INTERNATIONAL CONFERENCE
ON CLEANER ENERGY TRANSITION

ICCET 2024

21-23 OCTOBER 2024
KRAKÓW, POLAND

CONFERENCE PLAN

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ENERGETYKA WODNA

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

ABOUT THE CONFERENCE

The International Conference on Cleaner Energy Transition (ICCET 2024), hosted by Cracow University of Technology from October 21-23, 2024, aims to bring together leading researchers, policymakers, and industry professionals to discuss critical topics in energy transition. The focus will be on sustainable technologies like renewable energy systems, energy storage, cleaner energy policies, and energy efficiency improvements. The conference will serve as a platform for presenting cutting-edge research, sharing best practices, and fostering collaborations. The conference will also be a wonderful opportunity to celebrate the golden jubilee of Professor Jan Taler's 50-year career of scientific work in the energy field.

The International Conference on Cleaner Energy Transition (ICCET 2024) will address several key topics related to sustainable energy technologies and strategies, including:

Renewable Energy Systems

Advancements in solar, wind, hydro, biomass, and geothermal energy solutions.

Energy Storage

Innovations in battery technologies, thermal storage, hydrogen energy storage, and grid integration.

Energy Efficiency

Enhancing efficiency in buildings, industries, and transport systems through smart energy management and low--carbon technologies.

Cleaner Energy Policies

Exploring policies promoting cleaner energy, decarbonization strategies, and regulatory approaches for energy transition.

Sustainable Infrastructure

Integrating renewable energy into resilient and flexible energy infrastructures.

The conference will provide a platform for international experts to discuss these topics, share research, and present case studies of energy transition projects. Additionally, topics such as decarbonization pathways, energy security, and socioeconomic impacts of the cleaner energy transition will be explored, emphasizing the global shift to low-emission energy systems. ICCET 2024 aims to inspire collaboration across academia, industry, and government, advancing sustainable energy practices and supporting global climate goals.

ORGANIZERS

Cracow University of Technology

Cracow University of Technology (CUT) is a prestigious institution in Poland, offering education and research opportunities in fields like engineering, architecture, computer science, and environmental science. Established in 1946, it has become a leading technical university renowned for its contributions to innovation, science, and sustainable development. CUT comprises eight faculties, including architecture, civil engineering, and electrical engineering, and is deeply engaged in international collaborations and research projects funded by the European Union. It also plays a vital role in technology transfer and industrial partnerships. CUT is actively involved in various interdisciplinary research projects, addressing global challenges such as climate change, energy efficiency, and smart cities. The university is known for fostering close ties with industries and providing students and researchers with practical opportunities to apply their knowledge to real-world problems. With a strong commitment to both education and innovation, Cracow University of Technology aims to shape the next generation of engineers and scientists, preparing them to meet the challenges of a rapidly changing world.

Centrum Doskonalenia
Badań Naukowych
Politechniki Krakowskiej

The Center for Scientific Research Excellence (CDBN) at Cracow University of Technology (CUT) was established to enhance scientific effectiveness across various disciplines through interdisciplinary collaboration. The center aims to support researchers by forming multidisciplinary teams that publish high-impact papers, prepare project proposals, and improve international cooperation. CDBN is crucial in fostering collaborations between academia and industry, supporting research projects, and organizing specialized training for CUT researchers. The center also contributes to the success of NCN, NCBiR, and Horizon Europe project applications.

Department of Energy
Cracow University of Technology

The Department of Energy at Cracow University of Technology focuses on cutting-edge research and education in heat transfer, renewable energy, and energy system optimization. The department has a strong team of professors and researchers led by Prof. Jan Taler. Key research areas include computer-aided thermal strength analysis, heat exchangers, solar collectors, and hybrid energy systems. The department is equipped with advanced laboratories for practical research in energy systems, offering specializations in nuclear engineering, energy systems, and computer modeling in the energy sector.

RESHeat

Funded by
the European Union

The **RESHeat** project is an innovative initiative under the EU Horizon 2020 program aimed at developing a **zero-emission and autonomous energy system** based on **renewable energy sources** (RES). It focuses on **trigeneration,** delivering heating, cooling, and electricity to reduce energy demand in residential and public buildings while minimizing reliance on fossil fuels. The system integrates advanced **solar energy technologies,** including **sun-tracking photovoltaic (PV) panels and solar collectors,** which enhance the efficiency of energy capture. A significant feature of the project is its **seasonal underground thermal energy storage system.** Excess heat collected during the summer months is stored underground and can be used for heating in colder seasons. This ensures a reliable year-round energy supply. The goal is to meet **at least 70%** of the total energy demand of multi-family residential buildings through renewable sources. The project also incorporates the use of **heat pumps.** These are vital for both **heating and cooling,** as they transfer thermal energy with minimal electricity usage. In combination with solar technology, **solar-assisted heat pumps** enhance the overall efficiency of the system. The pumps are crucial for converting low-grade heat from underground storage into usable energy for residential heating or for cooling in warmer climates. This makes the RESHeat system adaptable to different regions and building types, ensuring **sustainable energy management.** The project's demonstrations are taking place in **Kraków and Limanowa** in Poland, as well as in the Palombara Sabina, Italy. These demonstration sites will test the system's **scalability and economic efficiency** for buildings

with varying apartment sizes. Beyond the technology, the project is strongly focused on the **commercialization** of its innovations.

The project is being implemented with the collaboration of several key partners, including Cracow University of Technology, project Coordinator; FHU Czamara SC (Polish HVAC company), OILON OY (heat pump manufacturer from Finland), Brno University of Technology, La Sapienza University of Rome, ELFRAN Franciszek Ścisłowicz (small Polish sun-tracked solar collectors and PVT manufacturer), ATER Provincia di Roma (housing authority in Rome) and Municipal Buildings Management Board in Kraków.

RESHeat system Installation in Cracow

RESHeat system Installation in Limanowa

RESHeat system instalation in Palombara Sabina

PROJECT PARTNERS

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KEYNOTE
SPEAKERS

Ali Cemal Benim

Duesseldorf University of Applied Sciences, Germany

Title: Hydrogen Combustion for Carbon Neutrality: Challenges and Computational Modelling

BIO

Prof. Dr.-Ing. habil. Ali Cemal Benim received his B.Sc. and M.Sc. degrees in Mechanical Engineering at the Bogazici University, Istanbul, Turkey. He earned his Ph.D. degree at the University of Stuttgart, Germany, at the Institute of Process Engineering and Power Plant Technology of the Faculty of Energy Technology with degree of distinction (summa cum laude) on the topic Finite Element Modeling of Turbulent Flames. Subsequently, he worked about seven years in the R&D department Thermal Machinery Laboratory of ABB Turbo Systems Ltd. in Baden, Switzerland. He was the manager of the group Computational Flow and Combustion Modeling. Since 1996, he is Professor for Energy Technology at the Düsseldorf University of Applied Sciences, at the Faculty of Mechanical and Process Engineering, since 2012 leading the Center of Flow Simulation (CFS). His research focuses on mathematical modelling and computational simulation of fluid flow, heat and mass transfer in a wide range of engineering applications, with emphasis on energy technology. Prof. Benim is the Executive Editor of "Progress in Computational Fluid Dynamics", Editor-in-Chief of "Computation" and the Section Editor-in-Chief of "Fire", and has further editorial positions in a number scientific journals.

ABSTRACT

The goals of sustainability and decarbonization are leading to an increasing use of environmentally friendly, low-carbon, and carbon-free fuels. Hydrogen is a carbon-free energy carrier and is being hailed as the carbon-neutral fuel of the future, especially in the form of green hydrogen. Nevertheless, the unique properties of hydrogen pose new challenges for combustion technologies as well as safety and transportation aspects. These challenges can be mitigated by using other hydrogen carriers, such as ammonia, but this leads to further challenges. The presentation will give an overview of the use of hydrogen and hydrogen-based fuels and the associated challenges. This will be followed by computational studies on certain aspects of the combustion of hydrogen fuels.

Wojciech Bujalski

Warsaw University of Technology, Poland

Title: Technologies for the district heating of the future

BIO

Prof. Wojciech Bujalski, Director of the Institute of Heat Engineering at Warsaw University of Technology, has over 20 years of experience in district heating and energy systems. He has led or participated in more than 11 research projects and over 50 industry collaborations, with a focus on energy storage, optimization, and Smart Energy Systems. Prof. Bujalski's research has resulted in over 70 publications and numerous conference presentations. He received the Siemens Scientific Award for his contributions to heat accumulator technologies and continues to explore innovative solutions in energy management and district heating optimization. His recent work includes the project "Innovative phase-change heat and cold stores in a modern district heating installation," aimed at optimizing heat and cold generation in district heating substations. Prof. Bujalski also has a deep interest in the economic aspects of the energy industry, supported by his postgraduate studies in Capital Investments and Company Development. He is widely recognized as an expert, regularly chairing international conferences on district heating and cogeneration. His research interests now extend to distributed energy systems, and he continues to drive advancements in energy transition technologies, contributing both to academic research and practical industrial applications.

