



Lodz University  
of Technology



REPORT ON ACTIONS COMPLETED IN 2023  
AT LODZ UNIVERSITY OF TECHNOLOGY  
WITHIN THE FRAMEWORK OF  
**THE RACE TO ZERO CAMPAIGN**

## Introduction

In the recent years, efforts aimed at reducing greenhouse gas emissions have become one of the foremost challenges facing the global society. Notable among them is the Race to Zero campaign, which seeks to rally leaders in the sector of education, business, municipalities, and regions to achieve, as soon as practicable, net zero emissions. Universities, as hubs of education and innovation, play one of the key roles in global sustainability and climate actions. 2022 saw as many as 8307 companies, 595 financial institutions, 1136 cities, 52 states and regions, 1125 educational institutions, and 65 healthcare institutions worldwide engaged in the effort to reduce greenhouse gas emissions. In the years that followed, others joined in the action.

The Race to Zero campaign is intended to inspire bold planning and delivery of concrete actions to reduce CO<sub>2</sub> and other greenhouse gas emissions. Lodz University of Technology aims to achieve net-zero target by 2050 and the intermediate goal of a 50% reduction in carbon footprint compared to the 2022 level by 2030.

This second edition of the report provides data on the university's carbon footprint, the main sources of emissions, and areas where changes are being implemented. Also presented are the ongoing activities in the areas of education, research, and university operation toward Race to Zero goals.

### SUSTAINABLE DEVELOPMENT PANEL

The report deals mainly with actions initiated in 2023, but there are others that are part of a longer process and thus extend beyond the specified timeframe. The Sustainable Development Panel, formed in 2020, is a case in point. Its task is to coordinate and implement activities related to Sustainable Development Goals on the campuses of Lodz University of Technology. It is a multidisciplinary team led by the Vice-Rector for Development. It includes experts from a variety of academic specializations as well as representatives of Lodz University of Technology's organizational units.

One of the results of its efforts the activities is the initiation of cooperation for sustainability with other institutions in Europe, e.g. within the structures of the Baltic University Program (BUP), in collaboration with the University of Florence, and within the European School of Sustainability Science and Research consortium. Lodz University of Technology hosts the Associated Secretariat of BUP that is responsible for the coordination of BUP's operations in Poland. The Baltic University, established in 1991 and coordinated by Uppsala University, is one of the largest university cooperation networks in Europe. It brings together close to 90 universities in the Baltic Sea region to collaborate on education for sustainable development, climate neutrality, and democracy. The cooperation with the University of Florence helps to set a shared course of action toward sustainability goals. Efforts are carried out in the area of research, teaching, and projects. Relations with the University of Florence and the Italian CIHEAM Bari contributed to the initiation of cooperation with seasoned experts in implementing innovative sustainable development projects. The European School of Sustainability Science and Research, on the other hand, is an inter-collegiate consortium focused specifically on sustainability research. Its activity is crucial in bridging the gap between sustainability research and sustainability education at European universities.

## 1. KEEPING TRACK OF THE CARBON FOOTPRINT

The key step toward reducing the carbon footprint is first to quantify it. Given the large size of Lodz University of Technology premises, the range and the scale of its operations, this has been a complex task.

The organization's carbon footprint can be assessed based on the data for each product/process in use and each mode of transport in the supply chain, or from LCA (Life Cycle Assessment) indicator databases for products and processes provided in the literature or included in commercially operated databases e.g. ecoinvent, bundled with licensed software such as SimaPro, Umberto, or GaBi.

SimaPro with the updated ecoinvent 3.9 database and the IPCC 2021 GWP 100a method were used to calculate Lodz University of Technology's carbon footprint. The calculations done in 2024 provide TUL's 2022 and 2023 quantified carbon footprint. The calculations were based on the information concerning utility usage on the campuses and in the halls of residence of Lodz University of Technology. Table 1 shows the input data that served as the basis for the carbon footprint calculations.

*Table 1. Utility consumption in 2022 in Lodz University of Technology buildings*

2022	Electricity [kWh] [excluding from PV sources]	Electricity from PV sources [kWh]	Central heating [GJ] [excluding heat from RES]	Heat from RES [GJ]	Water [m <sup>3</sup> ]	Natural gas [m <sup>3</sup> ]
<b>Campus A</b>	666 2881	14 1800	46 807	817	36 025	69 901
<b>Campus B [exclu- ding Sports Bay]</b>	322 4833	22 500	38 376		13 655	779
<b>Campus C</b>	1 424 844		22 239		48 485	9 594
<b>Campus D</b>	45 070		1 084		645	
<b>Campus E</b>	138 639		2 671		7 296	680
<b>Campus F</b>	122 994		2 549		6 117	937
<b>TUL Secondary School</b>	48 981		761		918	
<b>Total</b>	<b>11 668 241</b>	<b>164 300</b>	<b>114 487</b>	<b>817</b>	<b>113 141</b>	<b>81 891</b>

Table 2. Utility consumption in 2023 in Lodz University of Technology buildings

2023	Electricity [kWh] [excluding from PV sources]	Electricity from PV sources [kWh]	Central heating [GJ] [excluding heat from RES]	Heat from RES [GJ]	Water [m <sup>3</sup> ]	Natural gas [m <sup>3</sup> ]
<b>Campus A</b>	6 385 689	128 570	39 655	1 320	34 338	43 365
<b>Campus B [excluding Sports Bay]</b>	3 207 951	15 190	25 475		14 819	20
<b>Campus C</b>	1 454 289		22 973		57 516	11 438
<b>Campus D</b>	10 841		173		83	
<b>Campus E</b>	122 490		2 710		7 450	850
<b>Campus F</b>	140 097		2797		7 944	935
<b>TUL Seco- ndary School</b>	49 940		719		1 137	
<b>Total</b>	<b>11 371 297</b>	<b>143 760</b>	<b>94 501</b>	<b>1 320</b>	<b>123 287</b>	<b>56 608</b>

Figures 1-4 illustrate annual utility consumption by campus.

