online communication is LinkedIn. This choice reflects the nature of our work, which focuses on research, development, and expert collaboration across academic, industrial, and public sectors. LinkedIn allows us to effectively reach the professional community, build a network of expert contacts, and communicate our results directly to partners, potential collaborators, and the broader research audience.

Over the past year, we have significantly strengthened our online presence on this platform, reaching over 1,000 followers. This growth confirms the increasing interest in our activities and the topics we focus on. We see this positive development as evidence of the relevance of our communication and the trust the professional community places in us.

Follower growth



Sponzored	0
Organic	1087



Field	
Research	15,5%
Business Development	14,0%
Education	11,9%
Operations	7,6%
Programme and Project Management	7,0%
Engineering	6,6%
Media and Communications	5,7%
Sales	5,4%
Civil and Social Services	4,7%
Information Technology	4,2%
Others	17,3%

Fénix 2024 award for CEETe fold-out book

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POPULARISATION OF SCIENCE AND RESEARCH

Over the past year, our colleagues participated in numerous conferences, workshops, and other professional events where they actively presented CEET and the results of their research. These meetings provided opportunities not only for sharing knowledge and discussing current challenges in their fields, but also for establishing new professional connections. Thanks to their efforts, we continue to raise the visibility of our centre and strengthen its position within both the professional and general public spheres.

7th Catalytic Seminar

January 25th, 2024

The seminar, traditionally held in January, is organised by the Catalysis Expert Group of the Czech Chemical Society, of which several CEET IET staff members are active participants. It is intended for students and their supervisors working in the field of catalysis. The seminar provides an overview of current research topics within different teams, fosters expert–student dialogue, and supports networking among members from various institutions. This year's participants included speakers and attendees from Charles University, University of Chemistry and Technology in Prague, University of Pardubice, Unicre ORLEN, and, of course, VSB–TUO.

International Infotherma 2024 Trade Fair

January 22nd–25th, 2024

As in previous years, we participated in the 29th edition of the international exhibition INFOTHERMA 2024. The event focused on building construction and home technology in the context of current legislation, energy prices, energy performance requirements for buildings, boiler inspections and replacements, and practical experience from submitted grant applications. Guests at the official opening included Mgr. Petr Holub, Director General of the Ministry of the Environment of the Czech Republic; Ing. Jakub Unucka, Ph.D., MBA, Deputy Governor of the Moravian-Silesian Region; and Ing. Hana Tichánková, Deputy Mayor of Ostrava. The event was also attended by Mgr. Petr Hladík, Minister of the Environment. As in previous years, Ing. Jiří Horák, Ph.D., also known as SMOKEMAN, presented his popular educational performance "SMOKEMAN's Ten Commandments of Proper Heating."

Two-Day Training Courses on Proper Heating

February and November 2024

The accredited training programme is delivered at CEET VEC and aims to broaden and update participants' knowledge of legislation, standards, and best practices in the field of heating. The programme focuses on the combustion of solid fuels in small-scale heating appliances and places strong emphasis on clear and accessible presentations, supported by numerous practical demonstrations. This approach helps participants better understand the technical and regulatory aspects of proper heating.

12th Czech–Polish Catalysis Seminar CzePoCat 2024

February 9th, 2024

The annual seminar, organised by the CEET Institute of Environmental Technology, welcomed 57 researchers from five Polish, one French, and three Czech universities, along with scientists from two institutes of the Czech Academy of Sciences. The first expert session was chaired by Prof. David Kubička from the University of Chemistry and Technology in Prague and opened with a keynote lecture titled "Green, blue, grey or white hydrogen" delivered by Prof. Janusz Ryczkowski from Maria Curie-Skłodowska University in Lublin. The morning sessions featured twelve engaging presentations on current topics in catalysis and photocatalysis. The second morning session was chaired by Prof. Agnieszka Ruppert from the Lodz University of Technology. In the afternoon, the sessions were led by Prof. Nicolas Keller from Université de Strasbourg and again by Prof. Ryczkowski.

NanoLumCat Ostrava Workshop

April 8th–10th, 2024

Leading materials scientists gathered at the NanoLumCat Ostrava – Revealing the Future of Light Transformation workshop, held at the national supercomputing centre IT4Innovations at VSB–TUO. The event brought together experts from Italy, Germany, Spain, Poland, Slovakia, China, the Czech Republic, and other countries. The central theme of this three-day event was to explore the latest advancements in carbon dots and single-atom catalysis, aiming to launch a new era of research and development in nanomaterials for sustainable development.