ABSTRACT

A paper will present the state of the Polish district heating sector. It is necessary to take a broader view of the energy sector to assess it fully, as there is currently a substantial overlap between the sectors. The sector that will have the most significant impact on the district heating sector is likely to be the power industry. Another essential element in diagnosing the district heating sector is describing the legal environment. This is a series of legal acts forcing the transformation of district heating. Perhaps the most crucial element at present is the Energy Efficiency Directive. The combination of these two elements defines the district heating sector's challenges. The analysis focuses on the district heating sector's challenges and addresses industry-related issues. The presentation will outline the basic technologies for the district heating sector and assess their role in the future.

Fei Duan

School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

Title: High-efficiency Cogeneration Power System from Gas Turbine Fueled with Low Carbon Emissions

BIO

Dr. Fei Duan joined Nanyang Technological University (NTU), Singapore, in July 2008; now, he works there as a tenured faculty in the School of Mechanical and Aerospace Engineering at NTU. He graduated with his Ph.D. degree from the University of Toronto, Canada, in 2005. He also worked as a visiting scientist at the Institute of Fluid Mechanics at Friedrich-Alexander--University, Erlangen-Nuremberg, Germany. The topics of his research cover thermofluids, enhanced thermal management, efficient energy systems, etc. At NTU, Dr. Duan has secured over 12 million Singapore dollars in research funding from governmental agencies and industries as a principal investigator. have advised over 28 postdoctoral fellows or research associates, 18 Ph.D. students, and 14 Master's students. He has published over 180 peer-reviewed journal papers, 4 patents, 5 book chapters, and 120 conference presentations. He serves as Subject Editor for Applied Thermal Engineering (Elsevier, Impact Factor: 6.4) and on the Editorial Board for Scientific Reports (Nature Portfolio, Impact Factor: 4.8) and Frontiers in Heat and Mass Transfer (Tech Science Press).

ABSTRACT

We have designed a power cogeneration system from liquefied natural gas (LNG) as a fuel. The cogeneration system combines the gas turbine system and a self-designed thermoacoustic engine. The system applies LNG, which removes harmful emissions, including nitrogen oxide, sulfur oxide, particulate matter, etc., and reduces CO2 emissions in comparison to traditional long-carbon-chain fossil fuels. Although LNG is convenient for transporting and storing, it should be regasified before being applied in a gas turbine for electric power generation. We have explored reusing the cold energy source from LNG at the cryogenic level and waste heat from the gas turbine for the second power generation to improve the overall thermal efficiency of the system. The thermoacoustic engine, having a high efficiency with a low maintaining cost, has been applied. The talk covers the application review of LNG, the design of the thermoacoustic engine at the kilowatt level, regasification of LNG, phase change storage, and overall system test. Thermal, economic, environmental, and sustainability models have been developed for LNG-powered cogeneration systems. We are extending the models in the present project on the ammonia-based gas turbine system for low carbon emission.

Kamel Hooman

Delft University of Technology, Netherlands

Title: Commodifying Heat for a Sustainable Future

BIO

Kamel Hooman studied and worked at The University of Queensland (Australia) before joining TU Delft as a Professor and Chair of Heat Transformation Technology in 2022. Kamel is proud of his service to community through educating future engineers and mentoring young researchers. He conducts fundamental and applied research using a combination of numerical, experimental, and theoretical techniques. His work was rewarded by industry and funding agencies in Australia and overseas. He received several grants, awards, and fellowships from different agencies, including The Australian Research Council and the Australian Academy of Science. He was named the Australian Research Field Leader in the field of Thermofluids. He serves as an Associate Editor for the International Journal of Heat and Mass Transfer. He chaired and organized an IAHR international conference on heat exchangers and cooling towers in Australia while serving on many international conference committees. He delivered plenty of keynotes and plenaries at international conferences in the US, EU, and Asia. He had visiting positions in Poland, China, Germany, Malaysia, Italy, and France. He co-edited two books on convection in porous media and thermal energy storage, both published by CRC. He has contributed to many books through chapters and published over 200 papers in international journals while delivering over 50 invited conference plenary and keynotes.

ABSTRACT

A significant part of our global primary energy is wasted as heat. Some reports evaluate it to figure out at about 50%. Recovery and reuse of this waste heat is challenging but possible. One of the main challenges is the mismatch between heat sink (demand) and (waste heat) source. To close these spatial and temporal gaps, heat should be stored and ideally packaged to be transportable. In that case, an international market for heat can be envisioned where, depending on the enthalpy, temperature, and the time when heat is available, an agreed market value per kWh of heat transaction can be decided. This presentation further expands on this vision and shares recent results obtained to achieve these goals.

Jan Kiciński

Institute of Fluid Flow Machinery, Polish Academy of Sciences, Poland

Title: Distributed generation, smart community and smart residential - Is this our future?

BIO

Professor Jan Kiciński, a member of the Polish Academy of Sciences (PAN), is the head of the Department of Distributed Energy at the Institute of Fluid Flow Machines of the Polish Academy of Sciences (IMP PAN) in Gdańsk. Earlier, for several terms, he was the director and deputy director of scientific affairs at this institute. He was the head of several high-budget, nationwide research projects in the field of eco-energy and new renewable energy technologies. He is a doctor of honoris causa of the AGH University of Science and Technology in Krakow and the University of Warmia and Mazury in Olsztyn.

He was the head of the project: „Construction of the Research Center of the Polish Academy of Sciences - Energy Conversion and Renewable Sources". As a result, the largest and most modern center of this type in the country and one of three in Europe were created. He is a laureate, among others, of the National Energy Globe Award (the most prestigious international award in the field of environmental protection under the auspices of UNESCO and UNEP), the Prime Minister of the First Degree for Scientific and Technical Achievements award, and Siemens Research Award.

ABSTRACT

The authors of this article try to find answers to these and many other questions. Today we can already accept as a proven thesis that rapid and dangerous for our civilisation climate changes can also be attributed to high carbon and low-efficient power engineering. Power engineering and climate neutrality are no longer just problems for politicians, companies, and scientists but have become a challenge for our civilization. The foregoing general remarks, but also the fact that a gradual transition from traditional large-scale fossil fuel-based energy generation to distributed energy generation based on renewable resources is inevitable, constitute the main message of this article. Smart community and smart residential play a key role in this process. The article also aims to discuss the role of the Institute of Fluid-Flow Machinery of the Polish Academy of Sciences (IMP PAN) in Gdańsk in the process of energy transformation in our country.

Artur Kępczyński

Inspectorate for Armed Forces Support, Polish Armed Forces, Poland

Title: Energy transformation – challenges to armed forces

BIO

Major General Artur Kępczyński is an active-duty soldier. Since 2021, he has served as the Chief of the Inspectorate for Armed Forces Support (IAFS). This command is responsible for providing logistic support to Polish soldiers both at home and abroad. MG Kępczyński earned his B.Sc. degree from the Motor Transport Military Academy in Pila (Poland) and an M.Sc. degree in Mechanical Engineering from the Military Academy of Technology in Warsaw. Additionally, he completed Postgraduate Studies in Defence Policy at the War Studies University in Warsaw, as well as several NATO courses during his career. Over the past 30 years, Major General Kępczyński has held various positions in the scope of logistics within the Polish Armed Forces in Poland and abroad in Polish Military Contingents (including UNIFIL in Lebanon from 1997 to 1998), as well as in NATO, EU, and UN commands. Notable positions include roles at the JHQ Center in Heidelberg, Germany (2001-2003); the Regional Operations Center AFSOUTH in Naples, Italy (2003-2004); and HQ EUFOR Tchad/RCA at Mount Valerien, France (2008-2009). His scientific interests primarily focus on optimizing military logistics networks and ensuring the energy resilience of the armed forces.

ABSTRACT

All NATO nations are undergoing an energy transformation due to challenges related to climate protection, dependence on foreign energy resources, and advancements in new technologies. The implementation methods and legal frameworks vary, impacting the development of armed forces differently. This has a direct influence on each state's defense policy and poses risks associated with potential variations in the adoption of new solutions for specific armed forces. Tests, analyses, and some completed implementations highlight limitations and challenges in electrifying combat platforms, emphasizing hybrid solutions. Despite this, the energy demand within armed forces continues to grow. Based on available data, it is unlikely that fully electric tactical vehicles will be introduced into armed forces before 2040.

Vivien L. Lu

The Hong Kong Polytechnic University, Hong Kong

Title: Nature-inspired solutions for building efficiency

BIO

Professor Vivien L. Lu is a distinguished researcher in the fields of renewable energy and building energy engineering, and has authored six books/handbook chapters and over 320 SCI journal papers. Recognized as a Highly Cited Researcher in Engineering by Clarivate Analytics and ranked among the World's Top 2% Scientists in Energy by Stanford University, Professor Lu has been invited to present more than 70 plenary/keynote speeches and public seminars on an international and local scale. Her research interests span a variety of cutting-edge topics, such as strategically exploiting renewables, developing nanomaterial solutions for urban skins and advancing building energy efficiency. Professor Lu's contributions to the field have been acknowledged through numerous prestigious awards, including Gold Medals at the Geneva Inventions (2016; 2024), the Second-Class Innovation Award from the Ministry of Education of China (2019), 2017 Hong Kong Green Innovations Award, and US TechConnect 2017 Global Innovation Award, among others. In addition to her research achievements, Professor Lu plays a pivotal role in the academic and professional community. She leads the Energy Institute's Hong Kong Branch as Chairwoman and serves as Vice President of the Solar Energy Society of Hong Kong. Her editorial expertise is widely recognized, as she holds positions such as Section Editor-in-Chief, Associate Editor, and Guest Editor, and is a member of the editorial boards for several preeminent journals in the energy sector.