Figure 1. Annual electricity consumption on Lodz University of Technology campuses in 2022 and 2023

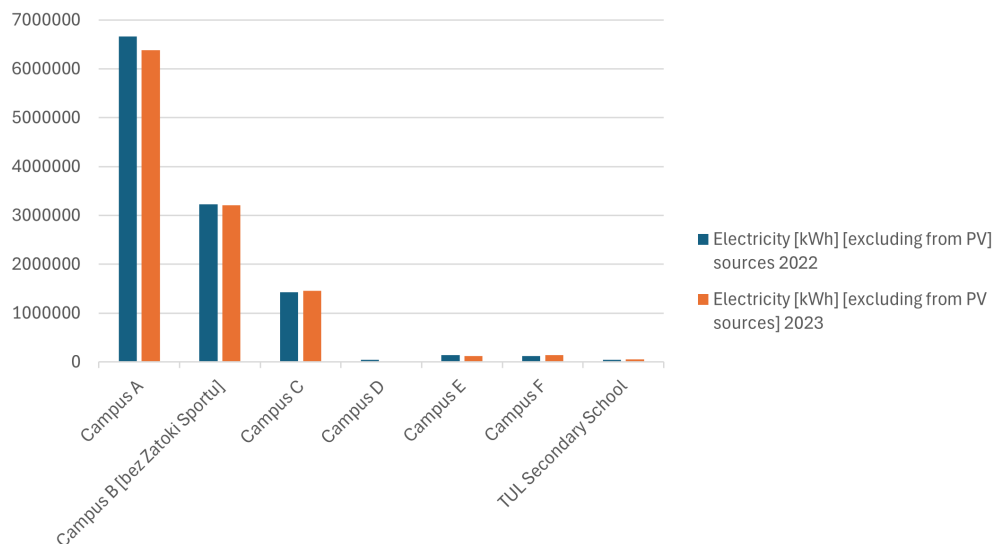


Figure 2. Annual central heating consumption on Lodz University of Technology campuses in 2022 and 2023

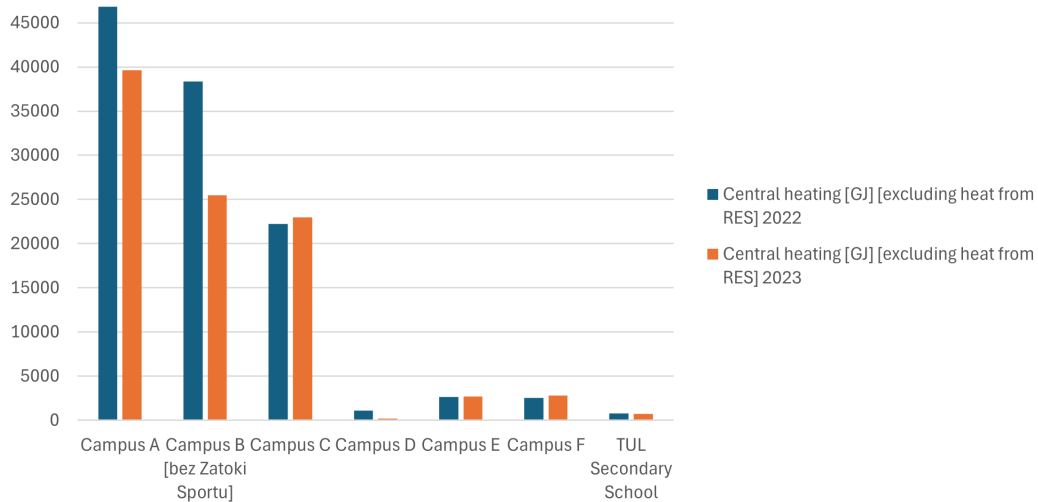


Figure 3. Annual water consumption on Lodz University campuses in 2022 and 2023

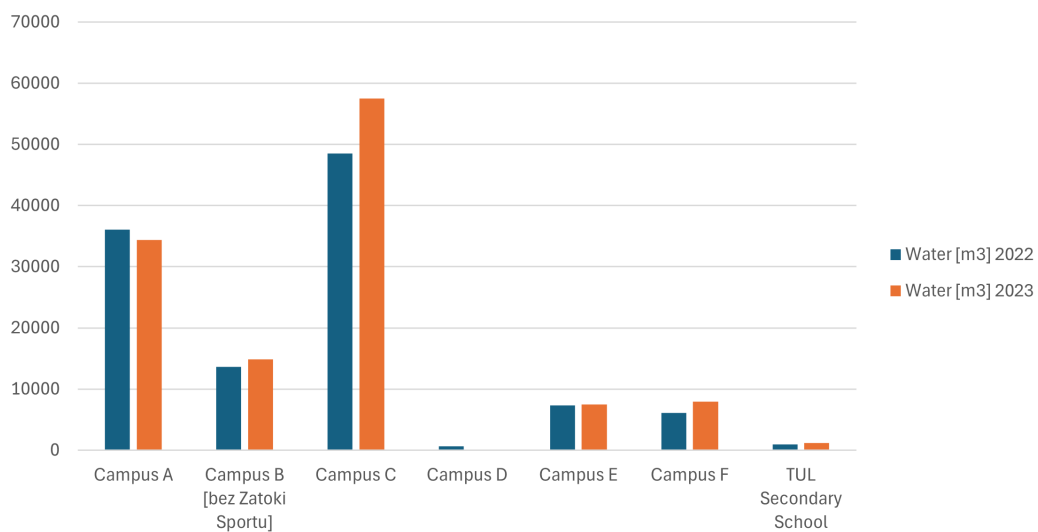
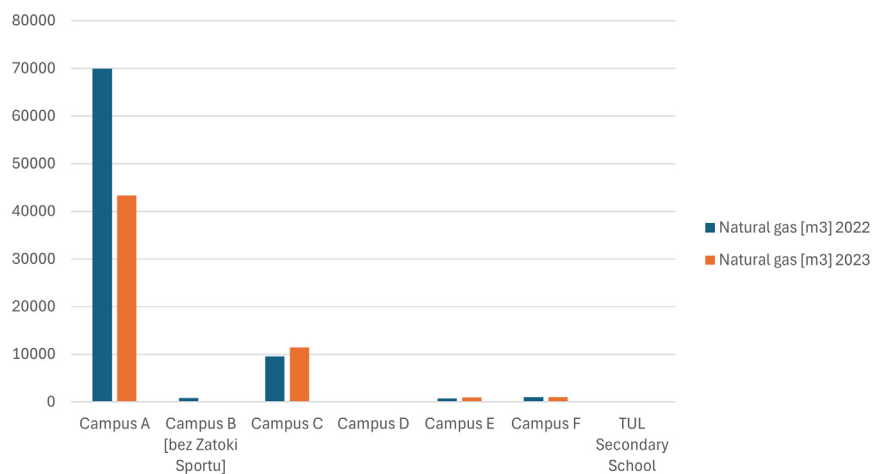