"Improve Your Technique" Day

April 18th, 2024

On this day, the auditorium of VSB–TUO opened its doors for the annual event "Improve Your Technique". The event attracted pupils of all grades from primary and secondary schools, along with teachers and technology and science enthusiasts. The goal 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

April 24th, 2024

As in previous years, we participated in Earth Day, a public outreach event full of workshops and educational programmes focused on envi-

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ronmental protection. Visitors could try measuring pH, learn how to properly sort waste, or observe what happens to various materials when submerged in liquid nitrogen.

"Smokeman Teaches" Educational Roadshow in Czech Cities

April–May 2024

The educational roadshow aims to introduce the public to the principles of proper combustion in local heating appliances and offer practical tips on how to operate and maintain boilers, stoves, and fireplaces efficiently. Participants could learn about basic types of heating devices, their characteristics, and even estimate the efficiency of their operation. The programme is delivered in an accessible and interactive format, helping people better understand best practices and improve the efficiency of residential heating.

11th International Conference on Chemical Technology (ICCT)

April 15th–17th, 2024

As in previous years, the ICCT conference focused on new and emerging trends in chemical and pharmaceutical technologies, with a strong emphasis on Green Deal principles and decarbonisation. The 2024 edition was held under the auspices of several important institutions, including the Ministry of Industry and Trade of the Czech Republic, the University of Chemistry and Technology in Prague, the University of Pardubice, the Faculty of Chemical and Food Technology at STU Bratislava, the Institute of Chemical Process Fundamentals of the Czech Academy of Sciences, the Association of the Chemical Industry of the Czech Republic, UniCRE, and other organisations from the Czech chemical industry. The main goal of the conference was to promote mutual exchange of knowledge and experience among industry professionals, academics, university students, scientists from the Czech Academy of Sciences, and other experts focused on innovative technologies in industrial chemistry.

Majáles Ostrava

May 17th, 2024

This traditional student festival took place at the Silesian-Ostrava Castle. Visitors to the CNT CEET booth had the chance to explore a variety of nano-themed tasks and demonstrations. One of the highlights was a „magic surface" game where participants guessed whether the surface had been treated with a special water-repellent nanocoating. In another activity, they identified common household products that might contain nanoparticles. Visitors could also enjoy an educational picture-matching game called the „Nano World Memory Game," where they matched a plant or animal, an electron microscope image, and a practical application of a nanomaterial.

13th International Colloids Conference

June 9th–12th, 2024

Members of the Industrial Chemistry research group took part in the 13th International Colloids Conference held in Sitges, Spain. This international event brought together over 200 participants from around the world to share their research findings. Both researchers presented their work in the poster session. Dr. Kateřina Klemencová presented a poster titled "Experimental study of catalytic pyrolysis of waste polypropylene over HZSM-5", focusing on the use of zeolites for breaking down polypropylene into light hydrocarbons. Dr. Barbora Grycová presented a poster titled "Aromatization of aliphatic hydrocarbons over HZSM-5".

SPASEC-27 and AOTs-28 Conferences

June 11th–14th, 2024

Researchers from the Heterogeneous Photocatalysis and Heterogeneous Catalysis group participated in the SPASEC-27 and AOTs-28 conferences, held in Limassol, Cyprus. prof. Kamila Kočí, head of the Heterogeneous Photocatalysis group, was a member of the international scientific committee and delivered an invited lecture on photocatalytic CO_2 reduction. Dr. Miroslava Filip Edelmannová also gave a short talk on the same topic.

Art & Science 2024

September 5th, 2024

We also participated in the Art & Science festival, an event where the university presents itself in a different light – not only as a place of education, science, and research, but also as a space for creative thinking that connects art and innovation. The programme combined scientific and artistic elements in a natural and complementary way. Visitors had the opportunity to tour the laboratories of the CEET Institute of Environmental Technology and CENET CEET, where they were welcomed with guided tours and interactive demonstrations.

European Researchers' Night

September 27th, 2024

During this annual event, visitors had the opportunity to explore two CEET facilities on the VSB–TUO campus: the ENET Centre, located in the CEETe building, and the Institute of Environmental Technology. The programme offered a unique glimpse into the world of modern science and technology, with a focus on sustainability and innovation in the energy and environmental fields. The theme of this year's edition was "Transformation", and the event brought to life hundreds of research buildings across the country that are typically closed to the public.