ABSTRACT

In the natural world, there are numerous „master builders" that inspire us to employ passive design in creating energy-efficient and sustainable buildings and cities. For example, the ventilation and thermal regulation mechanisms of termite mounds in Zimbabwe, the passive cooling effect brought about by the unique hair structure on the heads of silver ants in the Sahara Desert, and the ability of beetles in the Namib Desert to harvest water from the air, all provide us with valuable inspiration for engineering application. Through this lecture, we will explore the working principles of these nature „architects" and discuss their application strategies in architectural design, with a focus on advancing towards a low-carbon community.

Yang Liu

Linköping University, Sweeden

Title: Sustainable Smart Manufacturing – current reality and future prospect

BIO

Yang Liu holds an M.Sc. and D.Sc. (Tech.) from the University of Vaasa, Finland, and is currently a Senior Associate Professor at Linköping University, Sweden, and an Adjunct Professor at the University of Oulu, Finland. His research covers sustainable smart manufacturing, product service innovation, and autonomous systems.

Prof. Liu has authored over 130 Web of Science publications and ranks among the top 1% of scientists globally in Engineering and Technology. He serves as Co-Editor-in--Chief of Cleaner Engineering and Technology and holds editorial positions in several prestigious journals.

ABSTRACT

Innovations in smart technologies, such as the Internet of Things, Cyber-Physical System, Cloud Computing, Artificial Intelligence, Big Data Analytics, Digital Twin, etc., have enabled the progress of smart manufacturing. There is a lot of existing research on smart manufacturing and sustainable manufacturing. However, some problems are difficult but have not been adequately addressed so far. Sustainable smart manufacturing aims to integrate and apply various smart technologies in the entire lifecycle and decision-making processes, discover the real potential of lifecycle big data, achieve data and knowledge sharing among all lifecycle stages, and support the achievement of sustainable smart manufacturing in a lifecycle perspective. The talk will provide a comprehensive system view of sustainable solutions, especially in the production and operations management, and emerging technologies in digitalization and modelling to create the new paradigm of sustainable smart manufacturing in a broader range of product lifecycles. The current state of the art and challenges are examined, and future research directions are suggested.

Piotr Michorczyk

Cracow University of Technology, Poland

Title: Catalytic processes in the service of energy storage

BIO

Piotr Michorczyk is an Associate Professor at the Department of Organic Chemistry and Technology, Cracow University of Technology. He completed his PhD (2005) and DSc (2013) in chemical technology. He is the leader of the Chemical Technology and Industrial Catalysis Group (CTIC). He published more than 90 scientific papers (57 Scopus) in pre-reviewed journals and 7 patents. Piotr Michorczyk works in the field of heterogeneous catalysis and organic synthesis using micro-, mesoporous, as well as 3D printed materials as a catalyst. The goal is the design and construction of better catalysts for cleaner and more efficient processes for main chemical production as well as alternative ways for energy storage in organic compounds. His main interests are heterogeneous catalysts, dehydrogenation processes of hydrocarbons, and chemical utilization of CO2 and hydrogen production.

ABSTRACT

Hydrogen produced from renewable energy sources is considered a promising future fuel due to its high energy density and zero CO2 emissions. Despite extensive studies focused on "green production" of hydrogen, safe and long-term storage of hydro -gen is a major task in the development of a hydrogen economy. Great potential in this field offers technology based on chemical supports like liquid organic hydrogen carriers (LOHCs). Typically, LOHCs are organic molecules that can be reversibly hydrogenated and dehydrogenated to release H2. The technology (both hydrogenation/dehydrogenation steps) required the catalysts, which are crucial for reasonable conversion per-pas and high selectivity. This presentation focused on catalysts applied in the hydrogen release step (dehydrogenation steps). Correlation between catalytic properties, such as conversion per-pass, selectivity, and stability, as well as catalytic composition and structure of catalysts, will be discussed in detail. The possible application of LOHC technology in stationary and mobile energy storage will also be discussed.

Sandro Nižetić

University of Split, Croatia

Title: Photovoltaic technologies: Current state, applications, and future challenges

BIO

Prof. Dr. Sandro Nižetić, a Full Professor at the University of Split, Croatia, specializes in thermodynamics, energy efficiency, and renewable energy systems. With over 20 years of teaching experience, he has led numerous national and international research projects and worked with UNDP on energy efficiency in public buildings. He has held leadership roles, including Deputy Minister in Croatia and Vice Dean of Research at FESB. Prof. Nižetić has organized major international conferences, published over 200 papers, and received prestigious awards, including the Croatian State Prize and multiple Rector's Prizes. He is ranked among the top 2% of the world's most cited scientists from 2019-2022 according to Stanford and Elsevier. He also serves as Editor-in-Chief and Associate Editor for renowned journals like *Energy Sources Part A* and *Solar Energy*. He is actively involved in advancing energy technologies and continues to contribute to global research efforts on sustainability and renewable energy solutions.

ABSTRACT

Currently, the leading globally installed worldwide renewable energy capacities are related to photovoltaic technologies (PV). The present market available PV technologies are mostly silicon-based, which are the oldest ones. However, they are the most reliable and with favorable economic aspects. To secure a further desired rise in installed PV capacities, progress toward performance improvement is necessary. However, the novel possible application areas for current PV technologies should also be extended to meet global targets regarding overall installed PV capacities worldwide, considering the ongoing energy transition. The present status of the market available PV technologies will be discussed, together with some novel PV technologies that are still under ongoing research, however, with potential for future possible market implementation. The issues related to PV waste and recycling will also be discussed and highlighted as they play an important role.

Jan Taler

Department of Energy, Cracow University of Technology, Poland

Title: A new method for flow-thermal and strength calculations of supercritical steam superheaters

BIO

Prof. Jan Taler, a Full Professor at Cracow University of Technology, has served as Director of the Department of Energy for over 33 years. He holds a Ph.D. and D.Sc. in Mechanical Engineering and has been recognized with numerous awards, including the Siemens Prize for Research. Prof. Taler has published over 450 papers, 12 books, and is highly cited with over 3,000 citations. His expertise includes heat transfer, inverse heat conduction problems, boiler dynamics, and thermal stress monitoring, and he has developed several advanced numerical methods and systems for power plant monitoring and optimization. Prof. Taler's extensive research in thermal engineering has led to significant contributions to heat exchanger design, ash fouling monitoring in coal-fired boilers, and steam boiler operations. He pioneered a computer-based system for online monitoring of thermal stresses, which helps predict the lifespan of pressure components in steam boilers. Additionally, his work in developing methods for measuring heat flux and heat transfer coefficients has had a lasting impact on the field. He is an active member of several prestigious organizations, including the Polish Academy of Sciences and the International Centre for Heat and Mass Transfer. Prof. Taler has also served in leadership roles, such as Vice-chairman of the Thermodynamics and Combustion Committee and Vice-president of the Association for Education in Power Plant Machinery.

ABSTRACT

A method for calculating heat exchangers is proposed, dividing the exchanger into finite volumes. The momentum and energy equations are solved analytically within each volume, accounting for fluid properties. Steam pressure changes are computed numerically, while heat transfer at the tube's outer surface includes convection, radiation, and deposits. This explicit method, suitable for sub- and supercritical pressures, simplifies the calculation without solving nonlinear equations. The approach is applied to a 900 MWe boiler's superheater, providing detailed temperature and stress distributions. A new friction factor formula for rough tube surfaces is also introduced.

Qiuwang Wang

Xi'an Jiaotong University, China

Title: Spatio-temporal thermal resistance control for gravity driven solid granules thermal processes

BIO

Dr. Qiuwang Wang, Professor of School of Energy & Power Engineering, Xi'an Jiaotong University, China. His research interests include heat transfer enhancement and energy saving, energy storage fundamentals and technology, heat transfer under extreme conditions, heat transfer in porous media, and prediction and optimization of thermal and fluid problems. He is a Fellow of ASME, a China Delegate of the Assembly for the International Heat Transfer Conference (AIHTC), an executive member of the Scientific Council of the International Centre for Heat & Mass Transfer (ICHMT), a Vice President of the Chinese Society of Engineering Thermophysics in Heat & Mass Transfer. He is the founding Editor-in-Chief of Energy Storage and Saving, the Associate Editor of the International Journal of Heat and Mass Transfer, Heat Transfer Engineering, and the Editorial Board Member for several international journals such as Renewable and Sustainable Energy Reviews, Energy Conversion and Management, Energy, Applied Thermal Engineering, etc. He is the founding chair of two international conferences: the International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control (IWHT, since 2011) and the International Conference on Energy Storage and Saving (ICENSS, since 2022). He has also delivered more than 40 Plenary/Keynote lectures at international conferences.