Figure 4. Annual natural gas consumption on Lodz University of Technology campuses in 2022 and 2023



The carbon footprint of Lodz University of Technology was calculated for the years 2022 (27 355 220,06 kg CO<sub>2</sub>) and 2023 (24 344 949,03 kg CO<sub>2</sub>) (Tables 3 and 4) based on the data on the consumption of each utility and the area of the buildings in square meters.

Table 3. The carbon footprint per square meter for Lodz University of Technology buildings in 2022

### Lodz University of Technology carbon footprint in 2022

Utility	[kg CO <sub>2</sub> -eq]	[%]
Water	0.14	0.13%
Electricity	44.60	42.42%
Heating natural gas)	0.64	0.60%
Heating (net of natural gas)	59.35	56.45%
PV panels	0.05	0.05%
Heat, air-water heat pump	0.15	0.15%
Wastewater	0.21	0.20%
<b>Total</b>	<b>105.14</b>	<b>100.00%</b>

Table 4. The carbon footprint per square meter for Lodz University of Technology buildings in 2023

### Lodz University of Technology carbon footprint in 2023

Utility	[kg CO <sub>2</sub> -eq]	[%]
Water	0.15	0.16%
Electricity	43.46	46.45%
Heating natural gas)	0.44	0.47%
Heating (net of natural gas)	48.99	52.36%
PV panels	0.05	0.05%
Heat, air-water heat pump	0.25	0.27%
Wastewater	0.23	0.24%
<b>Total</b>	<b>93.57</b>	<b>100.00%</b>

The data clearly shows the impact that the end of the pandemic had on the carbon footprint results. The total water consumption at Lodz University of Technology increased in 2023 relative to 2022, especially on Campus C as the halls of residence saw the return of the students accommodated there. Also on-campus classes were resumed and therefore the number of students and staff remaining on campus was greater. The figures are for the entire Lodz University of Technology, including the halls of residence and TUL Secondary School High School.

On the other hand, the intensification of the university's Race to Zero efforts resulted in a decrease for some parameters, e.g., the absolute value (kg CO<sub>2</sub>-eq) and the contribution (in %) of heating to the carbon footprint in 2023 relative to 2022. Employees, students, and building managers have been growing in awareness of the need for efficient heating and of other activities reported in this document.

## 2. DEVELOPMENT OF LOCAL ENERGY SOURCES

Local energy sources are a vital part of any organization's energy security because local energy sources strengthen the organization's independence from external suppliers, reduce the need for and the cost of energy transmission and, as a consequence, contribute to a reduction in greenhouse gas emissions. The university has been consistently developing its own energy sources by installing photovoltaic systems, ground source and air source heat pumps and solar collectors to generate thermal energy.

Table 5. Local Energy sources at Lodz University of Technology in 2023

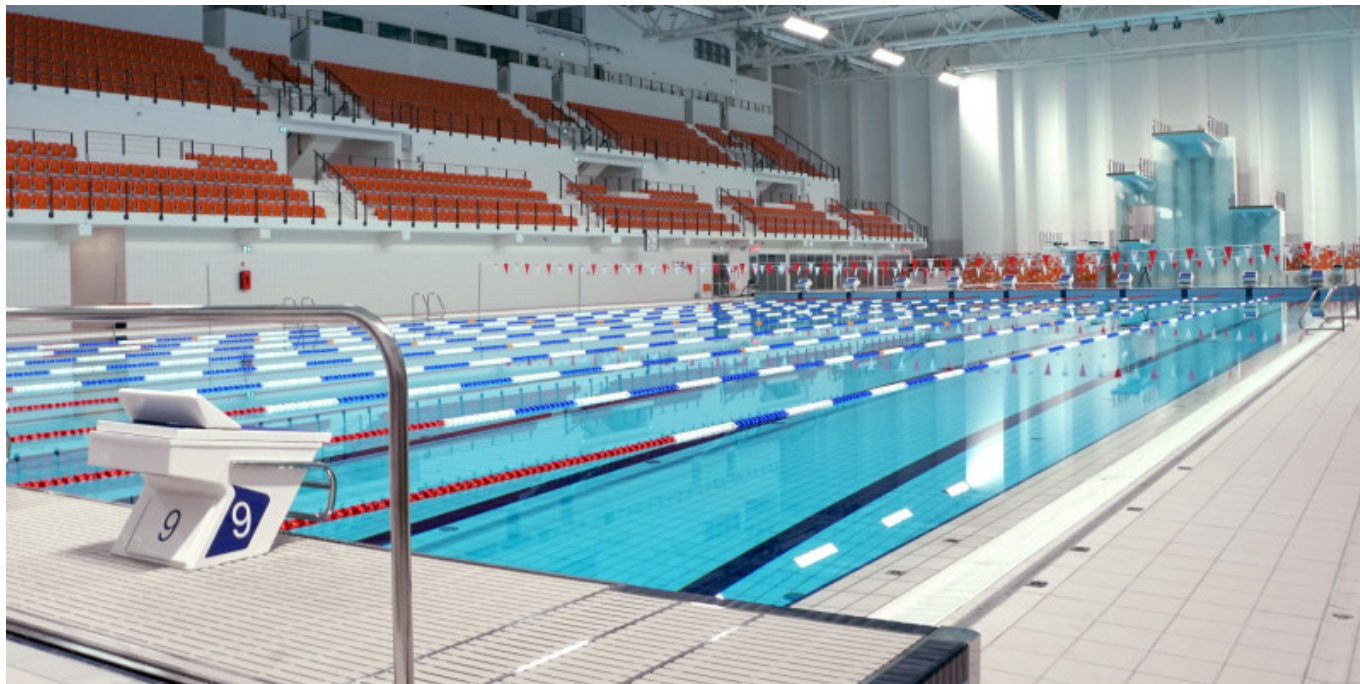
	Unit of measurement	2023
Electricity output from RES installations	MWh	143.8
Thermal energy output from RES installations	GJ	1320
Capacity of installed heat pumps	kW	382.6