Workshop on Thermal Energy Storage and Energetic Materials

October 30th, 2024

Experts from VSB – Technical University of Ostrava and Fraunhofer ICT in Pfinztal gathered for a specialised workshop aimed at presenting current research in the field and exploring opportunities for collaboration on related topics. These collaborations may lead to joint publications and project proposals in the future. Researchers from VSB–TUO presented their work on behalf of the Nanotechnology Centre, the CEET Research Energy Centre, and the Faculty of Materials Science and Technology. The German side was represented by researchers from Fraunhofer ICT, a partner in the Fraunhofer Innovation Platform at VSB–TUO.

Ceremonial Meeting of the VSB–TUO Scientific Council

November 14th, 2024

In November, the Scientific Council of VSB–TUO held its annual ceremonial session. The event served as an occasion not only to award diplomas to new associate professors and Ph.D. graduates, but also to honour the best scientific and research achievements of the past year. Among those recognised for the Best Applied Research Result of 2023 were employees of CEET – Assoc. prof. Lukáš Prokop, Ph.D., prof. Ing. Stanislav Mišák, Ph.D., Ing. Jan Němec, Ing. Libor Hrdina, Ph.D., and Ing. David Seidl, Ph.D., as well as Assoc. prof. Miroslav Čulík, Ph.D. from the Faculty of Economics. Their work was acknowledged for the development of the ATHOS software used for simulating the energy balances of technological systems.

IMPORTANT EVENTS

Workshop: Materials & Environment Lab (MEL)

November 27th, 2024

As part of the REFRESH project, a workshop of the Materials & Environment Lab (MEL)—one of the four living laboratories—was held to present selected research activities and introduce researchers involved in the project. In addition to core researchers, new team members who joined VSB–TUO from prestigious international institutions, thanks to REFRESH, also presented their work. Young researchers were actively involved as well. The workshop brought together both Czech and international scientists. Among the speakers was prof. Dr.h.c. Pavel Hobza, DrSc., a recipient of the Česká hlava (Czech Brain) award and the Schrödinger Medal in computational sciences, presented on non-covalent interactions with a focus on their application in materials research. Mgr. Aristeidis Bakandritsos, Ph.D., a chemist and principal investigator of several European projects (including MERGE and GLAS-A-Fuel at VSB–TUO), introduced new directions in the development of low-dimensional materials for energy, environmental, and medical applications.

Workshop: Energy Lab

October 22nd, 2024

The first meeting of the Energy Lab under the REFRESH project took place with a focus on sharing knowledge and experience in energy and technological innovations, including their social dimensions in the context of the energy transition. The workshop was opened by prof. Ing. Stanislav Mišák, Ph.D., Scientific Director of the Energy Lab and Director of the CEET. The event also included a presentation of the structure and thematic focus areas of the Energy Lab, which address various aspects of the energy transition: Materials research for energy and environmental technologies, research into secondary raw materials and alternative energy sources, digitalisation and transformation of the energy sector, safety and construction efficiency of energy systems, environmental and health aspects in the energy domain.

Workshop CEET

December 9th, 2024

The fourth edition of the CEET Workshop introduced a brand-new format in the form of panel discussions. In addition to reviewing the past year, the workshop offered for the first--time structured debates that brought new perspectives on key societal and technological challenges, generating many inspiring ideas. The event, held in a friendly and open atmosphere, focused on several core topics such as nanotechnology, sustainability, green hydrogen, and the quality of air and water. The first panel discussion, “Nanomaterials for Sustainable Technologies,” was led by the Director of the Nanotechnology Centre. The second, “Utilisation of Various Types of Waste and Waste Heat,” was moderated by the Director of the Energy Research Centre. After a short break, the third panel “Green Hydrogen – Where Will Hydrogen Technologies Thrive?” followed, led by the Director of the ENET Centre. The final discussion, titled “Clean Water, Fresh Air: Mission (Im)possible?”, was chaired by the Director of the Institute of Environmental Technology. The event concluded with a summary by the Director of CEET.

Educational Video Courses on ČTEdu: “HOW TO PROPERLY HEAT? Smokeman‘s Ten Commandments”.

The Research Energy Centre has entered into a licensing agree - ment with Czech Television for the placement of educational videos on ČT edu and iVysílání for a period of ten years. The educational videos are available on the ČT edu website.

VSB TECHNICAL UNIVERSITY OF OSTRAVA | CENTRE FOR ENERGY AND ENVIRONMENTAL TECHNOLOGIES

ANNUAL REPORT 2024

VSB-Technical University of Ostrava

CENTRE FOR ENERGY
AND ENVIRONMENTAL TECHNOLOGIES

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The Annual Report of CEET for the year 2024 was approved by the Scientific Council of CEET on May 26th, 2025 and is available electronically on the website

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