ABSTRACT

More than 4.5 billion tons of solid granules with high temperatures are produced annually in relevant industries such as metallurgy, chemical engineering, and building materials production. Over 300 million tons of standard coal are consumed and the unused waste heat exceeds 100 million tons in those fields. Traditional cooling techniques like water quenching result in a significant discharge of waste gas/water. Therefore, improving energy efficiency and material utilization during industrial processes and achieving the reduction of solid waste are of great importance for the efficient energy conservation of process industries. In the traditional calcination process, the external over-burning and internal under-burning of a single granule contribute to high energy consumption and poor quality of product. The high-temperature granules with wide particle sizes also present considerable obstacles to the recovery of waste heat using traditional fixed beds, moving beds, and fluidized beds. Addressing the above-mentioned issues, we proposed a principle of spatio-temporal thermal resistance control for gravity-driven solid granules thermal process equipment. The calcination technology with multi-dimensional alternating heating was developed to realize the temporal thermal resistance control of granules. Also, high-efficiency waste heat recovery technologies were implemented to address the issue of high apparent thermal resistance. Based on the above technologies, integrated equipment, including uniform calcination, granules grading, and efficient heat recovery, was developed.

Sebastian Werle

Silesian University of Technology, Gliwice, Poland

Title: Circular Economy: Maximizing Resource Efficiency through thermochemical Conversion Technologies

BIO

Sebastian Werle is a professor and habilitated doctor of technical sciences, specializing in environmental engineering and energy. Since 2024, he has been the Vice-Rector for Science and International Cooperation at the Silesian University of Technology. He was also the Coordinator for the Priority Research Area on Climate and Environment Protection, Modern Energy. Additionally, he serves as the Head of the Renewable Energy Laboratory at the Department of Thermal Engineering. He is the project leader grants funded by European funds (FP7 and Horizon Europe) and national grants. He is a member of the editorial board of the Journal of Power Technologies and has been a member of the Polish Institute of Combustion since 2010. Since 2019, he has been a member of the Energy Commission of the Polish Academy of Sciences branch in Katowice. He is a Member of the Committee on Environmental Engineering of the Polish Academy of Sciences for the term 2024-2027 and Member of the Committee on Thermodynamics and Combustion of the Polish Academy of Sciences for the term 2024-2027.

ABSTRACT

The paper explores the processes of gasification and pyrolysis of various types of waste biomass, as well as the processes of solvolysis and oxidative liquefaction of composite waste materials. Experimental research was conducted to investigate these processes. The study emphasizes the significance of the circular economy aspect. It highlights the importance of circular economy practices in addressing waste management challenges and achieving sustainable resource use.

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

MONDAY
21 OCTOBER 2024

DAY 1

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

8:00 – 8:45 | **Registration** | ‘Kotłownia’ hall

9:00 – 9:15 | **Conference Opening** | ‘Działownia’ hall

1. **Opening remarks:** Prof. dr hab. inż. Paweł Ocłoń and Prof. dr hab. inż. Jan Taler
2. **Opening remarks:** Prof. dr hab. inż. Andrzej Szarata (Rector of CUT)
3. **Opening remarks:** dr hab. inż. Stanisław Rybicki, prof. PK (Dean of Faculty of Environmental Engineering and Energy)
4. **Opening remarks:** dr hab. inż. Piotr Cisek, prof. PK (Chair of Organizing Committee)

9:15 – 10:30 | **Prof. Jan Taler 50 years of research work Jubilee** | ‘Działownia’ hall
Chairman: WIESŁAW ZIMA

1. **Presentation of Prof. Jan Taler’s research achievements** (Prof. Paweł Ocłoń)
2. **Speeches by Invited Guests and Congratulations to Prof. Jan Taler**
3. **Refreshments in GIL Gallery**

11:00
13:00

Keynote Session 1
Chairman PAWEŁ OCŁOŃ

'Kotłownia' hall

1. **A new method for flow-thermal and strength calculations of supercritical steam superheaters,** by JAN TALER, **11:00 – 11:30**
2. **Distributed generation, smart community and smart residential - Is this our future?** by JAN KICIŃSKI, **11:30 – 12:00**
3. **Commodifying Heat for a Sustainable Future,** by KAMEL HOOMAN, **12:00 – 12:30**
4. **Photovoltaic technologies: Current state, applications, and future challenges,** by SANDRO NIŽETIĆ, **12:30 – 13:00**

13:00
14:00

Lunch

'GIL Gallery', 1st floor

14:00
15:45

Session A
Chairman WIESŁAW ZIMA

'Kotłownia' hall

1. **Development of semi-empirical model of jet scrubber as a new type flue gas cleaning device,** by: JERZY GAGAN, KAMIL ŚMIERCIEW, MICHAŁ ŁUKASZUK, ANDRZEJ PAWLUCZUK, DARIUSZ BUTRYMOWICZ,TADEUSZ ZIELIŃSKI, **14:00 – 14:15**
2. **Performance of two-phase nozzle used in the ejecor devices operatring in low-temperature systems,** by: PAWEŁ JAKOŃCZUK, KAMIL ŚMIERCIEW, ADAM DUDAR, JERZY GAGAN, DARIUSZ BUTRYMOWICZ, **14:15 – 14:30**
3. **Innovative burner design for oxy-combustion of hydrogen: impact of various conditions on flame stability,** by: PIOTR BOJARSKI, MICHAŁ CZEREP, KRZYSZTOF JAMROZIAK, MATEUSZ KOWAL, JAKUB MULARSKI, DARIUSZ PYKA, ARTUR POŻARLIK, SYLWIA OLEŚ, HALINA PAWLAK-KRUCZEK, **14:30 – 14:45**

4. **Comparative techno-economic analysis of negative emission power plant vs CCGT with CCS,** by: CHAO FU, GONZALO DEL ALAMO SERRANO, PAWEŁ ZIÓŁKOWSKI, KAMIL STASIAK, MAJA KASZUBA, MILAD AMIRI, PAWEŁ DĄBROWSKI, HALINA PAWLAK-KRUCZEK, MICHAŁ OSTRYCHARCZYK, MARCIN BARANOWSKI, KRYSTIAN KROCHMALNY, MICHAŁ CZEREP, MATEUSZ KOWAL, ŁUKASZ NIEDŹWIECKI, PAWEŁ MADEJSKI, NAVANEETHAN SUBRAMANIAN, DARIUSZ MIKIELEWICZ, **14:45– 15:00**
5. **Transformation of power and heat generation industry according to the requirements of RES sector – some remarks on energy and heat storage,** by: RAFAŁ KOBYŁECKI, ROBERT ZARZYCKI, **15:00– 15:15**
6. **Biomass-fired CFBC – some recent operational data and remarks,** by: ROBERT ZARZYCKI, RAFAŁ KOBYŁECKI, **15:15– 15:30**
7. **Present and future energy status in Portugal and Slovakia,** by: FLORINDA F. MARTINS, MIROSLAVA FARKAS SMITKOVA, FRANTISEK JANICEK, **online, 15:30 – 15:45**

14:00
15:45

Session B
Chairman ARTUR CEBULA

'GIL Gallery', ground floor, room S1

1. **Sensitivity analysis of control strategy of the compressed air energy storage discharge process to obtain controllability of output power,** by: DOMINIK GRYBOŚ, JAN MARKOWSKI, JACEK LESZCZYŃSKI, PIOTR KUBALA, YOHISHIDE SUWA, **14:00 – 14:15**
2. **Small Modular Reactors as a nuclear retrofit option – safety aspects,** by: TOMASZ BURY, **14:15 – 14:30**
3. **Numerical study of the efficiency of an axial compressor rotor operating at low Reynolds numbers,** by: NATALIA KAPELA, JOANNA JÓJKA, **14:30– 14:45**
4. **Carnot battery with steam accumulator and pebble bed thermal energy storage,** by: VLADIMIR D. STEVANOVIC, LARS O. NORD, SANJA MILIVOJEVIC, MILAN M. PETROVIC, MILOS LAZAREVIC, **14:45– 15:00**

5 | **Renewable thermal energy storage system with sand battery,** by: MAKSYMILIAN HOMA, PAWEŁ ŻAK, RAFAŁ DAŃKO, WOJCIECH GORYL, KRZYSZTOF SORNEK, KAROLINA PAPIS-FRĄCZEK, **15:00– 15:15**

6 | **Phase Change Material for Thermal Management of High-Temperature Proton Exchange Membrane Fuel Cells in Electric Vehicle,** by: NADIYA PHILIP, PRAKASH C. GHOSH, **online, 15:15 – 15:30**

7 | **Heat transfer analysis on a longitudinal din attached to a beta - type Stirling engine,** by: ISHITA RAI, RAJEEV KYMAR, **online, 15:30 – 15:45**

14:00 – 15:45 | **Session C** | Chairman WOJCIECH BUJALSKI | 'GIL Gallery', 2nd floor, room 206

1 | **Optimization of the control curves of load-changing nuclear power units taking into account thermal stress,** by: PAL SZENTANNAI, LÉA DÉSESQUELLES, CAMILLE MATTER, BÁLINT PUDLEINER, TAMÁS FEKETE, **14:00 – 14:15**

2 | **Studies on the adsorption of organic dyes on the photoanode in dye-sensitized solar cells,** by: AGATA ZDYB, EWELINA KRAWCZAK, MARCIN ŁAPIŃSKI, AGNIESZKA NOSAL-WIERCIŃSKA, GRZEGORZ GAZDOWICZ, **14:15 – 14:30**

3 | **Thinking ground source heat pumps for renewable energy communities: an Italian case-study, by:** LEONE BARBARO, GABRIELE BATTISTA, EMANUELE DE LIETO VOLLARO, MIRIAM DI MATTEO, COSTANZA VITTORIA FIORINI, ANDREA VALLATI, ROBERTO DE LIETO VOLLARO, **14:30– 14:45**