Photovoltaic installations on the roof of the TUL Faculty of Electrical, Electronic, Computer and Control Engineering building  
Source: TUL resources



Lodz University of Technology adopted an interesting approach to utilize waste heat from Sports Bay operations (in 2022 it was 8 GJ, while in 2023 it reached 10 GJ). Sports Bay is a sports compound with two swimming pools. Given that the facility largely serves people in the greater community, it was excluded from the calculations of TUL's institutional carbon footprint



*One of the swimming pools at the ACSD TUL Sports Bay. Source: TUL resources*

### 3. IMPROVEMENT OF BUILDING ENERGY EFFICIENCY

Buildings are among the major sources of energy emissions and consumption, therefore improving their efficiency is critical to reducing greenhouse gas emissions and to reducing their carbon footprint. The university, to the extent that it is economically capable, has been conducting thermal modernization of its facilities and building new, energy-efficient buildings.

No modernization efforts may be undertaken unless they are preceded by an energy audit. Almost half of TUL's buildings, 39 out of 85, have already been audited.

There are tangible results of the efforts made by Lodz University of Technology to improve the energy efficiency of its buildings. Most of the buildings have been insulated, and some are controlled by intelligent energy management systems. The area of buildings where the heating and ventilation system has been upgraded has also increased and now represents about one fifth of the total building area.

Table 6. Improvement in the energy efficiency of buildings at Lodz University of Technology in 2023

	Unit of measurement	2023
Total number of energy-audited buildings	building	39
Total area of thermally-insulated buildings	sq. m	163 190.44
Total area of buildings where the heating and ventilation system was upgraded	sq. m	47 014.62

In the recent years, a number of Lodz University of Technology buildings have been modernized, including the pre-school building, as well as the Faculty of Organization and Management's Strefa Biznesu [Business Zone] building which underwent deep renovation. All of these improvements contributed to a further reduction in the carbon footprint.

In 2023, comprehensive thermal upgrade of the A7 building was completed. The facility is now home to the Center of Excellence in Universal Design. The building transformed from a heat emitter into a virtually decarbonized building with adequate insulation, modern ventilation systems for heat recovery, and energy monitoring and management systems. Water-saving plumbing fixtures, energy-efficient lighting and photovoltaics offer a sampling of items from the enormous scope of work that was completed. The building's window and door frames were replaced, the walls and the flat roof insulated. Built from prefabricates and monolithic construction dating back to the 1960s, the building was given a new life. It is now a sustainable structure which takes advantage of the latest technologies. The building is used for research and for teaching and learning. Reduced emissions of harmful substances and dust are an undeniable added value of the renovation.



Building A7. The Center of Excellence in Universal Design. Source: TUL resources

## 4. REPLACEMENT OF CONVENTIONAL LIGHT FIXTURES WITH ENERGY-EFFICIENT

In 2022, the process of inventorying old non-energy-efficient lighting points, mainly external, was also started in the university's buildings. Further activities in this regard were implemented in 2023, when the university concluded an agreement with the Provincial Fund for Environmental Protection and Water Management for the implementation of the task entitled „Replacement of internal lighting in the buildings of the Lodz University of Technology with energy-efficient LED technology.“ This investment allowed to replace lighting fixtures in a group of research, teaching, and administrative buildings located on the premises of Lodz University of Technology. Still, a portion of the university's building stock features incandescent, fluorescent, and mercury vapor lights. As they are highly energy-intensive sources with low energy efficiency class and highly uneconomical, the effort to reduce their number continued in 2023, which resulted in a considerable improvement in the number of energy-efficient lights: 19 000 out of the total of 40 000 are now energy-efficient.

The area of buildings managed by intelligent lighting management systems also increased from 14.6 thousand square meters in 2022 to 20.8 thousand square meters in 2023.

Apart from switching to energy-efficient light fixtures, other efforts are underway to expand intelligent lighting management systems to that will enable programmable control of illumination.

## 5. CONTINUAL MONITORING OF ENERGY CONSUMPTION

Rational use of energy is a key step in reducing the carbon footprint. Accurate measurement of energy consumption in as many individual buildings as possible will help to identify the highest energy consumers and enable interventions to prevent inefficient use. With advanced meters in place, energy consumption will be logged and the data will be transmitted simultaneously in real time. The number of electricity meters installed in buildings managed by the Chancellor Office rose from 59 at the start of the year to 79 at its end.

## 6. EFFICIENT WATER MANAGEMENT

The rainwater tanks at the TUL Language Centre exemplify a responsible approach to water use. The facility is surrounded by a garden that features a variety of flowering plants, shrubs, and low trees. It was previously watered from the general water supply system. After the project to install a rainwater irrigation system was completed, the garden is fed with rainwater while the excess water seeps into the deeper layers of the ground. This eliminates the need to use water from the mains, bringing clear cost savings and, above all, conserving water.



*Rainwater-fed greenery surrounding TUL Language Centre. Source: TUL resources*

Having faucets with water flow restrictors or aerators installed and operational represents another improvement serving to limit water consumption. Over 60% of all faucets installed at Lodz University of Technology buildings are now low-flow faucets and the efforts to replace the remaining ones continue.

## 7. SUSTAINABLE LOW-EMISSION TRANSPORT

Lodz University of Technology is committed to contributing to carbon footprint reduction by fostering sustainable and low-carbon transport. Four charging stations for simultaneous charging of bikes, scooters, and electric cars are available on Campus B. They enjoy considerable popularity among the academic community, as well as visitors using campus facilities, such as when they avail themselves of the Sports Bay.

The university also promotes sustainable transport by encouraging the use of public transport services. In 2023, a broad information campaign was conducted among TUL employees about the discounts offered by Łódzka Kolej Aglomeracyjna [Łódź Metropolitan Railway]. A survey questionnaire gauging interest in this option was responded to by over 150 employees, with a significant number of them ultimately taking up the offer. Using rail as a low-carbon means of commuting is a great way to reduce your carbon footprint and promote a sustainable lifestyle. Electric

rail is one of the greenest modes of transport, emitting significantly less CO<sup>2</sup> than individual users' internal combustion vehicles. At the same time, it helps to reduce the number of vehicles on the road, which, in turn, helps to relieve traffic congestion and improve traffic flow. Another advantage of sustainable transport is better travel times.

Bikes (22 units) are available for free use at all times, courtesy of the TUL Center for International Cooperation. By the same token, the university cares about the ease and convenience of bicycle riding by providing bike repair stations for student and staff use on both Campus A and B, three of them altogether. The university's dedication to increasing the share of bicycle commute to work and class is also demonstrated through the development of bicycle parking facilities. Across the university campuses, there are 488 parking spaces (for bicycles and scooters): 221 on Campus A, 180 on Campus B, and 87 in the halls of residence area. The number grew by 20 compared to 2022.



*Design project of the Smart Parking 4 Bikes. Source: TUL resources*

The design project of SMART PARKING 4 BIKES was done in 2023. Smart Parking 4 Bikes is intended as a lockable and sheltered storage facility for bicycles and scooters, powered by solar panels. The funding for the design project was provided by the Łódzki Klaster Fala Energii. Lodz University of Technology is a member of the cluster.

When reporting on sustainable and low-emission transport, also worth mentioning is the activity of the Lodz Solar Team research group. The group is comprised of enthusiastic students whose aim is to build and continually improve solar vehicles. Through its activities, the research group promotes and advances eco-mobility not only within TUL, but also nationally and internationally by participating in competitions. What is worth of further appreciation with respect to student research groups is their effective interdisciplinary cooperation with other students and mentors because interdisciplinarity is crucial to solving problems associated with sustainable development goals.

Lodz Solar Team and Iron Warriors (another student research group) were granted funding for the projects they carried out in 2023: design of an engine control map for the ECU of the new engine to power the Eco Arrow 3.1 bolide; design of wheel discs for the solar vehicle, whose special attribute is that they are lighter but retain their strength

properties. During the prototyping of the new Eagle Three, augmented reality was used to visualize the design at 1:1 scale, allowing the designers to test the changes proposed, without the need to physically build the component.

The university's commitment to sustainable and low-emission transport is also evidenced by its outreach activities, e.g., the #Ekologicznie z PŁ [#ECOLOGically with TUL] series of videos on green transport, which included episodes addressing eco-driving.



*Eagle Two - solar vehicle built by Lodz Solar Team.  
Source: TUL resources*



*#ECOLOGically with TUL – episode on green transport  
Source: TUL resources*

## 8. WASTE SEGREGATION AND RECYCLING

Lodz University of Technology is a member of the MoReLogg project consortium which also includes Gdansk University of Technology (the lead institution), AGH University of Science and Technology, and PC Ecology. The goal is to develop, construct, and implement a modular, integrated system for monitoring anthropogenic pollution in broadly defined water management. The fundamental work includes the design of new sensors for the qualitative and quantitative analysis of pesticides, biosensors for the analysis of E. coli and cyanobacteria, and for the analysis of neurotoxins produced by cyanobacteria. Furthermore, a sensor for the analysis of petrochemicals and polycyclic aromatic hydrocarbons is also to be designed. Another waste recycling project and part of the ongoing research on textile industry wastewater treatment is called 'Industrial-scale system for recycling textile wastewater with the electro-oxy-Fenton method'.

The university pays careful attention to effective waste management, segregating waste by fractions and monitoring the volume of waste disposal. Just how important the issue of proper waste management is further reinforced by programs carried out in collaboration with social partners, e.g., Polska Stolica Recyklingu [Polish Capital City of Recycling] carried out in 2023 in partnership with the Fundacja Odzyskaj Środowisko [Reclaim the Environment Foundation]. The goal is to raise environmental awareness and disseminate knowledge about the need for proper segregation of waste electrical and electronic equipment, batteries and rechargeable batteries. Points are earned

for each unwanted but still usable item collected through In Post EKOzwroty [In Post EcoReturns] service. The following categories of items are collected: electronics, clothing and textiles, footwear, books, children's items and toys.



Project Polish Capital City of Recycling 2023  
Source: <https://www.polskastolicarecyklingu.pl>



Project Polish Capital City of Recycling. Source: TUL resources

## 9. GREEN CAMPUS AND CAMPUS NEIGHBORHOOD

For many years, Lodz University of Technology has taken great care in maintaining the green area of its campus which includes a historic park and flower meadows that are a favorite with staff and students alike. They are carefully tended by landscaping services. Further areas are undergoing a process of restoration: to the 2022 total of 1450 m<sup>2</sup> another 66 m<sup>2</sup> were added in 2023.

In 2023, the university embarked on the revitalization of the Klepacz Park. It commissioned design documentation for the replacement of the asphalt surface on the pathways with a permeable mineral surface, pathway layout adjustments, increasing the area of greenery, and planting new trees to compensate for those that had died.







*Green Campus - Garden in Skorupki Street. Source: TUL resources*

The winning proposals dropped into the 2023 Idea Box, the university's participatory budget scheme, similarly to the ones in the previous editions, showed TUL academic community's concern for the environment. 25 out of the 73 submitted ideas related to ecology. The following are a few examples of the projects funded from the 2023 Idea Box budget: Sadzimy drzewa na PŁ [Planting trees at TUL], Deszcz dla roślin zamiast w kanał [Rainwater for plants instead of the sewer], Ławki solarne do ładowania urządzeń mobilnych [Solar benches for recharging mobile devices], and Dobrostan zwierząt na kampusie PŁ [For the wellbeing of on-campus animals]. As a result, the number of installations that serve to protect biodiversity has steadily been growing, e.g. nesting boxes for birds, hedgehog homes.