4 | **Theoretical framework and mathematical modelling of acoustic metamaterials for enhanced wave manipulation,** by: BARTŁOMIEJ CYWKA, ANDRZEJ FRĄCKOWIAK, WOJCIECH PROKOPOWICZ, **14:45– 15:00**

5 | **Energy implications of circular economy solutions and renewable energy integration,** by: PETAR SABEV VARBANOV, **15:00– 15:15**

6 | **The impact of power units on air quality on a university campus located in the center of an urban agglomeration,** by: ROBERT CICHOWICZ, MACIEJ DOBRZAŃSKI, DAMIAN MUNIAK, JAROSŁAW MÜLLER, **online, 15:15 – 15:30**

15:45 – 16:00 | **Coffee Break** | 'GIL Gallery', 1st floor

16:00 – 17:00 | **Poster Session 1** | Chairman SANDRO NIŽETIĆ | 'GIL Gallery', 1st floor

1 | **Prediction of thermal parameters for individual tube rows of finned heat exchangers using artificial neural networks,** by: MATEUSZ MARCINKOWSKI, TOMASZ CIEŚLIK, DAWID TALER, JAN TALER, EWELINA ZIÓŁKOWSKA

2 | **Modeling hydrogen storage in salt caverns,** by: MAGDALENA SZYMKIEWICZ, TOMASZ SOBOTA

3 | **Thermal and rheological properties of phase change material doped with carbon-based additives,** by: EWELINA RADOMSKA, BARTOSZ NOWAK, JANUSZ KOPYTOWSKI, KINGA PIELICHOWSKA

4 | **Outdoor characterisation of the photovoltaic module in the weather conditions of Poland,** by: SLAWOMIR GULKOWSKI, EWELINA KRAWCZAK, ŁUKASZ POPŁAWSKI, MIKOŁAJ SIEŃKO, MARTYNA MICHALCZUK, GABRIELE MALGAROLI, JOSE VICENTE MUNOZ DIEZ

5 | **Marine plastic waste management according to circular economy concept through the interdisciplinary and international cooperation,** by: ANETA MAGDZIARZ, JIAWEI WANG, CHUNFEI WU, JAMES SULLIVAN, AGATA MLONKA-MĘDRALA

6 | **Characteristics of boiling heat transfer and flow resistance during HFE-649 flow in an annular minichannel,** by: MAGDALENA PIASECKA, SYLWIA HOŻEJOWSKA

7 | **Effect of stationary ats on the reduction of ammonia (NH3) emissions from process gases of industrial heat and chemical treatment furnaces,** by: BARTOSZ CIUPEK

8 | **Thermal studies of selected plastic waste co-pyrolysis, by:** AGNIESZKA KIJO-KLECZKOWSKA, MARCIN, GAJEK, JAROSŁAW KRZYWAŃSKI, ADAM GNATOWSKI, KRZYSZTOF KNAŚ, MAGDALENA SZUMERA, WOJCIECH NOWAK

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

9 **Analysis of heat flow in a cylinder being treated in a gas nitriding furnace using a new inverse problem solving method,** by: MAGDA JOACHIMIAK, ANDRZEJ FRĄCKOWIAK

10 **The role of innovative construction solutions in promoting green urban development,** by: KLAUDIA ZWOLIŃSKA-GLĄDYS, PIOTR ŻYCZKOWSKI, RAFAŁ ŁUCZAK, ZBIGNIEW KUCZERA, MAREK BOROWSKI

11 **The development of a test stand for evaluating fan noise attenuation devices that utilise acoustic metamaterials,** by: BARTŁOMIEJ CYWKA, WOJCIECH PROKOPOWICZ, ANDRZEJ FRĄCKOWIAK

12 **Efficient single-stage compressor for low-power Brayton-based cycles,** by: WIKTOR HOFFMANN, BARTOSZ ZIEGLER, TOMASZ KRAKOWSKI

13 **CFD Analysis of a wind panel with Savonius wind turbines,** by: PRZEMYSŁAW GRZYMISŁAWSKI, DAWID PÓŁTORACZYK

14 **Base drag reduction for commercial road vehicles - road experiment verification,** by: BARTOSZ ZIEGLER, TOMASZ KRAKOWSKI, PRZEMYSŁAW GRZYMISŁAWSKI

15 **Towards net-zero in Poland: a novel approach to power grid balance with centralized hydrogen production units,** by: WITOLD ŻUKOWSKI, JAN PORZUCZEK, MAŁGORZATA OLEK, DARIUSZ BRADŁO, GABRIELA BERKOWICZ-PŁATEK

16 **Hydrogen production in a fluidized-bed made out of cobalt-cenosphere catalyst,** by: KINGA WENCEL, PRZEMYSŁAW MIGAS, WITOLD ŻUKOWSKI, JAN WRONA, GABRIELA BERKOWICZ-PŁATEK

17 **Optimization of the operation of circulation pumps in the wet flue gas desulfurization system,** by: SZYMON WIELGUS, MARCIN TROJAN, PIOTR DZIERWA, KAROL KACZMARSKI, MARIUSZ GRANDA

18 **Analysis of the possibility of replacing a conventional coal-fired cogeneration unit of heat and power with a combined cycle power plant,** by: MAGDALENA SZYMKIEWICZ

19 **Adsorption chillers with novel heat exchanger fins: simulation, performance, and sustainable applications in desalination and hydrogen generation,** by: PIOTR BORUTA, KAROL SZTEKLER, TOMASZ BUJOK, WOJCIECH KALAWA, ŁUKASZ MIKA, WOJCIECH NOWAK

20 **Research on the FC72 refrigerant condensation process in minichannels,** by: MAŁGORZATA SIKORA, TADEUSZ BOHDAL, KAROLINA FORMELA

21 **Energy islands for offshore wind farms,** by: MICHAŁ RYBIŃSKI, PIOTR DZIERWA, KAROL KACZMARSKI, KLAUDIA ZIĘDALSKA, SEBASTIAN KOWALCZYK

22 **The impact of air shutter settings on the combustion process in a biomass burner,** by: MICHAŁ WANTUŁA, TOMASZ TURZYŃSKI, SZYMON PIETER, PAWEŁ KAZIMIERSKI, DARIUSZ KARDAŚ

23 **Analysis of the accuracy of the inverse marching method used to determine thermal stresses in cylindrical pressure components with holes,** by: MAGDALENA JAREMKIEWICZ

24 **CO_2 capture with activated carbon - simulations and measurements,** by: WIESŁAW ZIMA, SŁAWOMIR GRĄDZIEL, ARTUR CEBULA, MONIKA PIWOWARCZYK, EWA KOZAK-JAGIEŁA, ADAM PAWŁOWSKI

25 **Fluidized beds with a variable vertical density profile: experimental studies and computronical simulations,** by: KRYSTIAN LESKI, GABRIELA BERKOWICZ-PŁATEK, WITOLD ŻUKOWSKI, EDUARDO CANO PLEITE

26 **OXY-combustion of hydrogen-enriched methane under varying conditions and its impact on stability,** by: PIOTR BOJARSKI, MICHAŁ CZEREP, MATEUSZ KOWAL, JAKUB MULARSKI, DARIUSZ PYKA, ARTUR POŻARLIK, HALINA PAWLAK-KRUCZEK

27 **Qualitative and quantitative analysis of contaminants in the components of photovoltaic panels,** by: PAWEŁ KWAŚNICKI, DARIUSZ AUGUSTOWSKI, ANNA GRONBA-CHYŁA, AGNIESZKA GENEROWICZ, MOHAMED ALWAELI, JÓZEF CIUŁA

28 **Positive effect of wind farm control on energy production and revenue in European markets,** by: FILIP WASILCZUK, PIOTR KASPRZAK, MICHAŁ RYBIŃSKI, PAWEŁ FLASZYŃSKI, PIOTR DZIERWA, KLAUDIA ZIĘDALSKA, SEBASTIAN KOWALCZYK

15:30
17:30

Meeting of the Committee of Thermodynamics and Combustion of the Polish Academy of Sciences

Faculty Council Hall, Building of Faculty of Environmental Engineering and Energy, room 315

17:00
18:00

Keynote Session 2
Chairman PIOTR CISEK

'GIL Gallery', 2nd floor, room 206

1 **Spatio-temporal thermal resistance control for gravity driven solid granules thermal processes,** by QIUWANG WANG, **online, 17:00 – 17:30**

2 **Sustainable Smart Manufacturing – current reality and future prospect,** by YANG LIU, **online, 17:30 – 18:00**

TUESDAY
22 OCTOBER 2024

DAY 2

8:00
9:00 **Morning Coffee** 'GIL Gallery', 1st floor

8:45
9:00 **Registration** 'Kotłownia' hall

9:00
11:00 **Keynote Session 3**
Chairman JAN TALER 'Kotłownia' hall

1 **Circular Economy: Maximizing Resource Efficiency through thermochemical Conversion Technologies,** by SEBASTIAN WERLE, **9:00 – 9:30**

2 **Energy transformation – challenges to armed forces,** by ARTUR KĘPCZYŃSKI, **9:30 – 10:00**

3 **Catalytic processes in the service of energy storage,** by PIOTR MICHORCZYK, **10:00 – 10:30**

4 **Technologies for the district heating of the future,** by WOJCIECH BUJALSKI, **10:30 – 11:00**

11:00
11:30 **Coffee Break** 'GIL Gallery', 1st floor

11:30
13:00 **Session D**
Chairman ALI CEMAL BENIM 'Kotłownia' hall

1 **Power Components in Three-Wire Circuits with Asymmetric and Non-Sinusoidal Three-Phase Voltage,** by: KONRAD ZAJKOWSKI, STANISŁAW DUER, **11:30 – 11:45**

2 **Valorisation of Turkey Bone Waste via Thermochemical Methods: Industrial Applications and Environmental Sustainability,** by: AGATA MLONKA-MĘDRALA, SZYMON SOBEK, SEBASTIAN WERLE, MARIANA PĂTRAȘCU, COSMIN MĂRCULESCU, ANETA MAGDZIARZ, **11:45 – 12:00**

3 **Kinetic analysis and prediction modeling by advanced machine learning of pyrolysis of cattle manure from conventional and organic systems,** by: ALESSANDRO CARDARELLI, MICHELE CIAMBELLA, PIETRO FORNAI, MARCO MARCONI, DIEGO PENNINO, LUCA TORTORA, MARCO BARBANERA, **12:00– 12:15**

4 **Small-scale air Brayton cycle fueled by green methanol – thermodynamic analysis,** by: DARIUSZ KARDAŚ, SYLWIA POLESEK-KARCZEWSKA, **12:15– 12:30**

5 **Forecasting economic and environmental effects of expanding PV: an input-output framework based on ETO dataset on Poland,** by: EWA ADAMIEC, KRZYSZTOF GASKA, MAREK KISIEL-DOROHINICKI, SŁAWOMIR KOPEĆ, ŁUKASZ LACH, AGNIESZKA SPIRYDOWICZ, JANUSZ ZYŚK, **12:30– 12:45**

6 **Active sensor for the continuous measurement of the overall heat transfer coefficient and the equivalent surrounding temperature for thermal management of buildings,** by: BERTRAND GARNIER, AHMED OULD EL MOCTAR, **12:45 – 13:00**

11:30
13:00 **Session E**
Chairman SEBASTIAN VERLE and ANDREA VALLATI 'GIL Gallery', ground floor, room S1

1 **Numerical analysis of hazardous scenarios caused by uncontrolled hydrogen leakage at a hydrogen refueling station,** by: KRZYSZTOF RUSIN, KATARZYNA STOLECKA-ANTCZAK, WOJCIECH KOSMAN, ANDRZEJ RUSIN, **11:30 – 11:45**

2 **Input-output model for forecasting economic and operational effects of digitization of power generation and distribution infrastructure in Poland,** by: EWA ADAMIEC, ADA BRZOZA-ZAJĘCKA, MAREK KISIEL-DOROHINICKI, SŁAWOMIR KOPEĆ, ŁUKASZ LACH, KRZYSZTOF HELLER, JANUSZ ZYŚK, **11:45 – 12:00**

3 **Sustainable air conditioning with a focus on evaporative cooling and the Maisotsenko cycle,** by: JAN POKORNÝ, PAWEŁ MADEJSKI, JAN FIŠER, **12:00– 12:15**

4 **Numerical modeling and experimental verification of rotary-lobe expander injectors for liquid rocket engines applications,** by: TOMASZ KRAKOWSKI, BARTOSZ ZIEGLER, KONRAD LUDWICZAK, WITOLD STANKIEWICZ, **12:15– 12:30**

5 | **Parametric analysis of solar domestic hot water system for Nigerian households,** by: EZEKIEL ATIBA, DOROTA CHWIEDUK, **12:30 – 12:45**

6 | **Sustainable Micromobility in Cities: Optimization of Shared Bicycles and Reducing Emissions,** by: VLASTIMÍR NEVRLÝ, JAROSLAV PLUSKAL, **online, 12:45 – 13:00**

11:30 – 13:00 | **Session F** | Chairman VIVIEN L. LU | 'GIL Gallery', 2nd floor, room 206

1 | **Assessment on the visual effect of photovoltaic double skin façade with different facade material,** by: XINJIANG LIU, VIVIEN LU LIN, CHAO SHEN, **11:30 – 11:45**

2 | **Defining Storage Needs to Support RES-E Targets and Limit Dispatch-Down: Ireland,** by: ANJA PERKO, PATRICK WALSH, **11:45 – 12:00**

3 | **BI-static rotatable window with broadband special regulation,** by: JIHONG PU, VIVIEN LU LIN, **12:00– 12:15**

4 | **Modeling and simulation of solar assisted steam power plant,** by: PAWEŁ MADEJSKI, ISYNA MUNA, **12:15– 12:30**

5 | **Investigation on the yearly use of solar-assisted heat pumps,** by: EMANUELE ZANETTI, RICCARDO CONTE, MARCO AZZOLIN, DAVIDE DEL COL, **12:30– 12:45**

6 | **Creation of energy model of solar thermal collectors system,** by: GABRIELA SADOWSKA, TOMASZ CHOLEWA, CONSTANTINOS A. BALARAS, ALICJA SIUTA-OLCHA, SANDRO NIŽETIĆ, SPIROS PAPAEFTHIMIOU, MÜSLÜM ARICI, **12:45– 13:00**

13:00 – 14:00 | **Lunch** | 'GIL Gallery', 1st floor

14:00 – 14:45 | **Sponsor Session: Hitachi Energy** | Chairman MAREK MAJDAK | 'Kotłownia' hall

Power Electronics – The Key to Energy Transformation
by ADAM RUSZCZYK

14:45 – 15:30 | **Workshop 1: Meet the Editor** | Chairman PAWEŁ OCŁOŃ | 'Kotłownia' hall

15:30 – 16:00 | **Coffee Break** | 'GIL Gallery', 1st floor

16:00 – 17:00 | **Poster Session 2** | Chairman PETAR SABEV VARBANOV | 'GIL Gallery', 1st floor

1 | **Innovative Approaches to Methane Emission Reduction and Hydrogen Production in Coal Mining,** by: MAREK BOROWSKI, KLAUDIA ZWOLIŃSKA-GLĄDYS, ZBIGNIEW KUCZERA, RAFAŁ ŁUCZAK, PIOTR ŻYCZKOWSKI, ANDRZEJ SZMUK, KAMIL PIECH

2 | **Flow boiling heat transfer in group of minichannels: experimental and numerical approaches,** by: BEATA MACIEJEWSKA, MAGDALENA PIASECKA

3 | **Spatial temperature distribution measurement using electrical impedance tomography,** by: JAN PORZUCZEK

4 | **Electrical Energy Storage Potential of RESHeat System,** by: KAROL MZYK

5 | **The impact of changes in polish law on the profitability of photovoltaic micro-installations,** by: KRYSTIAN CIEŚLAK

6 | **Research on the calorific value of dry sewage sludge and algae mixtures in varying proportions,** by: OLGA PĘCZALSKA, ADAM PAWŁOWSKI, PAWEŁ GARBACZ, MACIEJ THOMAS

7 | **Analysis of overall heat-transfer coefficient in a plate exchanger,** by: ROBERT KŁOSOWIAK

8 | **Heat transfer performance of tubular surfaces in a large-scale fluidized bed heat exchanger** by: ARTUR BŁASZCZUK, SZYMON JAGODZIK, TADAAKI SHIMIZU, KARI MYÖHÄNEN

9 **Comparative analysis of energy transformation from ethanol as fuel and as a hydrogen carrier,** by: JAROSŁAW MARKOWSKI, MAGDALENA DUDEK, ILIA ILIEV

10 **A comparative case study of measured and simulated data of PV installations situated in Poland,** by: EWELINA KRAWCZAK

11 **Pyrolysis and kinetic analyses of black wattle (Acacia mearnsii) for bioenergy,** by: MONIKA KOSOWSKA-GOLACHOWSKA, ADAM LUCKOS

12 **Recent advances and developments of underground thermal energy storage systems in buildings,** by: SHENG ZHANG, PAWEŁ OCŁOŃ, PETAR SABEV VARBANOV

13 **Analysis of the impact of various methods of improving the efficiency of the Brayton-Joule cycle on the operation of a gas turbine power plant,** by: TOMASZ SOBOTA, MAGDALENA SZYMKIEWICZ, PAWEŁ STATUCH

14 **Immersive cooling process of electronic elements,** by: MAŁGORZATA SIKORA, MIKOŁAJ KOŁTONOWSKI

15 **Analysis of the impact of energy mix change in Central Europe in the context of electric vehicles and V2G/V2H technologies,** by: MARTIN MISKO, JAN POKORNY, ONDREJ PECH, PATRIK RAPTA

16 **Study on the Energy Efficiency of an Air Source Heat Pump Based on R290 Refrigerant for a Modernized Single-Family House from the 1980s,** by: MARCIN TUROŃ

17 **Concept of a test stand for producing electricity from waste heat,** by: WIESŁAW ZIMA, KAROL MORAŃSKI, JERZY CISEK, ARTUR CEBULA

18 **Using Machine Learning and Econometric Models to Identify Macroeconomic Factors Influencing Renewable Energy Production in the EU,** by: ATIF KHAN, ARTUR WYRWA, WOJCIECH SUWAŁA, JANUSZ ZYŚK, MARCIN PLUTA, MACIEJ RACZYŃSKI, YI-KUANG CHEN

19 **Influence of Nanoparticles Concentration on Impinging Jet Heat Transfer,** by: SEBASTIAN GURGUL, ELŻBIETA FORNALIK-WAJS, JAN WAJS