The action Planting trees at TUL, held on the International Zero Emissions Day, had the academic community of Lodz University of Technology planting trees and shrubs on Campus A . Three hundred further tree and shrub saplings were donated by the Landscape Parks of Łódzkie Voivodeship for private use by TUL employees and students and distributed that day.



*Project Planting trees at TUL. Source: TUL resources*

## 10. OUTREACH AND AWARENESS-RAISING ACTIVITY

The Sustainable Development Panel initiated the development of webpages, part of the TUL website, where news, plans, and reports on sustainable development are posted. The reports on SDGs that had been drawn up helped improve Lodz University of Technology ratings in a number of international rankings, e.g., THE Times Higher Education ranking.

In 2023, the Panel administered the second annual survey *Politechnika Łódzka w drodze do zrównoważonego rozwoju* [Lodz University of Technology on the Path to Sustainable Development] among TUL staff and students. The principal purpose of the survey is to assess the level of engagement of the academic community towards the goals of sustainable development, to identify changes in the perception of these issues over the years, and to set a direction for further action in this regard. The questionnaire included questions that addressed sustainability and allowed the Panel to gauge knowledge, awareness, priority attributed to individual SDGs, perception of personal agency among the staff and students and their assessment of the university activity in this area to date. The questionnaire also included open-ended questions to elicit ideas for new actions and initiatives which could be taken by Lodz University of Technology.

**Politechnika Łódzka w drodze do zrównoważonego rozwoju**

Scanowni Państwo, Drodzy Pracownicy Politechniki Łódzkiej,

prosimy o wypełnienie krótkiej anonimowej ankiety. Która pozwoli nam ocenić stopień zaangażowania społeczności akademickiej w realizację celów zrównoważonego rozwoju, określić zmiany w postrzeganiu tych zagadnień w ciągu ostatnich dwóch lat oraz wytyczyć kierunki dalszych działań. Państwa opinie są dla nas niezwykle istotne. Wypełnienie kwestionariusza zajmie Państwu ok. 15 minut. Dziękujemy za czas poświęcony na udział w badaniu.

\* Wymagane

**1**

Które z poniższych stwierdzeń opisuje Pana/Pani wiedzę o wymienionych niżej pojęciach?

	Wiem o tym bardzo dużo, zajmuję się tą tematyką	Wiem o tym dużo, interesuję się tym	Mniej wiem
Gospodarka o obiegu zamkniętym (circular economy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agenda 2030	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Zrównoważony rozwój (sustainable development)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cele zrównoważonego rozwoju (Sustainable Development Goals -SDGs)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stadtregiovy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**2**

W jaki sposób dowiedział/a się Pan/Pani się o celach zrównoważonego rozwoju/Agendzie 2030/gospodarce o obiegu zamkniętym? Proszę wskazać, co było źródłem wiedzy na ten temat. (możliwość wielokrotnego wyboru)

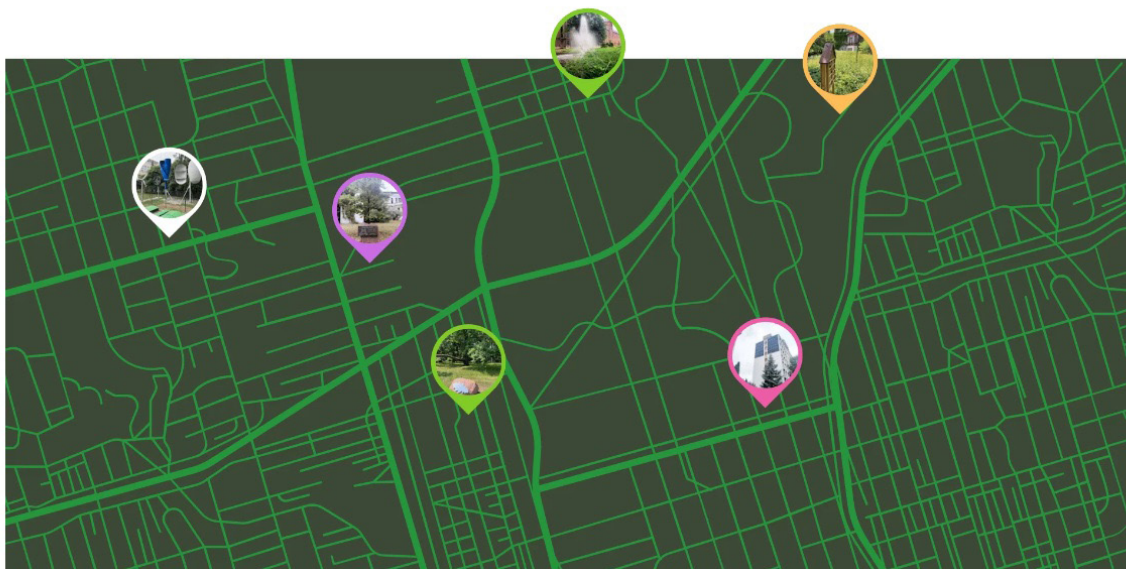
*Survey questionnaire Lodz University of Technology on the Path to Sustainable Development. Source: TUL resources*

The student community is engaged in many ways. For example, for a number of years now, Lodz University of Technology and Veolia Energia Łódź have jointly organized a competition for the best energy-related master degree dissertation. Eligible for entry are dissertations on new technologies, renewable energy, and energy transition. Another competition was organized by Klaster LODZistics, for students pursuing a degree in logistics, named Artificial Intelligence/IT: an opportunity or a threat to the future of green logistics and sustainable development? Lodz University of Technology is the cluster's coordinator. One of the prizes was the opportunity to participate in the Greener Tomorrow Through Sustainable Logistics training course.

The Ekolog[ja] – rozwijanie postaw proekologicznych [Ecolog[y]ist – fostering pro-environmental attitudes], conducted by the Foundation of Lodz University of Technology from July to December 2023, was intended to encourage students to take pro-environmental actions, raise environmental awareness and direct students to activities that impact on green transformation in the economy. A number of educational and awareness-raising materials and events were produced in the project, e.g., articles, films featuring experts, panel discussions, workshops for leaders of green transformation, and a street game to promote outdoor activity. A range of materials were shared through the project's website and the TUL Foundation's social media, like the content covered during the discussion panels and videos featuring experts. Furthermore, directly related to Race to Zero themes, a workshop designed for student leaders of change was held, called Mój ECOfootprint [My ECOfootprint]. It provided the participants with the opportunity to develop practical skills related to calculating carbon footprint.

Gra miejska

## Poznaj zielony Kampus PŁ



*Street game Poznaj zielony kampus PŁ [Experience TUL's green campus]. Source: TUL Foundation resources*

In October 2023, an eco-nook was made available to students at the Faculty of Electrical, Electronic, Computer and Control Engineering. It was built thanks to the Life Mercury FREE project. Students can visit the eco-nook, a space separated from the hall with honeycomb- and leaf-shaped dividing walls, to find latest information on environmental actions. They can use touchscreen computers to browse a selection of websites on environmental issues including the removal of mercury-containing items from households.



*Eco-nook at the Faculty of Electrical, Electronic, Computer and Control Engineering. Source: TUL resources*

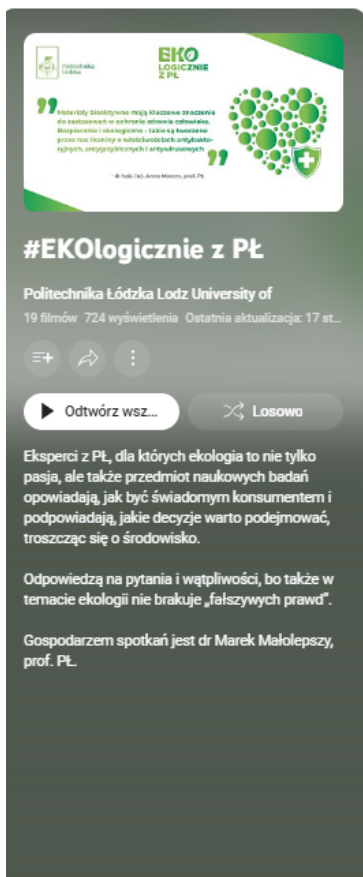
It is also extremely important, from the TUL's perspective, to engage its research staff in topics concerning carbon footprint reduction. Thus, many actions to this end are ongoing at the university, most of them in different partnership arrangements.

An example is the NEBA Alliance project, conducted in a consortium of 14 partners from Austria, Belgium, Estonia, Finland, Germany, Italy, the Netherlands, Slovenia, Spain, Sweden, and Poland represented by Lodz University of Technology. NEBA Alliance seeks to address skill gaps in the sustainable construction and circular economy sectors by accelerating up-skilling and re-skilling in the ecosystem of the construction industry.

The educate4green project posits that a green future requires green-minded people who think and act green. Its goal is to accelerate the advancement of green knowledge and skills among students, teachers, and professionals. The project envisions the design, deployment, and scaling up of a novel model of education grounded in a transnational, transdisciplinary, and forward-thinking approach to business and engineering with a view to creating green jobs and businesses, and sustainable development. The project aims to empower young people to play an important role in the green reconstruction to be brought to their regions.

Part of the TUL environmental awareness outreach efforts, its staff also share their knowledge through online communication channels. In 2023, 24 pieces of popular science material were released.

In 2023, the series #EKologicznie z TUL (available on Facebook TUL and YouTube TUL), where experts share their knowledge on topics related to ecology, continued with new eight episodes produced: Jak ekotkaniny chronią przed wirusem? [How eco-fabrics protect you against viruses?], Jak się nosić ekologicznie [How to dress sustainably?], Jak zmniejszyć ślad węglowy lotniczych podróży? [How to reduce the carbon footprint of air travel?], Zielony kampus – czyli jaki? [What are you talking about when you're talking about green campus?], Jak smakuje opakowanie? [Is the packaging tasty?], Zrównoważony rozwój PŁ [Sustainable development of TUL], Ekologiczne kosmetyki [Green cosmetics], and Ekologiczny transport [Green transport]..



**#EKologicznie z PŁ**

Politechnika Łódzka Lodz University of Technology









19 filmów 724 wyświetlenia Ostatnia aktualizacja: 17 st...

Odtwórz wsz... Losowo

Eksperti z PŁ, dla których ekologia to nie tylko pasja, ale także przedmiot naukowych badań opowiadają, jak być świadomym konsumentem i podpowiadają, jakie decyzje warto podejmować, troszcząc się o środowisko.

Odpowiedzą na pytania i wątpliwości, bo także w temacie ekologii nie brakuje „falszywych prawd”.

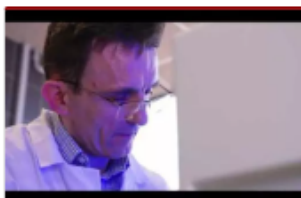
Gospodarzem spotkań jest dr Marek Malolepszy, prof. PŁ.

- 1  **Ekologicznie z PŁ. Jak ekotkaniny chronią przed wirusami? Sezon 3, odc. 5**  
Politechnika Łódzka Lodz University of Technology • 139 wyświetleń • 3 miesiące temu
- 2  **Ekologicznie z PŁ. Jak się nosić ekologicznie? Sezon 3, odc. 4**  
Politechnika Łódzka Lodz University of Technology • 108 wyświetleń • 3 miesiące temu
- 3  **Ekologicznie z PŁ. Jak zmniejszyć ślad węglowy lotniczych podróży? Sezon 3, odc. 3**  
Politechnika Łódzka Lodz University of Technology • 217 wyświetleń • 4 miesiące temu
- 4  **Ekologicznie z PŁ. Zielony kampus – czyli jaki? Sezon 3, odc. 2**  
Politechnika Łódzka Lodz University of Technology • 103 wyświetlenia • 4 miesiące temu
- 5  **Ekologicznie z PŁ. Jak smakuje opakowanie? Sezon 3, odc. 1**  
Politechnika Łódzka Lodz University of Technology • 118 wyświetleń • 4 miesiące temu
- 6  **Ekologicznie z PŁ. Zielone miasta**  
Politechnika Łódzka Lodz University of Technology • 173 wyświetlenia • 10 miesięcy temu
- 7  **Ekologicznie z PŁ. Zrównoważony rozwój na PŁ**  
Politechnika Łódzka Lodz University of Technology • 196 wyświetleń • 11 miesięcy temu
- 8  **Ekologicznie z PŁ. Ekologiczny transport**  
Politechnika Łódzka Lodz University of Technology • 249 wyświetleń • 1 rok temu

List of episodes in the #ECologically with TUL series. Source: TUL resources

Popularization of science at Lodz University of Technology is also effected with the series Nauka movi(e) [Science talk[ie]s]. In 2023, 4 new episodes were produced: Co zostaje z bioplastików? [What happens to bioplastics?], Ekologiczny fantom [Ecological manikin], Energia słoneczna z warzyw i owoców [Solar energy from fruits and veggies], and Ekologiczny transport [Green transport].