20 **Selecting Effective O&M Strategies for Offshore Wind Farm in Poland,** by: PAULINA IMIŃSKA, PAWEŁ OCŁOŃ, MACIEJ SUŁOWICZ

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

21 **Comparative LCOE/LCA and maintenance/service analysis of renewable energy sources in the context of curtailment with the regional diversity in Poland,** by: PIOTR OLCZAK, MARCEL KOŚCIELNY

22 **Assessment of the influence of the return temperature in the district heating network on the energy efficiency of the domestic hot water system,** by: ALICJA SIUTA-OLCHA, TOMASZ CHOLEWA, MARTYNA BOCIAN, EMILIA MODRZYŃSKA

23 **Energy autonomy of unmanned ground vehicles applied to Robotics for Risky Interventions and Environmental Surveillance,** by: MIKOŁAJ ZARZYCKI, MAGDALENA DUDEK, ANDRZEJ MASŁOWSKI, ANDRZEJ RAŹNIAK, PIOTR KOCIEL, RAFAŁ CZUPRYNIAK

24 **Possibility of reducing CO2 emissions through thermal modernization of a residential building,** by: MAREK MAJDAK

25 **Selected issues of thermal energy storage,** by: JANUSZ CIEŚLIŃSKI

26 **Investigating photovoltaic cells with enhanced surfaces to improve their efficiency,** by: ARTUR PIASECKI, MAGDALENA PIASECKA, BEATA MACIEJEWSKA

27 **Applications of additive manufacturing technology in heat transfer,** by: KATARZYNA CHLISZCZ, WALDEMAR KUCZYŃSKI

28 **Wet steam dryness determination,** by: PAWEŁ GARBACZ, JAKUB WESOŁOWSKI, WIESŁAW ZIMA, ARTUR CEBULA

29 **A novel, cool, natural panel for façade design optimization against heat: enhancing thermal-energy performance in urban environments,** by ANDREA VALLATI, SIMONA MANNUCCI, ADRIANA CIARDIELLO, COSTANZA VITTORIA FIORINI, MARCO FERRERO, FEDERICA ROSSO

30 **Semi analytical Method to solution inverse non-linear heat conduction equation,** by: MICHAŁ CIAŁKOWSKI, ANDRZEJ FRĄCKOWIAK, MAGDALENA MIERZWICZAK, STANISŁAW KACHEL, ADAM KOZAKIEWICZ

19:00
21:00 **Gala Dinner** Avangarda Restaurant, ul. Zyblikiewicza 1, Kraków

WEDNESDAY
23 OCTOBER 2024

DAY 3

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

8:00 – 9:00 | **Morning Coffee** | ‘GIL Gallery’, 1st floor

8:45 – 9:00 | **Registration** | ‘Kotłownia’ hall

9:00 – 11:00 | **Keynote Session 4** | Chairman KAMEL HOOMAN | ‘Kotłownia’ hall

1. **Hydrogen Combustion for Carbon Neutrality: Challenges and Computational Modelling,** by ALI CEMAL BENIM, **9:00 – 9:30**
2. **Nature-inspired solutions for building efficiency,** by VIVIEN LIN LU, **9:30 – 10:00**
3. **High-efficiency Cogeneration Power System from Gas Turbine Fueled with Low Carbon Emissions,** by FEI DUAN, **10:00 – 10:30**
4. **RESHeat project presentation,** by PIOTR CISEK, **10:30 – 11:00**

11:00 – 11:30 | **Coffee Break** | ‘GIL Gallery’, 1st floor

11:30 – 13:15 | **Session G** | Chairman LARS O. NORD | ‘Kotłownia’ hall

1. **CFD modelling of the flow of ice slurry in plate heat exchanger channels,** by: JAN KUCHMACZ, BEATA NIEZGODA-ŻELASKO, **11:30 – 11:45**
2. **Model-based inference control system for poly-optimization of water treatment technology processes as a progress in improving energy efficiency in a critical water sector,** by: KRZYSZTOF GASKA, EWA ADAMIEC, MAREK KISIEL-DOROHINICKI, PAWEŁ OCŁOŃ, WOJCIECH TUREK, TOMASZ PEŁECH-PILICHOWSKI, ADA BRZOZA-ZAJĘCKA, **11:45 – 12:00**

3 | **Proposal for supplementing the national power system with the use of energy from agro biomass,** by: SYLWESTER KALISZ, MAREK PRONOBIS, JÓZEF SOŁTYS, 12:00 – 12:15

4 | **Optimization of duct shape and length for small horizontal axis wind turbine,** by: PATRYK MARCZAK, MACIEJ BOREK, MAREK JASZCZUR, **12:15 - 12:30**

5 | **Transient modeling of heat exchangers using a steady-state model for low heat capacity media,** by: MARIUSZ GRANDA, MARCIN TROJAN, JAN TALER, **12:30 – 12:45**

6 | **Exergy analysis of a real hybrid system,** by: WALDEMAR KUCZYŃSKI, ANNA MATYJA, **online,** 12:45 – 13:00

7 | **Thermal management systems for axial flux motors: A review,** by: MARKO ĐULA, SANDRO NIŽETIĆ, **online,** 13:00 – 13:15

8 | **A dominance relations-based multi-attribute decision-making method for phase change materials selection,** by: RAVIPUDI VENKATA RAO, **online,** 13:15 – 13:30

11:30 13:30 | **Session H** Chairman DAMIAN MUNIAK | 'GIL Gallery', ground floor, room S1

1 | **Selection and analysis of the main components of a 10 kW CHP ORC system powered by waste heat from the food drying process,** by: GRZEGORZ ŻYWICA, TOMASZ KACZMARCZYK, EUGENIUSZ IHNATOWICZ, ŁUKASZ WITANOWSKI, PIOTR KLONOWICZ, PIOTR LAMPART, **11:30– 11:45**

2 | **Turbine flow system developments for a 10 kW waste heat recovery ORC system,** by: PIOTR KLONOWICZ, ŁUKASZ WITANOWSKI, DAWID ZANIEWSKI, TOMASZ SUCHOCKI, PIOTR LAMPART, GRZEGORZ ŻYWICA, **11:45 - 12:00**

3 | **An innovative experimental pilot-plant to investigate the gasification process of biomass. Impact of raw and torrefied pellet on the process performances,** by: MAURIZIO GRIGIANTE, DANIELE ANTOLINI, **12:00 – 12:15**

4 | **Prediction of thermal-flow parameters of plate and tube heat exchangers using Artificial Neural Networks and linear regression,** by: TOMASZ CIEŚLIK, MATEUSZ MARCINKOWSKI, DAWID TALER, JAN TALER, EWELINA ZIÓŁKOWSKA, **12:15 – 12:30**

5 | **Change in Optimal Shares of PV and Wind in Hybrid Power Plants in Europe Due to Climate Variability Using the Monte Carlo Method,** by BERNARD TWARÓG, 12:30 – 12:45

6 | **Online determination of the heat transfer coefficient at the inner surface of a cylindrical component in a thermal stress monitoring system for critical boiler pressure components,** by: JAN TALER, KAROL KACZMARSKI, TOMASZ SOBOTA, DAWID TALER, PIOTR DZIERWA, MAGDALENA JAREMKIEWICZ, MARCIN TROJAN, 1245 – 13:00

7 | **Application of a phase-change heat storage for warming-up the internal combustion engine in a hybrid drive system: simulations and experiment,** by: TOMASZ KOSZTYŁA, DAMIAN MUNIAK, **online,** 13:00 – 13:15

8 | **Mapping the textile waste network: a detailed examination of waste management data in the Czech Republic,** by: JAROSLAV PLUSKAL, RADOVAN ŠOMPLÁK, VERONIKA SMEJKALOVÁ, **online,** 13:15 – 13:30

11:30 13:45 | **RESHeat Workshop Session** Chairman SŁAWOMIR GRĄDZIEL | 'GIL Gallery', 2nd floor, room 206

1 | **Modeling of RESHeat system demosites in Cracow and Limanowa,** by MEHMET ALI YILDIRIM, FILIP BARTYZEL, PAWEŁ OCŁOŃ, **11:30 – 11:45**

2 | **Software for RESHeat system simulations and design,** by PIOTR CISEK, KAROL KACZMARSKI, MARZENA NOWAK-OCŁOŃ, MONIKA PIWOWARCZYK, **11:45 - 12:00**

3 | **Energy Performance Assessment of the Novel Underground Thermal Energy Storage System,** by SHENG ZHANG, PAWEŁ OCŁOŃ, PETAR VARBANOV, **12:00 – 12:15**

4 | **Life Cycle Assessment of the RESHeat system in Cracow City,** by NATALIA GENEROWICZ-CABA, PAWEŁ OCŁOŃ, ŁUKASZ LELEK, JOANNA KULCZYCKA, **12:15 – 12:30**

5 | **Experimental and modelling analysis of a renewable energy system for decarbonizing residential buildings in Mediterranean climate,** by MIRIAM DI MATTEO, COSTANZA VITTORIA FIORINI, GABRIELE BATTISTA, EMANUELE DE LIETO VOLLARO, ROBERTO DE LIETO VOLLARO, PAWEL OCLON, ANDREA VALLATI, **12:30 – 12:45**