## Nauka movi(e)



### Nauka movi(e) o bioplastiku

Naukowcy z Politechniki Łódzkiej są częścią interdyscyplinarnego zespołu badającego bioplastik. Czym charakteryzuje się to tworzywo i jaki wpływ ma na środowisko? Odpowiedź m. in. na te pytania będzie efektem projektu BIO-PLASTICS EUROPE, finansowanego z programu Horyzont 2020.



### Nauka movi(e) - fantom do nauki resuscytacji

ECO CPR – Ekologiczny fantom do nauczania podstawowych zabiegów resuscytacyjnych to wynalazek naukowców Politechniki Łódzkiej, Uniwersytetu Medycznego w Łodzi oraz Akademii Sztuk Pięknych w Łodzi. Fantom ma funkcję edukacyjną i będzie wykorzystywany w praktycznej nauce udzielania pierwszej pomocy.

**NAUKA MOVIE**

|| ▶

dr hab. inż. Aneta Poniżewska-Marañda, prof. PŁ

### Nauka movi(e) o tropieniu produktów podwójnej jakości

Czy ten sam proszek kupiony w Polsce i w Niemczech spierze tyle samo plam? W odpowiedzi na to pytanie pomogą naukowcy realizujący projekt Sztuczna Inteligencja i Blockchain dla systemu kontroli jakości i bezpieczeństwa produktów (SALUS). Pracami kieruje dr hab. inż. Aneta Poniżewska-Marañda, prof. PŁ

*Selected episodes in the Science Talkjies series. Source: TUL resources*

An interesting tube for the popularization of science is the series Łap naukę [Grab yourself a piece of science] because it features members of TUL student research groups (SRG). A great deal of the series video material deals with issues related to ecology, e.g., air pollution research (SRG Wentylator), electromobility (Lodz Solar Team SRG), RES - wind turbines (GUST SRG). The videos show that research conducted at the university changes the world in a real and practical way and that students contribute a great deal to this. In 2023, 12 videos related to environmental topics were produced for the series.

**Łap naukę. Łódzka Akademia Przyszłości**

Politechnika Łódzka Lodz University of Technology  
20 videos 305 views Last updated on Oct 24, 2023

20 ciekawych tematów, 20 kreatywnych kół naukowych, 20 inspirujących naukowców w 20 filmach. Tak w skrócie można opisać cykl popularnonaukowych filmów „Łap naukę”, w których udowadniamy, że badania prowadzone w Politechnice Łódzkiej realnie zmieniają świat.

Bohaterami cyklu są koła naukowe: Włókno, Experience, Main, SKaNeR - Raptors, SKaNeR-RFH, Kollaps, Ferment, GUST, Iron Warriors, Łodz Solar Team, Ryza, Nano, Polimer, EcoResearch, BioMedSpec, Wentylator, KINO, Koło Matematyków i IbiComp oraz Sukces.

- 1 **Łap naukę: Wentylator**  
Politechnika Łódzka Lodz University of Technology • 229 views • 4 months ago
- 2 **Łap naukę: ECORESEARCH**  
Politechnika Łódzka Lodz University of Technology • 97 views • 5 months ago
- 3 **Łap naukę: IRON WARRIORS**  
Politechnika Łódzka Lodz University of Technology • 168 views • 5 months ago
- 4 **Łap naukę: Łodz Solar Team**  
Politechnika Łódzka Lodz University of Technology • 360 views • 5 months ago
- 5 **Łap naukę: R4H**  
Politechnika Łódzka Lodz University of Technology • 151 views • 5 months ago
- 6 **Łap naukę: KOLLAPS**  
Politechnika Łódzka Lodz University of Technology • 126 views • 6 months ago
- 7 **Łap naukę: MAIN**  
Politechnika Łódzka Lodz University of Technology • 113 views • 6 months ago

*Selected episodes in the Grab yourself a piece of science series, Source: TUL resources*

Efforts are also being continued with regard to electronic document management. Document workflow is now performed within the EZD system, which not only reduces operational costs (e.g., notably lower printing paper costs), but is also a major improvement in the university functioning.

TUL also intends to promote good practice among the on-campus catering outlets' operators by encouraging them to use biodegradable containers for takeaway food service.



## CONCLUSION

Race to Zero is a complex initiative and one that requires all sectors of the economy and the entire society to participate in the effort against climate change. Lodz University of Technology, as a socially aware and responsible university, has actively joined in.

Its Race to Zero Action Plan is all-embracing: it includes not only academic activity, but also active engagement of the academic community and collaboration with external partners. Lodz University of Technology is actively seeking opportunities to join international projects and networks to share knowledge and experience on climate action. Such partnerships allow it to undertake more ambitious projects and accelerate its efforts towards climate neutrality.

The variety and complementarity of the actions taken give reason to be optimistic that the goals pursued are indeed achievable. Rising energy prices and high inflation experienced in recent years have pushed the cost of university operations dramatically up, which necessitates ever careful analysis of energy costs and energy efficiency. Lodz University of Technology continues to introduce measures to reduce energy consumption, limit greenhouse gas emissions, improve energy efficiency, and as a consequence, reduce its carbon footprint.

*Building A17. Source: TUL resources*





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REPORT ON ACTIONS COMPLETED IN 2023  
AT LODZ UNIVERSITY OF TECHNOLOGY  
WITHIN THE FRAMEWORK OF  
**THE RACE TO ZERO CAMPAIGN**