6 | **Actual performance data for RESHeat system,** by PAWEŁ OCŁOŃ, ANDREA VALLAI, MEHMET, ALI YILDIRIM, PIOTR CISEK, MAREK CZAMARA, FRANCISZEK ŚCISŁOWICZ, **12:45 – 13:00**

7 | **A Comparative Life Cycle Assessment of Solar Combined Cooling, Heating, and Power Systems Based on RESHeat Technology,** by: TING PAN, **13:00 – 13:15**

8 | **Energy, environmental, and economic potential in building decarbonization of high-grade heat production by hybrid heat pumps,** by: MIRIAM DI MATTEO, COSTANZA VITTORIA FIORINI, DOMIZIANA VESPASIANO, GIANLUIGI LO BASSO, ANDREA VALLATI, **13:15 – 13:30**

9 | **An innovative ventilation system hygienizing the air in continuous mode,** by: JAROSŁAW MÜLLER, IRENEUSZ ŻMUDA, ZYGMUNT DZIECHCIOWSKI, MICHAŁ POLUS, SŁAWOMIR GRĄDZIEL, **13:15 – 13:30**

13:30 14:00 **Conference Closure** 'GIL Gallery', 2nd floor, room 206

14:00 15:00 **Lunch** 'GIL Gallery', 1st floor

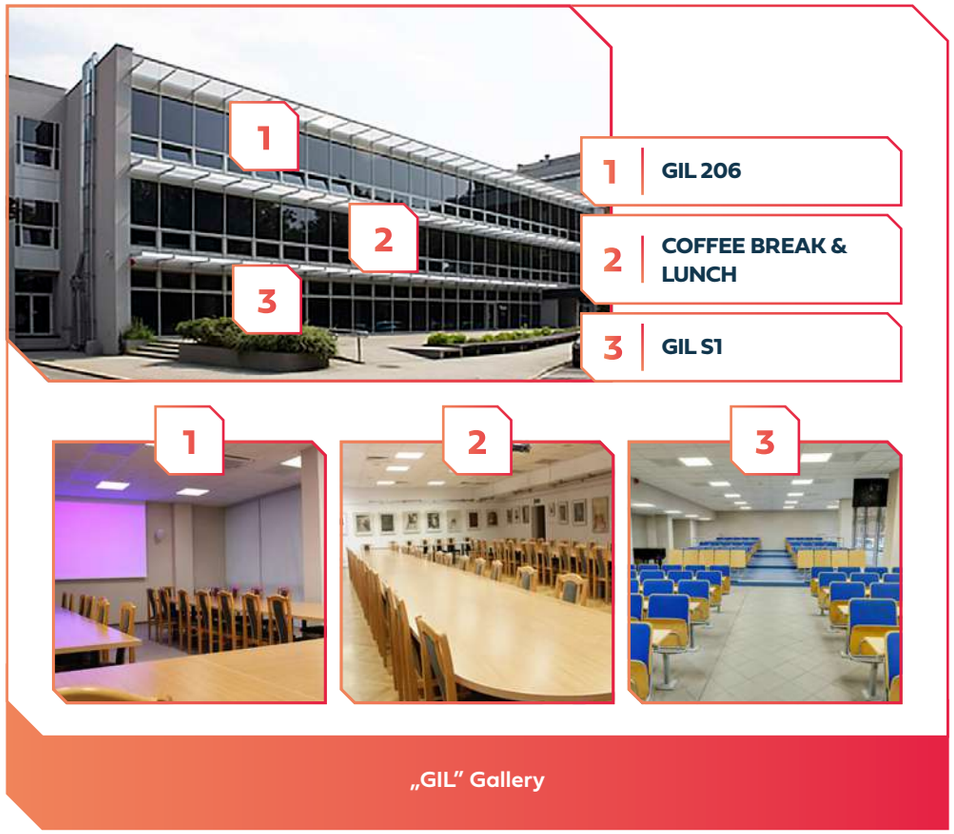
PROGRAM OUTLINE

	MONDAY 21st Oct. 2024	TUESDAY 22nd Oct. 2024	WEDNESDAY 23rd Oct. 2024
8:00 – 8:45	Registration	Morning Coffee	Morning Coffee
8:45 – 9:00		Registration	Registration
9:00 – 9:15	Conference Opening	Keynote Session 3	Keynote Session 4
9:15 – 10:30	Prof. Jan Taler Jubilee		
10:30 – 11:00	Coffee Break		
11:00 - 11:30	Keynote Session 1	Coffee Break	Coffee Break
11:30 – 12:00		Parallel Sessions: D, E, F	Parallel Sessions: G, H / RESHeat Project Workshop
12:00 – 12:30			
12:30 – 13:00			
13:00 – 13:30	Lunch	Lunch	
13:30 – 14:00			Conference Closure
14:00 – 14:30	Parallel Sessions: A, B, C	Sponsor Session	Lunch
14:30 – 14:45			
14:45 - 15:00		Workshop 1: Meet the Editor	
15:00 – 15:30			
15:30 - 15:45		Coffee Break	
15:45 – 16:00	Coffee Break		
16:00 – 16:30	Poster Session 1	Poster Session 2	
16:30 – 17:00			
17:00 - 17:30	Keynote Session 2		
17:30 - 18:00			
19:00 - 20:00		Gala Dinner	
20:00 - 21:00			

KTiS PAN Meeting

CONFERENCE VENUE

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024



„GIL" Gallery

Conference and Exhibition Hall „Kotłownia"

Inter faculty Education and Research Center „ Działownia

INTERNATIONAL CONFERENCE ON CLEANER ENERGY TRANSITION 2024

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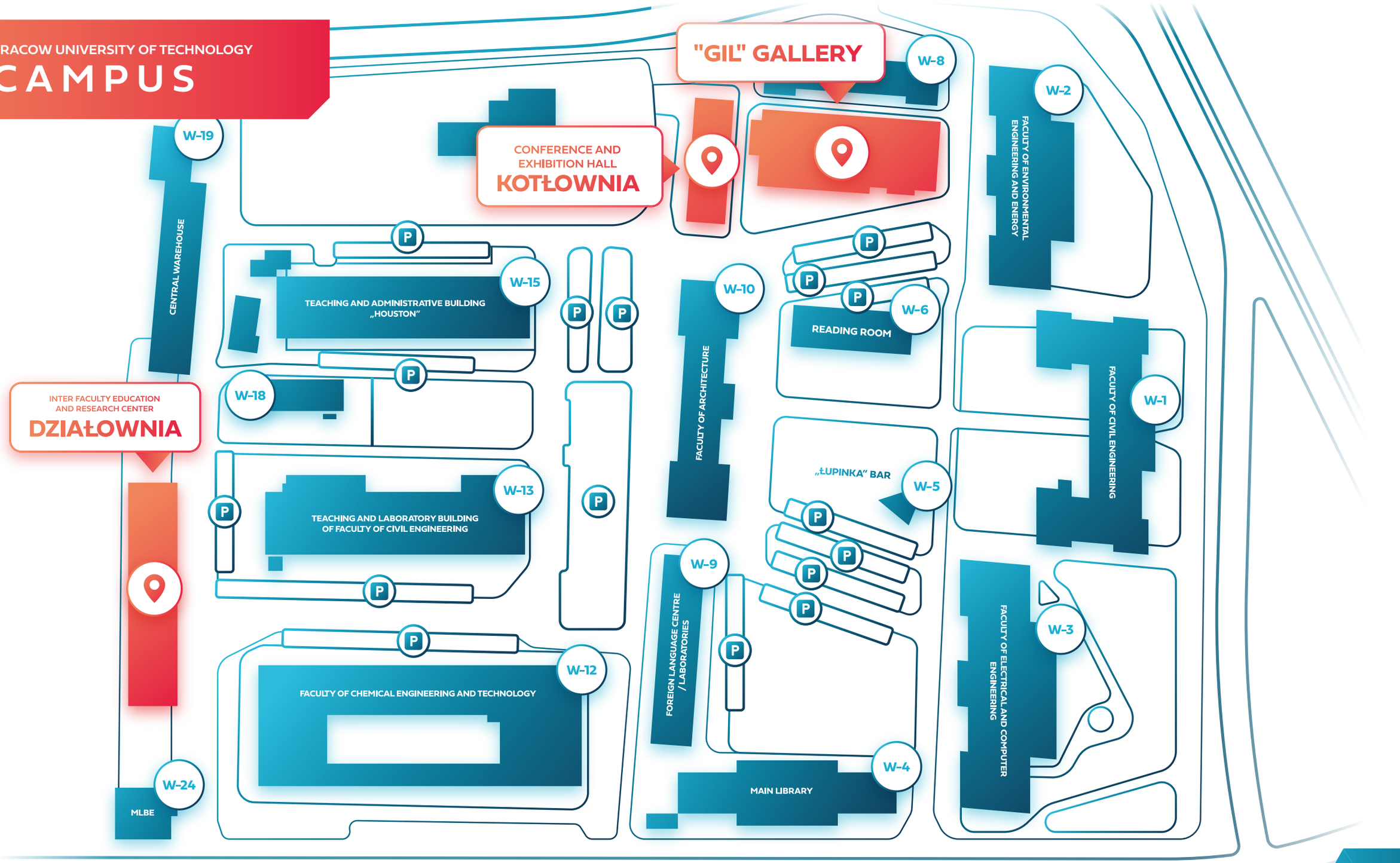

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